

Ministry of Higher Education and Scientific research



Department of Biology

College of Education

Salahaddin University

Subject: Genetics

Course Book – (Year: 3)

Lecturer's name: Asst Phroff. Dr.Kazhal Mohammed Sulaiman

Academic Year: 2022/2023

Course Book

1. Course name	Genetics
2. Lecturer in charge	Dr.Kazhal Muhammad Sulaiman
3. Department/ College	Biology Dept./ College of Education
4. Contact	e-mail: kazhal.sulaiman@su.edu.krd
5. Time (in hours) per week	Theory: 4 hrs for 2 group
6. Office hours	8.30 am-1.30 pm in all dayes
7. Course code	-
8. Teacher's academic profile	<p>I was awarded M.Sc.in 15-5-2000 and PHD in23-12 2013 in the field of genetics in biology Dep. college of Education , Salahaddin University- Erbil, Iraq. Human genetics ,Molecular genetics, population genetics and cytogenetics are my interest area of expertise.</p> <p>The researches published that are :-</p> <p>1-Genetic and Histological Effects of Cigarette Smoke on Albino Laboratory Mice (MSc thesis)under supervision of Dr.Nadhum J.Ismail,(professor in genetics).</p> <p>2- Genetic Variation and Long Term Effects of Chemical Exposure on the Halabja Population in Kurdistan Region – Iraq . (PhD thesis)under supervision of Dr.Nadhum J.Ismail,(professor in genetics).</p> <p>3-Genetic Effects of Cigarette Smoke on first generation of Albino Laboratory Mice.(Research published in Dohuk University journal.</p> <p>4-Preventiv effects of Nigellia and Ricins on chromosomal aberrations in Allium cepa root tip .(published in Tekret University journal.</p> <p>5-Preventiv effects of Olive oil on chromosomal aberrations in Vicia faba root tip.International symposium of Biotechnology and conservationof species from arid regions.Feb.10-13-2013 college of science, Sultan Qaboos University, Sultanate of Oman.</p> <p>6- Protective Effects of Garlic Allium Sativum Extracts against Ethyl Methyl Sulfonate induced Genotoxcity in Bone Marrow</p>

	<p>cells of Albino Mice.(Research published in Cihan University- The first international scientific conference 20-21 April 2014).</p> <p>7- Cytogenetics and molecular study of P53 gene in liver cancer diagnosed in Erbil city using de novo sequencing method.</p> <p>8- Chromosomal aberrations in peripheral blood lymphocytes of photocopy Machine workers in Erbil City/ Iraqi Kurdistan Region.</p> <p>9- Cytogenetic study of traffic policemen occupationally exposed to vehicle Exhaust in Erbil City/ Iraqi Kurdistan Region</p> <p>10- Cytogenetic study of Stomach cancer in Erbil City</p> <p>11-Chromosomal aberrations in the peripheral blood lymphocytes of Dental Radiographers who exposed to diagnostic X-ray in Erbil city / Iraqi Kurdistan region</p> <p>12-Cytogenetic study of Acute myelogenous Leukemia in Erbil City-Iraqi Kurdistan Region</p> <p>13- Chromosomal study for Assessment of Recurrent Spontaneous Miscarriage by Fluorescence <i>in situ</i> Hybridization (FISH) in Erbil City</p> <p><u>Teaching:-</u></p> <p>Practical genetics, Molecular biology, Cytology, Zoology and biostatistics.</p> <p>Scientific conferences and training courses in which I participated are:-</p> <p>1-Teaching Method training 2000.</p> <p>2- Computer training 1998.</p> <p>3-End note work shop 2013, biology Dep.</p> <p>4-Liver cancer work shop 2014 ,college of Education.</p> <p>5- Breast cancer work shop 2014 ,college of Education.</p> <p>6-Ides work shop 2014 ,college of Education.</p> <p>7- 4th International visible conference on Education Science , Ishik University- Erbil,13/4/2013</p> <p>7- 5th International visible conference on Foreign Language , Teaching and Applied Linguistics ,Ishik University- Erbil,13-14/4/2014.</p>
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	<p>8-1st International conference on Ecology, Environmental and Energy, Ishik University- Erbil,1/6/2014.</p> <p>9- 1st International Scientific Conference of Cihan University- Erbil,20-21-April-2014.</p> <p>10-Research training course,2-6-/3/2014.Hawler Medical University.</p> <p>11-Biostatistic course, 27-28/5/2014.Hawler Medical University.</p> <p>12-6th International visible conference on Educational Studies and Applied Linguistics in Erbil – Iraq organized by Faculty of Education of Ishik University and College of Education of Salahaddin University, April 26-27,2015.</p> <p>13-2nd t International conference on Ecology, Environmental and Energy, in Erbil – Iraq organized by Faculty of Education of Ishik University and College of Education of Salahaddin University, April 12-13,2015.</p> <p>14- Introduction to Pub Med Work shop , held by Medical research center, Hawler Medical University,June-16,2015.</p> <p>15-Reference Management work shop, held by Medical research center, Hawler Medical UniversityApril-28-30,2015.</p> <p>Scientific position that are I occupied:-</p> <p>1-Decider of Biology Dep.2000-2002.</p> <p>2- Head of Biology Dep.1/9/2015 till now.</p>
<p>9. Keywords</p>	<p>Practical Genetics, academic profile, course book</p>
<p>10. Course overview:</p> <p>Genetics is that branch of science that aim to understand how the traits(characters) were transmitted from parents (father and mother) to off springs. Also to understand how different types of genetics disease was developed and to explain what is the genetic material. Its ultimate objective is to explain all the characters, and all the things related to the composition of genetic material (Deoxyribo nucleic acid-DNA) , their replication, transcription and translation to functional proteins(Hormones, enzymes and ect...).Geneticists examine a wide variety of inherited traits, from the ability to bear large numbers of fruit in trees, to eye colour in mammals. Genetics is a major cornerstone of the larger field of biology. People who study</p>	

