

**Department of Animal Resources**

**College of Agriculture**

**University of Salahaddin–Erbil**

**Subject: (Animal Biotechnology) Theory**

**Course Book – 4 Year**

**Lecturer's name: Dr. Ahmed Ibrahim Ahmed (PhD Microbiology)**

**Academic Year: 2021/ 2022**

**Course Book**

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| **1. Course name1.** | **Animal Biotechnology** | |
| **2. Lecturer in charge2.** | **Dr. Ahmed Ibrahim Ahmed** | |
| **3. Department/ College3.** | **Animal Resource, Agricultural College** | |
| **4. Contact4.** | **e.mail: ahmed.ahmed1@su.edu.krd**  **Mobile tele: 07504047692** | |
| **5. Time (in hours) per week5.** | **Theory: 2 hrs** | |
| **6. Office hours6.** | **6 hrs** | |
| **7. Course code7.** |  | |
| **8. Teacher's academic 8. profile** | **I hold BVM-S(DVM) in Baghdad University 1990 and PG. Diploma in Poultry disease also I got MS.c in Microbiology in Hawler Medical University 2010 while My Ph.D. in Microbiology in Baghdad University 2017, I am Lecturer in Animal Resource Department/ Agriculture College/ Salahadin University** | |
| **9. Keywords** | **Immunological determinations and Molecular Diagnosis, Gene engineering, Embryo Transfer, Nutritional biotechnology, and Modern Vaccines** | |
| **10. Course overview**  **This lesson is designed to be an introductory lesson that will cover the recent Molecular methods which use the modern technology to improve animal production/health as well as cover the novel and rapid methods to characterize the responsible gene in animal products and biological agents which used in animal farms or added in animal food. Principle of Artificial insemination and embryo transfer (MOET, IVEP) in animals as well as gene engineering and cloning also the information on gene-modified food and it is consequences on animal products.**  **Biotechnology laboratory is a course practical part to familiarize the students with laboratory biosafety, technical procedures, and equipment and materials as well as Knowledge of determining the biological and chemical quantity needed and use biotechnology techniques ELISA, HPLC, Tissue Culture PCR gel electrophoresis used which available in the laboratory.** | | |
| **11. Course objective**  **- Students understand and be able to describe the concepts of application of biotechnology**  **- Students understand and are familiar with artificial insemination**  **- students be able to use a formula for molarity, Normality, prepare concentration and solutions required**  **- students to be able how to extract DNA, RNA, and proteins.**  **- Students learn how to be precise and precaution when performing a techniques**  **-Students understand and are able how to choose a proper technique/program and analysis the result**  **-Students understand how to obtain or record gene sequences in the gene bank** | | |
| **12. Student's obligation**  **The students should be obligated attendance and completion of all techniques available in the laboratory as well as quizzes, monthly/final examinations, assignments, reports and essays** | | |
| **13. Forms of teaching**  1- PowerPoint.  2- Whiteboard.  3- Pictures.  4- video  5. field visit | | |
| **14. Assessment scheme**   * **Examination:** * **1st exam. After 5 lectures** * **2nd exam. After 10 lectures** * **Repots at each end week, poster, Quiz** * Mark distribution:   Monthly exam 40% [theoretical 25%inluded 5%quiz 10%end week report + Practical15%  Final exam 60%( theoretical 40% + Practical20%= final mark 100% | | |
| **15. Student learning outcome:**   * Students to understand the types of biotechnology and its application with modern information. * Students to learn how to precisely perform techniques and precaution * Students to be able to prepare to require a concentration of liquid and solid sources. * Students to be familiar with recently developed biotechnology * Students to understand how to choose a proper technique/program and record/protect their bioinformatics results | | |
| **16. Course Reading List and References:**   Panno, J. 2005. ANIMAL CLONING: The Science of Nuclear Transfer. Library of Congress Cataloging-USA.   Eberhard Passarge, M. D. 2007. Color Atlas of Genetics. Third edition, University Hospital Essen, Germa.ny | | |
