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**Department of** ---Environmental Sciences

**College of ……**Science……….

University of ………Salahaddin……….

**Subject:** Molecular Biology and Biotechnology (practical)....

**Course Book – (Year 4)**

**Lecturer's name: Sara Abdulkhaleq yaseen**

**Academic Yea**r: 2022/2023

**Course Book**

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| **1. Course name** | Molecular Biology and Biotechnology | |
| **2. Lecturer in charge** | **Sara Abdulkhaleq Yaseen** | |
| **3. Department/ College** | **Environmental Sciences/Science** | |
| **4. Contact** | **e-mail: sara.yaseen@su.edu.krd**  **Tel:07503152383** | |
| **5. Time (in hours) per week** | **Practical: 6 hrs** | |
| **6. Office hours** | **3 hours in a week** | |
| **7. Course code** |  | |
| **8. Teacher's academic profile** | I am **Sara Abdulkhaleq Yaseen**, MSc. in phycolimnology in environment I get it during 2019 at Environmental Department -Salahaddin University. In addition, I get, Bachelor during 2013 at the Environmental department. I participated in different training courses such as, Instruction course. I published 2 articles in Scientific Journals. I am working and Teaching in College of Science since 2013. | |
| **9. Keywords** |  | |
| **10. Course overview:**  The course will cover **Environmental Practical molecular biology Biotechnology*.*** Biotechnology is a field of applied [biology](http://en.wikipedia.org/wiki/Biology) that involves the use of living organisms or parts of organisms for practical uses and bioprocesses in [engineering](http://en.wikipedia.org/wiki/Engineering), [technology](http://en.wikipedia.org/wiki/Technology), [medicine](http://en.wikipedia.org/wiki/Medicine) and other fields requiring bioproducts. Modern use similar term includes [genetic engineering](http://en.wikipedia.org/wiki/Genetic_engineering) as well as [cell-](http://en.wikipedia.org/wiki/Cell_culture) and [tissue culture](http://en.wikipedia.org/wiki/Tissue_culture) technologies. Biotechnology, as ‘the appliance of bioscience’, is helping to diagnose and treat major human diseases, provide solutions for a cleaner environment and produce new industrial bioproducts and processes.  Over the last 20 years, biotechnological advances have revolutionized biology. It's now possible to manipulate the DNA present in an organism. Recent biotechnological advances have dramatically influenced agriculture, basic research, medicine, and the legal system. It is the integrated use of biochemistry, microbiology and engineering sciences in order to exploit microorganisms, cultured tissues/cells, to their best.  Through this semester discusses some of the methods and applications of biotechnology. We’ll look at the techniques biologists use in the lab to manipulate DNA and see how to alter the genetic material present in an organism. There are many practical uses for biotechnology, and we’ll touch on some of them. We’ll also discuss the practical and ethical questions raised by the ability to alter an organism’s genetic make-up. | | |
| **11. Course objective:**  At the end of this course students should be able to demonstrate a clear understanding of the facts and basic concepts of molecular biology and biotechnology which are covered in lecture and laboratory, including;  1. To enable candidates to acquire the knowledge and develop an understanding of how materials are provided by biological agents to provide goods and services.  2. To appreciate the role played by biotechnology in improving health care for human beings.  3. To understand the interdisciplinary nature of this subject.  4. To create awareness about the appreciation of biological processes to industries.  5. To develop the ability to appreciate biological phenomenon in nature and the contribution of biotechnology to human welfare.  6. To develop scientific attitude towards biological phenomenon.  As a student on this exciting course, you will be stimulated by the emphasis on laboratory work and research.  On a typical morning you might be analysing DNA on a gel and in the afternoon using a fermenter to produce commercial products. One day might involve learning about how microbes can clean up pollution, and on another day visiting a company that researches new anti-cancer drugs.  Our students gain a wide range of laboratory-based skills and techniques, which both provide the practical basis for their studies and provide a useful portfolio of employability skills.  These skills, plus associated research experience gained in the final year Honours project, have enabled our biotechnology graduates to establish an excellent reputation in medical, industrial and research laboratories. | | |