genetics do so in a wide variety of situations, from research laboratories to pharmaceutical companies, and new breakthroughs in this field are consistently being made.

This course will involve study the mendelian genetics, modification of mendellion lows(non – mendelian genetics), what is genes , alleles, genotype , phenotype ,types of genetic crosses, qualitative genetics , quantitative genetics, explains genes and how is work, what are prosperities of genetic code, what is heterochromatin and euchromatin, study of trisomy , tetrasomy ,polyploidy, sperm abnormalities.

This course will involve study what is genetic code, the prosperities of genetic code, ideogram, understanding the Telomere of chromosome, mutation and mutagen action, numerical changes of chromosomes, structural changes of chromosome ,carcinogen, the mechanism of action of teratogen.

In the first half of the 20 th century , genetics become more closely linked with Molecular biology, cell biology, biochemistry and made more extensive use of such molecular methods as(Isolation of genomic DNA, polymerase chain reaction, gel electrophoresis and DNA sequencing), those methods enable scientists to conduct research at the cellular, sub cellular and molecular levels and obtain fundamentally new data on the mechanisms regularity the entire complete of the life.

11. Course objective:

Genetics are important science in biology because when we are study genetics we understanding how the genetic characters are transmitted from generation to generation.

Some of the main objectives in this course should be as follow :

- 1- Student learn about the genetic material DNA, the structure ,composition ,number of chromosome in living organisms, and how the gene is expressed.
 - 2- Student learn how the information in DNA can transfer from generation to generation.
 - 3- Studying the genetic diseases and the mutated genes that cause the diseases.
 - 4- Studying the carcinogen and teratogen.
 - 5- Studying mutations in chromosome and in germ cells.
 - 6- Understanding the basic principles of genetics, the new techniques in genetics to improvement the live.
 - 7- Studying the tumour suppressor genes, proto oncogenes.
 - 8- To developed critical thinking skills by reviewing journal articles and planning and conducting experiments related to course topics.
 - 9- To developed and enhance communication skills through a variety writing assignments.
- This course provides an introduction to basic principles of genetic material, inheritant patterns, the structure of chromosome.

By the end of the semester , we should all have a good basic idea of how genes work , what is genetic code and what is modern genetics means.

12. Student's obligation

Class attendance is taken on a daily basis. Students are expected to attend all classes. The official college attendance policy is followed. Attendance in each class is counted from the first day the student is eligible to attend the class as given on the students assessment sheet” admit to class” registration card or student change notice.

13. Forms of teaching

Power point presentation for head titles, summary, definitions, classification of materials and any other illustrations will be used to reach the objectives of the course. There will be classroom discussions and the lecture will give enough back ground, translate and solve. Supplementary reading will be required from scientific books.

