



Department of Biology

College of Science

University of Salahaddin

Subject: Industrial microbiology (Theory)

Course Book: Fourth Class

Academic year: 2022-2023

Course book

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

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

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| Course lecturer(s) | Dr. Abdulilah Saleh Ismaeil |
| Contact | abdulilah.ismaeil@su.edu.krd Tel: (+9647504733977) |
| Teacher's academic Profile | <p>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.</p> <p>I got PhD in Food Microbiology at college of science-salahaddin university in 2020.</p> |
| Course Objectives | <ul style="list-style-type: none"> • 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 |

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| | <p>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.</p> <ul style="list-style-type: none"> • 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. |
| <p>Intended Learning Outcomes</p> | <p>Upon completion of this course students learn:</p> <ul style="list-style-type: none"> ➤ 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 |

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| | <p>for Industrial Microbiology and Biotechnology .The first task for an industrial microbiologist is to find a suitable microorganism for use in the desired process.</p> <ul style="list-style-type: none"> ➤ 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. |
| <p>Forms of teaching</p> | <p>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.</p> |
| <p>Examinations and Grading</p> | <p>The students are required to do two theoretical examination (15%).</p> <p>Final examination 50%</p> |
| <p>Course Reading List and References:</p> | <p>1. Stanbury, P. F. , Whittaker, A. and Hall , S.J. 2003. Principles of Fermentation technology. 2 nd edition. Butterworth –Heinemann Publication.</p> <p>2. Okafor, N. 2007. Modern Industrial microbiology and technology. Science publishers.</p> |

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| | 3. Waites, M. J. , Morgan, N.L., Rockey, J.S. and Higton, G. 2001.Industrial microbiology (an Introduction). Blackwell Publication |
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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 dairy 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.