Department of Biology

College of Science

University of Salahaddin

Subject: Industrial Microbiology

Course Book: Fourth Class

Academic year: 2023-2024

Course Book

Course Title		Industrial microbiology
Code	Theory Hr./week	Practical Hr./week
SBIO	2	2

Course type	**Compulsory**
Department/College	**Biology/Science**
Course language	**English**

Course lecturer(s)	**Dr. Abdulilah Saleh Ismaeil** **Nishtiman S. Hasan**
Contact	abdulilah.ismaeil**@su.edu.krd** **Tel: (+9647504733977)** **Nishtiman.hasan@su.edu.krd** **Tel: (+9647507975805)**
Teacher's academic Profile	**Abdulilah Saleh Ismaeil** I graduated in 1998 from Salahaddin University - college of science, biology department, ranked third among biology department. I got master science (Food microbiology) in 2005 at college of science-salahaddin university.I got PhD in Food Microbiology at college of science-salahaddin university in 2020. **Nishtiman S. Hasan** I graduated from Salahaddin University Biology department in 2012, worked as assistant biology for four years and assist in many labs. In 2019 I finished my MSc degree and started as Assistant Lecturer Teaching in 2021. I have become member in Biological syndicate in 2013.
Course Objectives	• The course introduces the basic concepts of industrial microbiology. • The course deals with the possible utilization of microorganisms in industrial processes, or in processes in which their activities may become of industrial or technical and economic value significance. Of major economic,

	environmental and social importance, industrial microbiology involves the utilization of microorganisms in the production of a wide range of products, including enzymes, foods, beverages, chemical feedstock, fuels and pharmaceuticals, and clean technologies employed for waste treatment and pollution control. Industrial microbiology also encompasses activities like production of bio control agents, inoculants used as bio fertilizers, etc. • The microbial product may be microbial cells (living or dead), microbial biomass, and components of microbial cells, intracellular or extracellular enzymes or chemicals produced by the microbes utilizing the medium constituents or the provided substrate. • The activities in industrial microbiology begin with the isolation of microorganisms from nature, their screening for product formation. • Improvement of product yields, maintenance of cultures, mass culture using bioreactors, and usually ends with the recovery of products and their purification.

Intended Learning Outcomes	**Upon completion of this course students learn:** ➢ To promote understanding of basic and advanced concepts in Industrial microbiology. ➢ To expose the students to various emerging areas of Industrial Microbiology. ➢ How to obtain, maintain and handle industrial microorganisms. ➢ How micro-organisms can be used in food production. * understand the microbial principles relating to the production of some fermented foods. Be able for choosing microorganisms for Industrial Microbiology and Biotechnology .The first task for an industrial microbiologist is to find a suitable microorganism for use in the desired process. ➢ Understand a wide variety of alternative approaches, ranging from isolating microorganisms from the environment to using sophisticated molecular techniques to modify an existing microorganism. ➢ Understand the role of beneficial microorganisms in food processing, preservation and safety, and the possible health benefits resulting from the consumption of these microorganisms.

Forms of teaching	The lectures will given to the student before lecture time, during the lecture time the subjects will be explained using data show and Wight board together.
Examinations and Grading	-Theoretical exam = 65% practical exam = 35% -Theoretical exam = 15% for the semester exam and 50% for the final Practical exam35%. for the semester exam Examinations: 20% Assignments: 15%
Course Reading List and References:	1. Stanbury, P. F. , Whittaker, A. and Hall , S.J. 2003. Principles of Fermentation technology. 2 nd edition. Butterworth –Heinemann Publication. 2. Okafor, N. 2007. Modern Industrial microbiology and technology. Science publishers. 3. Waites, M. J. , Morgan, N.L., Rockey, J.S. and Higton, G. 2001.Industrial microbiology (an Introduction). Blackwell Publication

Weekly Subjects

First week

An introduction of biotechnology and industrial microorganisms with Industrial importance (bacteria, mould & yeast). The areas of industrial Microbiology.

Second week

General basis of isolation , selection and preservation of strains of Industrial microorganisms.

Third week

Fermentation , fermentation products and methods of extraction of Fermentation products.

Fourth week

Fermenter. Batch and continuous fermentation.

Fifth week

Culture media of fermentation and sterilization of culture media. Additives to culture media.

Sixth week

Starter. Factors effecting starter efficiency and productivity.

Seventh week

Improvement of strains for industrial purposes and bioengineering of Microorganisms for industrial purposes.

Eighth week

Bio reaction regulation. Regulation of enzyme activity.

Ninth week

Alcoholic fermentation and glycerol production.

Tenth week

Acetic acid fermentation. Lactic acid fermentation and diary products.

Eleventh week

Antibiotic production. Vitamins production**.**

Twelfth week

Amino acids production. Organic acid production.

Thirteenth week

Single cell protein& Baker's yeast.

Fourteenth week

Enzyme production.

PRACTICALWEEKLY SUBJECTS

Weeks	Subjects
1	Course Book
2	An introduction of industrial microbiology .In this lab. 1-Description the microorganisms which have positive relationship with foods. 2-Describe the production of insulin by using microorganisms.
3	Growth rate and preparation of solutions
4	Alcoholic Fermentation
5	Acetic Acid production.
6	Yogurt fermentation
7	Enzyme production.
8	Pickles fermentation
9	Antibiotic production.
10	Single cell protein
11	Amino acid production
12	Sauerkraut fermentation
13	Visiting to food industry factory.
14	Exam.