

Teachers' guide – summary sheet

1. IDENTIFICATION DETAILS

Title:	Degree in Biotechnology (Plan 2009)		
Faculty/School:	Bio-sanitary Sciences		
Course subject:	Industrial Microbiology I		
Type:	Obligatory	Credits ECTS:	3
Year / Semester:	Year Three – 6th semester	Code:	2049
Subject:	Applied biotechnology		
Module:	Biotechnological processes and products		
Language:	Spanish		
Total number of hours undertaken by pupil:	75		

2. DESCRIPTION OF THE COURSE

Industrial Microbiology is a discipline whose aim is to obtain microbial products useful to society; it is therefore a branch of applied science. Industrial Microbiology I: the course begins with a historical overview of what has been the use and domestication of microorganisms by man, and then passed to fully consider those groups of organisms most interesting from the standpoint of industrial and biotechnology. Review the potential of these microorganisms and the techniques that exist today to improve and modify them. Will analyze how large-scale microbial fermentations are carried out and finally see in detail some classic fermentation provide us consumer products in today's society.

3. SKILLS TO DEVELOP

3.1. General skills

- To acquire the highest professional qualifications, with a solid theoretical, practical, technological and humanistic training necessary for the development of a global scientific thinking in professional activity.
- Promote the concern of knowledge as a key tool in the process of personal and professional growth of the student.
- Develop the ability to search, make assimilations, analysis, synthesis and mutual exchange of information.
- Know the basic principles and tenets of the experimental sciences and humanities.
- Develop habits of oral and written communication.
- Understand the principles and fundamental laws of physics, mathematics, chemistry and biology as

the basis of the mental structure of biotechnologists.

- Acquire the skills required for experimental work: design, conduct critical appraisal, collection of results and drawing conclusions, understanding the limitations of the experimental approach.
- Understand the applications of biotechnology in the fields of health, food, biotech crop, environmental and chemical industries.
- Ability to work as a team and manage groups.
- Acquire the ability of analytical thinking, synthetic, reflective, critical, theoretical and practical thinking.
- Ability to problem solving and decision-making.
- Learn to plan time effectively.
- Assess the sciences as a cultural fact.
- Recognize the mutual influence between science, society and technological development to ensure a sustainable future.
- Develop the capacity and commitment of their own learning and personal development.

3.2. Specific skills

- Describe the great morphological, physiological and metabolic variability of microorganisms and their potential for the biotechnology industry.
- Identify the source of antimicrobial agents, the effect on the microorganisms and their importance in medicine today.
- Be able to describe, quantify, analyze and critically evaluate the results of experimental work in the laboratory.
- Develop habits of rigorous thought.
- Ability to communicate orally and in writing the knowledge acquired.
- Know how to apply theoretical knowledge to solving practical problems and cases relating to different subjects.
- Ability to work effectively in teams and coordinately.
- Be able to self-assess the knowledge acquired.

4. PRE-REQUISITES

To study the subject Industrial Microbiology I: we recommend having a good level of knowledge of the subjects Microbiology I, Microbiology II, Biochemical Engineering, Molecular Genetics and regulation of gene expression, Bioreactors and Biocatalysis.

5. WORK TIME DISTRIBUTION

CONTACT HOURS	REMOTE STUDY HOURS
35,5	35,5

6. OBJECTIVES

To acquire the knowledge needed to design and control of industrial processes based on the use of microorganisms.

7. INDEX OF SUBJECTS

SECTION I. INTRODUCTION.

Item 1. Introduction.

BLOCK II. MICROORGANISMS IN THE INDUSTRY

Item 2. Microorganisms and industry.

Item 3. Microorganisms of industrial interest.

Item 4. Microbial products of industrial interest.

Item 5. Improvement and development of strains: classical and molecular biotechnology.

Item 6. Industrial fermentations.

Item 7. Industrial processes and products.

SECTION III. PRACTICES

Practice 1. Determination of the parameters of thermal death of an organism.

Practice 2. Determination of kinetic parameters of growth of a microorganism for the production of microbial biomass.

8. METHODOLOGY/LEARNING ACTIVITIES

- Lectures
- Practical classes
- Teamwork
- Visits to industries
- Individual and group tutorials
- Virtual Classroom

9. EVALUATION SYSTEM

The evaluation of learning the content of this course will take into account the work done by the student throughout the semester in the different activities that will be used for development: of attendance and participation in lectures, case studies, implementation and presentation of team work, attendance at industry visits scheduled, attendance and preparation for tutorials and the mark obtained in the theory exam.

10. BIBLIOGRAPHY

- Alexander N. Glazer and Hiroshi Nikaido. 2007. *Microbial Biotechnology: Fundamentals of Applied Microbiology*. 2nd Ed. Cambridge University Press.
- Lee Yuan Kun. 2006. *Microbial Biotechnology: Principles and Applications*. 2 Rev Ed. World Scientific Publishing Company.
- Waites, M. J. et al. 2001. *Industrial Microbiology. An Introduction*. Blackwell Science.

11. ADDITIONAL INFORMATION

- Scientific journals of a general nature:
- Cell (<http://www.cell.com>)
 - Nature (<http://nature.com>).
 - Science (<http://sciam.com>).
 - Scientific American (Sci. American. New York).
 - Investigación y Ciencia (<http://www.investigacionyciencia.es>).

- Scientific journals focused on Industrial Microbiology and Biotechnology:
- Applied and Environmental Microbiology (American Society of Microbiology. Washington).
 - Applied Microbiology and Biotechnology (Springer-Verlag. New York).
 - Archives of Microbiology (Springer-Verlag. New York).
 - Archives of Virology (Springer-Verlag. Vienna).
 - Biotechnology (Nature Publishing Corporation. New York).
 - Microbiology and Infectious Diseases (Pergamon Press. Oxford).
 - Ecology (Ecological Society of America. Austin).
 - Enfermedades Infecciosas y Microbiología Clínica (Ediciones Doyma. Barcelona).
 - European Journal of Applied Microbiology and Biotechnology (Springer-Verlag. New York)
 - European Journal of Clinical Microbiology and Infectious Diseases (Vieweg. Wiesbaden).
 - European Journal of Immunology (VCH Publishers. Deerfield Beach).
 - FEMS Microbiology Letters (Elsevier Science Publishers. Amsterdam).
 - Food Microbiology (Academic Press. London).
 - Journal of Antimicrobial Chemotherapy (W. B. Saunders. London).
 - Journal of Applied Bacteriology (Blackwell Scientific Publications. Oxford).
 - Journal of Bacteriology (American Society of Microbiology. Washington).
 - Journal of Clinical Microbiology (ASM. Washington).
 - Journal of General Virology (Society for General Microbiology. London).
 - Journal of Industrial Microbiology (Elsevier Science Publishers. Amsterdam).

- Journal of Molecular Biology (Academic Press. London).
- Journal of Virology (American Society of Microbiology. Washington).
- Letters in Applied Microbiology (Blackwell Scientific Publications. Oxford).
- Microbial Ecology (Springer-Verlag. New York).
- Microbiología (Sociedad Española de Microbiología. Madrid).
- Molecular Microbiology (Blackwell Scientific Publications. Oxford).
- Revista Española de Microbiología Clínica (Sanidad y Ediciones. Madrid).
- Systematic and Applied Microbiology (Gustav Fischer Verlag. Stuttgart).
- Trends in Microbiology (Elsevier Science Publishers. Amsterdam).
- Virology (Academic Press. San Diego).
- Yeast (John Wiley & Sons. Sussex).