14. Assessment scheme

Approximately 3 unit examinations will be given during the course. Each exam will consist of examine the slide ,definition , fill blanks, draw and lable and what is the pointed part . The semester grade is based on the average score of two lecture exams, the final exam and lab activity.

- 1- Two monthly theoretical examinations(1,2)=24%
- 2- Attendance= 3%
- 3- Laboratory examination(1,2)= 13%.
- 4- Comprehensive final examination 60%(40% theoretical+ 20% practical)

15. Student learning outcome:

Each student will :-

- Demonstrate understanding of the composition of genetic material, chromosome and genes.
- Demonstrate understanding of some genetic terms.
- Demonstrate understanding of the classification of chromosome according to centromere,
- Demonstrate understanding of the genome.
- Demonstrate understanding of what is genotype, phenotype, heterozygous, homozygous alleles.
- Demonstrate understanding of the term of chromosomal non disjunction.
- Demonstrate understanding of the main function of genes.
- Demonstrate understanding of the mutation in genes .
- Demonstrate understanding of what is mendelian lows mein.
- Demonstrate understanding of what is the modification of mendelian low.
- Demonstrate understanding of the mechanism of action of genes and genetic code.
- Demonstrate understanding of how genes are work.

- Demonstrate understanding of what is cell division, cell cycle and check points.
- Demonstrate understanding of how mutation was happened.
- Demonstrate understanding of the major effects of mutation on the cell function.
- Demonstrate understanding of how mutagen work.
- Demonstrate understanding of how teratogen work.
- Demonstrate understanding of what is modern techniques in genetic now today.
- Demonstrate detailed understanding of telomere function.
- Demonstrate understanding of different types of genetic diseases.

16. Course Reading List and References:

- Key references: Sulaiman, K. M. 2015. Practical genetics for 3 rd class Biology students.
- Useful references: -
 - William S. Kluge and Michael R. Cummings, "Concepts of Genetics", 5th ed .2012.
 - Jeffrey M. Becker. Biotechnology ,A laboratory course,2d edition 2008.
 - Jack J.Pasternale, university of waterloo, Canada. An introduction to human molecular genetics,2d edition 2005.
 - Helen M.Kingston , ABC of Clinical genetics ,3d edition uk,2002.
- Magazines and review (internet):Genetics, chromosomes, mutations.molecular biology.

17. The Genetic topics

Weeks	Topics	
1	Introduction, genetic terms	
2	What is genes, how do gene work	
3	what is genetic code ,Prosperities of genetic code.	
4	What is chromosome, structure	
5	Composition of chromosomes	
6	Kryotype, idiootype,	
7	Monthly examination 1	
8	chromosomal groups.	
9	chromosomal groups.	
10	, Sex chromosome	
11	Telomere ,telomerase	
12	centromere ,	

13	What is mutation, types of mutations	
14	Numerical changes of chromosome	
15	Trisomy 13,18,21	
18. Practical Topics (If there is any);-		
<p>19. Examinations:</p> <p>1. Compositional: What is Gene?</p> <p>Answer : a discrete unit of hereditary information that usually specifies a protein; a region of DNA (locus) located on a chromosome that specifies a trait (characteristic).</p> <p>2. True or false type of exams:</p> <p>1- dominant allele - an allele that is always expressed when present, regardless of whether the organism is homozygous or heterozygous for that gene.</p> <p>2- In most organisms, AAG codon is the start or initiation codon,</p> <p>3- Chromatin or chromosomal regions that are lightly staining, and relatively uncoiled during the anaphase Answer:- 1 and 3 true while 2 was false.</p> <p>2- - In most organisms, AUG codon is the start or initiation codon,</p> <p>3. Multiple choices:</p> <p>1-Transition : which means: a - purin →Purine b- Pyrimidine→Purine- c- Purine →pyrimidin .</p> <p>2- . Translocation involves the transfer of a chromosome section or a set of genes to a: a- Homologous chromosome b- non-homologous chromosome c- Sister chromatid</p> <p>Answer:1(a) ,2(b).</p> <p>4.Fill blanks:</p>		

1- crossover is the breaking and rejoining of homologous (non-sister) chromatids during early -----, resulting in recombination .

2- chromatin - the complex of ----- and proteins that makes up uncondensed eukaryotic chromosomes.

Answer: 1 Prophase of meiosis1, 2- DNA, RNA.

20. Extra notes:

21. Peer review