|  Wojciech Gorczyca. 2008. Cytogenetic, FISH and molecular testing in hematologic malignancies. New York, NY, USA.   Fitzgerald-Hayes, M. and Reichsman, F. 2014. DNA and Biotechnology, third edition. Library of Congress Cataloging-in-Publication Data Fitzgerald -Hayes, Molly, USA.   Kitagawa, Y.; Matsuda, T. and Iijima. S. 1997. Animal Cell Technology: Basic and Applied Aspects. Volume 10. KLUWER ACADEMIC PUBLISHERS, NEWYORK, BOSTON, DORDRECHT, LONDON, MOSCOW.   Grewal and Moazed. 2003. “Heterochromatin and epigenetic control of gene expression” Science 301:798.   Goldmit and Bergman. 2004. “Monoallelic gene expression: a repertoire of recurrent themes” Immunol Rev 200:197.   American Genetics Journal.   Biotechnology book | | |
| **17. The Topics** | | **Lecturer's name** |
| 1. Introduction and Applications of animal biotechnology  3. DNA recombinant and Cloning  3. Types of ELISA Technique and Interpretation  4. Types of PCR , Sequencing,  5. Modern Vaccines  6. Artificial insemination and Embryo Transfer (MOET, IVEP),  7. Gene engineering  8. Flow Cytometer, and its Benefits  9. Electron Microscope ( SEM and TEM)  10. 1st Examination  11. Transgenic animal In vivo and In vetro  12. Nutritional biotechnology ( pre & probiotic ) GMO food  **13. 2nd Examination** | | **Me at all lectures**  **Two hrs each lecture.** |
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| **18. Examinations** | |  |
| ***1. Compositional:*** | |  |
| ***Q: Write what you know about the gene cloned by the plasmid. (25 Marks)*** | |  |
| — *In the cloning by live cell, first must get the plasmid by extraction it from the live cells such as bacteria and must be detected the target DNA fragment which it be cloned and treated both them with one type of restriction enzyme to get two complementary fragments and mixed the cutting plasmid with target DNA, and adding the DNA Ligase to get the recombinant DNA from the two fragments after that transfer the recombinant DNA to the medium contain bacteria and down the temperature to zero, immediately up it to 40°C to help the recombinant DNA to inter inside the bacteria cells, after that transfer the sample of this medium to another medium contain the antibiotic after 1hours transfer the bacteria population isolated the plasmid from them and make the purification for the plasmid to get many copy of the target DNA.* | | **You must write or drawing the figure or curve when it necessary.** |
| ***2. True or false type of exams:*** | |  |
| ***Q2: Put the True (T) symbol for true sentences and Wrong(R) symbol for wrong sentences and correct the wrong sentences if found: (30 Marks)***  *1. The plasmid is extra DNA found only in virus.*  *2. Cosmid composed from plasmid and cos sequence of lambda*  *3. We can detect the antigen by ELISA methods.*  *4. Gene is the entire nucleotide sequence that is necessary for the synthesis of a functional polypeptide.*  *5. The Components of a Gene are only Promoter and Termination Signal.*  *6. mRNA: serves as the message in transcription.*  *7. Translation is the process of RNA guided DNA synthesis. Occurs in the Nucleus.*  *8. The mature mRNA is then transported out of the cytoplasm into the nucleus where it is translated.*  *9. Translation is the RNA guided synthesis of Proteins. Occurs mainly in the cytoplasm.*  *10. AUG is a start codon and makes the methionine in polypeptide chain.*  *11. The plasmid is extra DNA found only in virus.*  *12. In cloning process must cut the plasmid and target RNA with same restriction enzyme.*  *13. There are 64 codon, 50 of them make amino acid and 3 of them is stop codon.*  *14. tRNA: Joins together very big newly synthesized pieces of DNA called Okazaki fragments.*  *15. ELISA is the methods to detect the carbohydrates.*  ***Answers****:*  *1. R. The plasmid is extra DNA found only in bacteria.*  *2. T.*  *3. T.*  *4. T.*  *5. R. The Components of a Gene are only Promoter RNA coding sequence and Termination Signal.*  *6. R. mRNA: serves as the message in Translation.*  *7. R. Translation is the process of RNA guided Protein synthesis. Occurs in the cytoplasm.*  *8. R. The mature mRNA is then transported out of the nucleus into the cytoplasm where it is translated.*  *9. T.*  *10. T.*  *11. R. The plasmid is extra DNA found only in bacteria.*  *12. R. In cloning process must cut the plasmid and target DNA with same restriction enzyme.*  *13. R. There are 64 codon, 61 of them make amino acid and 3 of them is stop codon.* | |  |

