Industrial Microbiology; Code: PHM704

A-Basic Information

Programme(s) on which the course is given:	Master's degree of pharmaceutical sciences (Microbiology and Immunology)
Department responsible for offering the course:	Department of Microbiology and Immunology
Department responsible for teaching the course:	Department of Microbiology and Immunology
Academic year:	Pre-master courses-2023/2024-first semester
Course title and code:	Industrial Microbiology, PHM704
Contact hours (credit hours):	Lecture: 3 (3)
Course Coordinator:	Dr. Amr Shaker

B- Professional Information

The course aim and intended learning outcomes are based on that mentioned in the programme specifications, with more course-related specific details.

1 - Overall Aims of Course

Upon successful completion of this course, the students should know and understand Industrial Microbiology. The student should be familiar with the different technologies used in biotechnology. The students should also understand the evolution of fermentation technology and the different types of tissue culture. They should also have a detailed background on Genetic engineering.

2 - Intended Learning Outcomes of Course (ILOs)

a- Knowledge and Understanding:

By the end of the course the student should be able to:

a1. Explain the basic theories and principles of industrial microbiology, enumerate and describe all types of fermentors.

a2. Define and understand genetic engineering and its different applications

a3. Understand the principle of gene therapy and Illustrate fermentation technology and tissue culture.

a4. Understand the basic concepts of quality in biotechnological industry

B. intellectual skills

The students should be able to:

b1. Estimate and differentiate between the different techniques used for in industrial microbiology.

b2. Integrate the methods used for the production of various biotechnological products and able to solve problems in industrial microbiology.

b3. Interpret the relevant parameters including physiological and genetics factors which affect the production process of various biotechnological products..

C. General and Transferable Skills

The students should be able to:

c1. work and learn independently

c2. able to retrieve data from different sources and presented it in Lab discussion

c3. design an assignment based on the selected topics.

3. Course Contents

Topics	No. of hours	No. of Lectures
Overview and introduction on industrial microbiology and different types of biotechnological processes.	6	2
Different methods of fermentations; submerged and solid-state fermentations: examples of antibiotics, bio-surfactants, bio-polymers, production of insulin, growth hormone and monoclonal antibodies, others.	6	2
Applications of Industrial microbiology.	6	2
Molecular biology, gene expression and regulation, cloning, PCR, sequencing techniques, hybridization., mutagenesis and methods of genetic transfer.	6	2
Principles of gene therapy and treatment of various diseases, biotechnological applications in medicine.	6	2
Protein-engineering, metagenomics, metabolic engineering, Genetic engineering focusing on creation of genetically modified microorganisms.	6	2
Tissue culture, its applications in production of recombinant proteins and cytotoxicity assay methods.	3	1
Bio-catalysis in industry and its medical applications, bioconversion, bioleaching, and production of various important products (antibiotics, organic acids, bioinsecticides…etc).	3	1
Manufacture of RNA COVID-19 vaccine.	3	1
Total	45	15

4. Teaching and Learning Methods

1- Lectures
2- Discussion sessions
3- Assignments

5- Student Assessment Methods

- **Activities** (assignments)
- **Final written exam** to assess the ability of student to remember and retrieve information as well as understanding of the scientific background.
- **Oral Exam** to assess skills of analysis, scientific thinking as well as scientific discussion

Assessment Schedule

Assessment 1	Activities	Week 10
Assessment 2	Final written exam	Week 16
Assessment 3	Oral exam	Week 16

Weighting of Assessments

Activities	10%
Final-written exam	80%
Oral exam	10%
Total	**100%**

6- List of References

A. Recommended textbooks

- Practical Streptomyces genetics, 2008
- Industrial Microbiology, 12t^{h} edition, 2015

B. Websites

- www.ncbi.nlm.nih.gov
- www.sciencedirect.com
- www.springerlink.com

7- Facilities Required for Teaching and Learning

- Study halls
- Overhead projector
- Data show
- Internet

Course Coordinator: **Dr. Amr Shaker**

Amr Shaker

Acting Head of Department: **Assoc. Prof. Dr. Sarra Ebrahim Saleh**

Sarra Saleh

Course name	Industrial Microbiology
Code	PHM704

Course matrix

Contents	ILOs									
	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3
Overview and introduction on industrial microbiology		■	■	■			■		■	■
Different methods of fermentations; submerged and solid-state fermentations: examples of antibiotics, bio-surfactants, bio-polymers, production of insulin, growth hormone and monoclonal antibodies, others.		■	■	■			■		■	■
Applications of Industrial microbiology.	■		■	■	■		■	■		■
Molecular biology, gene expression and regulation, cloning, PCR, sequencing techniques, hybridization., mutagenesis and methods of genetic transfer.	■		■	■	■		■	■		■
Principles of gene therapy and treatment of various diseases, biotechnological applications in medicine.	■		■	■	■		■	■		■
Protein-engineering, metagenomics, metabolic engineering, Genetic engineering focusing on creation of genetically modified microorganisms.	■			■		■		■	■	
Tissue culture, its applications in production of recombinant proteins and cytotoxicity assay methods.	■			■		■		■	■	
Bio-catalysis in industry and its medical applications, bioconversion, bioleaching, and production of various important products (antibiotics, organic acids, bioinsecticides…etc).	■			■		■		■	■	
Manufacture of RNA COVID-19 vaccine.	■			■		■		■	■	

تم الاعتماد فى محضر مجلس قسم الميكروبيولوجيا والمناعة
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