| **12. Student's obligation**  Students will be asked to prepare research papers on selective topics and summarize articles contents published in English language, those articles need to be from printed media or internet articles. There will be classroom discussions and the lecture will give enough background to translate, solve, analyze, and evaluate problems sets, and different issues discussed throughout the course. | | |
| **13. Forms of teaching**  Different forms of teaching will be used to reach the objectives of the course:  Power point presentations for the head titles and definitions and summary of conclusions, classification of materials and any other illustrations, besides worksheet will be designed to let the chance for practicing on several aspects of the course in the classroom. | | |
| **14. Assessment scheme**  The students are required to do one closed book exam at the mid of the semester besides other assignments including translations and one project paper. The exam has 10 marks (mean of two examination), the attendance, classroom activities; translations and project paper count 5 marks. So that the final grade will be based upon the following criteria:  Mean of two practical examinations: 10%  Daily quizzes: 3%  Classroom activity: 1%  Report and presentation: 1%  Final practical examination: 30%  Total practical Marks: 30/100 | | |
| **15. Student learning outcome:**   1. Students will demonstrate knowledge of the central dogma of biology and predict outcomes when the process malfunctions. 2. Students will demonstrate ability to use evolutionary theory and related equations to model and predict population change or stability. 3. Students will demonstrate ability to evaluate the impact of structure/part modification on a biological system and/or relationships between systems. 4. Students will demonstrate application of the formal practices of observation, experimentation, and hypothesis testing. | | |
| **16. Course Reading List and References‌:**  Required book:  ***Basic Laboratory Methods for Biotechnology* (2nd Edition) by Lisa A. Seidman & Cynthia J. Moore**  ISBN-13: 978-0-321-57014-7  Publisher: Pearson Benjamin-Cummings Publishing Company  Spiral bound 751pp  Pub. Date: January 2009  ***Introduction to Biotechnology* (2nd Edition), by William J Thieman &**  **Michael A. Palladino**  ISBN-13: 9780321491459  Publisher: Benjamin Cummings  Paperback, 408pp  Pub. Date: August 2008  ***Molecular Biology and Biotechnology: A Guide for Students*, (3rd**  **Edition) by Helen Kreuzer & Adrianne Massey**  Book ISBN or Item Number: 978-1-55581-472-4  Publisher: ASM Press  Paperback, 498 pages, two-color throughout with full-color insert,  Illustrations, glossary, index.  Publication Date: Oct 2007  ***Biotechnology: Science for the New Millennium*, by Ellen Daugherty**  ISBN-13: 978-0008195397  Publisher: EMC/Paradigm  Spiral bound  Pub. Date: 2007  And any other **Biotechnology and Molecular Biology books** published.  The core materials of the course consist of the above book, articles from media and internet, and laboratory lecture notes, make sure you read all the materials and prepare well before going for the examinations.  Students are encouraged to search for any other materials that may help improve their English language ability in reading, writing, listening and speaking biotechnology and molecular biology texts. | | |
| **17. The Topics:** | | **Lecturer's name** |
| **Week 1:**  Basic Concept About Practical molecular biology and biotechnology  **Week 2:**  DNA Extraction From Eukaryotic Cells  **Week 3:**  RNA Extraction Procedures  **Week 4:**  DNA and RNA Concentration and Quantification  Week 6:  Detection of DNA and RNA Components and associated with proteins  Week 7:  Bacterial Plasmid Extraction and Transformation  Week 8:  Bacterial Conjugation  Week 9:  Agarose and Polyacrylamide Gel Electrophoresis  Week 10:  Protein Extraction Procedures  Week 11:  First semester- 1st examination which was out of 10%  Week 12:  Standard (Conventional) Polymerase Chain Reaction (PCR)  Week 13:  Enzyme-Linked Immunosorbent Assay (**ELISA**)  Week 14:  Restriction Enzyme Analysis  Week 15:  Chromatography (**Separation of Grass Pigment**)  Week 16:  Microbial Metabolism in Wastewater Purification and Treatment System  Week 17:  Determining Oil Spill Degradation by Soil Bacteria  Week 18:  First semester- 2nd examination which was out of 10% | | Lecturer's name:  **Sara Abdulkhaleq yaseen** |
| **18. Practical Topics (If there is any)** | |  |
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| **19. Peer review**  .‌‌ | | |