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| *14.R. ligase: Joins together very big newly synthesized pieces of DNA called Okazaki fragments.*  *15.R. ELISA is the methods to detect the polypeptide.*  ***3. Multiple choices:***  ***Q3: Choosing the correct words to the following spaces:*** *(20 Marks)*  *16. Only one strand of the -------- is used as a template in transcription.*  *17. a: DNA, b: RNA, c: tRNA, d: rRNA.*  *18. The genetic code is the set of ----------which specify the 20 different amino acids commonly found in proteins.*  *19. a: 64 codons, b: 64 anticodon, c: 64 amino acid, d: 64 polypeptide.*  *20. --------------of these codons do not encode for an amino acid, they are read as a Stop sign by the Ribosome.*  *21. a: Three, b: Thirty, c: Thirteen, d: Thirty three.*  *22. ---------- attached to the nucleosome and involved in further compaction of the DNA*  *23. a: H2A, b: H2B, c: H1, d: H3.*  *24. Histones protein rich in ------ and --------.*  *25. a: A and T, b: G and C, c: Lysine and Arginine, d: U and A.*  *26. About -------- bp of DNA wrapped around histone core particle.*  *27. a: 147, b: 189, c: 174, d; 137*  *28. Then short (10 to 12 nucleotides) RNA primers are synthesized by ---------*  *29. a: DNA primase, b: DNA polymerase, c: DNA Ligase, d: DNA primers.*  *30. Energy for synthesis comes from the removal of the two phosphates of the in coming -------.*  *31. a: nucleotide, b: nucleated, c: nucleosome, d: chromatin.*  *32. Okazaki Fragments is series of short segments on the ----------.*  *33. a: lagging strand, b: leading strand, c: Parental strand, d: Maternal strand.*  *34. tRNA: carries amino acids to the-----------.*  35. *a: Ribosome, b: Cytoplasm, c: Nucleus, d: Mitochondria* |  |
| **20. Extra notes:**  Another type of examinations:  ***Q5: Account for the following phrases: (25 Marks)***  *1- Using the 1% and 3% of agarose gel to test the genome DNA and part of DNA, respectively.*  *2- You must add the Ethidium bromide to the gel or to become covered on it, when you need to take DNA photo.*  *3- DNA sample must mixed with 6X Loading Buffer when*  Ministry of Higher Education and Scientific research  Directorate of Quality Assurance and Accreditation به ڕێوه به رایه تی دڵنیایی جۆری و متمانه به خشین  *load it in the gel electrophoresis.*  *4- Adding the DNA Ladder Standard to the right side of the gel.*  *5- Using the electric field in the DNA running on the agarose gel.*  ***Answers****:*  *1- Using the 1% and 3% of agarose gel to test the genome DNA and part of DNA, respectively.*  *Because the genomic DNA it's very large compared with one gene for that wonted low concentration, but for a part of DNA which have small size wonted high concentration of gel to separate it.*  *2- You must add the Ethidium bromide to the gel or to become covered on it, when you need to take DNA photo.*  *Because this material can join with DNA and give the colour to DNA molecule when UV light was available.*  *3- DNA sample must mixed with 6X Loading Buffer when load it in the gel electrophoresis.*  *To give colour to the DNA to be seen in the gel and to increases the density of the DNA.*  *4- Adding the DNA Ladder Standard to the right side of the gel.*  *To compared the quality and the quantity of the DNA samples with it.*  *5- Using the electric field in the DNA running on the agarose gel.*  *Because the DNA have a negative charge* |  |
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| **19. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ**  This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.  *(A peer is person who has enough knowledge about the subject you are teaching; he/she has to be a professor, assistant professor, a lecturer).* | |
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