بسم الله الرحمن الرحيم

جامعة آل البيت

AL al-Bayt University
Department of Biological Sciences
Genetic-404240 (three credit hours)
Course Outline: 2020/2021-Fall Semester

General Information:

Instructor: **Prof. Fawzi Irshaid** **Telephone: 0776948182**
E-mail: **irshaid@aabu.edu.jo** **Office:** **Abin-Rashed**
Classroom and Time: Online; Mon-to-Wed: 8:00- 9:30 Office Hours: Sun, Mon, Tue, Thu (9:00- 10:00)

Course description: This introductory course will provide students with a basic understanding of the principles of prokaryotic and eukaryotic genetics. During this course, the students will introduce to various topics in genetics. These includes chromosome structure, patterns of Mendelian and non-Mendelian inheritance, and the genetics of human disease, quantitative genetics, probability and hypothesis testing, genetic recombination and mapping, molecular genetics, the Genetics of Bacteria and Viruses, gene expression, genetic engineering, and population genetics, mutation and chromosomal abnormalities.

Name of Textbook:

All required readings are in the various text book of genetics. The following text books can be used:

1. Genetics: Analysis and Principles, 7th edition, 2016. Author: Robert Brooker, Publisher: McGraw-Hill.

2. Genetics - A Conceptual Approach, 4th edition, 2010. Author: Benjamin Pierce, Publisher: W. H. Freeman.

3. Genetics: Analysis of Genes and Genomes, 8th Edition by Daniel L. Hartl and Maryellen Ruvolo. Publishers: Sudbury, Massachusetts. 2020, 9th edition.

4. You could use a comparable Genetics textbook for reference and practice problems.

5. Notes and handouts will be available in PowerPoint in the e-learning site of this course. These handouts are your main source of information. If you choose to print handouts, you can print several slides on one page using a variety of layouts, some with space for note-taking.

Grading:

There will be short homework throughout the semester and one midterm and a final examination. The point distribution is as follows:

Type of Evaluation	**%**
1. Midterm:	**30%**
2. Class attendance:	**10%**
3. Homework:	**10%**
2. Final exam:	**50 %**
Total point	**100%**

How to access E-learning system:

1. To use the E-learning system (Moodle) in University of Al al-Bayt, you need to get a user name and password from computer center at the University or call the staffs at the computer center.
2. Once you obtain your user name and password, you can login to the E-learning system.
3. Open the university of website: (https://www.aabu.edu.jo/EN/Pages/default.aspx) - From the portal or center choose E-learning.
4. After successful login, you will see a list of your courses. Access the course you want by click on its name.
5. After accessing your course, you will see a page contains the file for each lecture. Click any file to download it.
6. To access course assignments, click assignments link. After you click on the assignment link you will see all the assignments that have been posted by your instructor, note that each assignment has a full description including assignment type, due date and cutoff date.
7. When a student wants to participate in a Forum activity, he or she first clicks on the front page link to the forum. There is a button to begin a new conversation.
8. If you need any help you can contact the computer center staffs they will answer your question.
9. There are several files that can show you step by step how to access the e-learning system and download your files, assignments, and quizzes and much more.

Attendance Policy:

1. I strongly recommend you attend every lecture. Missing any class will put you at a distinct disadvantage when test taking
2. Any student with six or more unexcused absences from lecture sessions can be legally dropped from the course
3. Students who miss an exam due to illness or other valid excuse must notify me within the first week after the exam, so make up arrangements can be made
4. The only other valid excuses for missing an exam are: death in the family, illness, or accident. In such cases you must provide evidence of some kind and you must reschedule within 3 days.

Academic Misconduct:

1. Any act of cheating, plagiarism, or academic misconduct is subject to the penalties

2. The minimum penalty for any student caught cheating on an exam will receive a zero on that test or will receive a letter grade of "35%" for the semester.

3. Any student who infringes upon any one of these resolutions will be treated according to published policy.

4. Please pay particular attention to issues of plagiarism, as all violations will pursued through the Office of Academic Integrity.

The final exam (important notes):

1. The final exam will be comprehensive and the corrected exam forms will not be returned to the student.

2. Final exam: 50 points (half will cover material after the second exam, half is comprehensive) . Difficult or confusing questions can be discussed with the instructor. For this reason, students should make a note of any questions they are unsure of while they are taking each exam.

3. I will not allow a final to be made up unless you have a hospital record.

Make-up Exam Policy:

1. Each student is expected to attend all lectures and complete all of the exams during the required time.
2. Make-up exams for the first two exams will be administered during the next week of each exam.
3. Only individuals with written medical (doctor) or legal excuses will be allowed to take a make-up test.
4. Individuals must contact the instructor within 24 hours of the exam or a grade of 0 will be assigned.
5. You can contact the instructor at irshaid@aabu.edu.jo.
6. If you are absent from a midterm and cannot provide a valid reason that is approved by the instructor, a mark of zero will be recorded for the missed midterm.

Homework:

As you are writing your home work, keep in mind the following rules:
1 The actual writing must be done by the individual student.
2. Again, any apparent misconduct, including submission of material written by others as your work will be brought to the attention of the Committee on Academic Misconduct
3. Note: Assignments turned in up to 24 hours late will be penalized 20%, from 24 to 48 hours late the penalty will be 40%, from 48 to 72 hours late, the penalty will be 80%.

Course outline: A more specific summary will be mentioned at the beginning of each lecture:

I. Course introduction: Why study genetics? – Brief review of genes and genomes

A. What is a gene
B. What is a chromosome?
C. Chromosome Structure and organization

II. Cell divisions & Chromosomes

A. Stages of meiosis
B. Origins of Genetic Variation
C. Gametogenesis

III. Simple Mendelian Inheritance

A. Mendelian genetics
B. True breeding and hybridization
C. Monohybridization-single traits
D. Dihybridization-two traits
E. Test cross

IV. Mendelian inheritance in human

A. Examples of human Mendelian traits
B. Recessively inherited disorders
C. Dominantly inherited disorders
D. The family pedigree

V. Non-Mendelian Inheritance

A. Incomplete dominance
B. Codominance
C. Multiple alleles
D. Epistasis
E. Quantitative traits
F. Cytoplasmic inheritance
G. Multifactorial inheritance

VI. Chi-square analysis

A. Introduction to X^2 test
B. Null and alternative Hypotheses
C. P-value and degree of freedom
D. X^2 –Table and statistical significance

VII. Sex chromosomes

A. Sex chromosomes in human
B. The Y chromosome's role in sex determination

C. The chromosomal basis of sex
D. Inheritance of sex-linked genes
E. Sex-influence trait
F. Sex-linked characters in human
G. X inactivation in Female Mammals

VIII. Chromosomal basis of inheritance

A. Behavior of Mendel's factors.
B. linked genes: genetic recombination
C. The chromosomal basis of sex
D. Exceptions in Chromosomal Inheritance
E. Cytoplasmic Inheritance

*** The midterm exam: place and time will be announced by the University**

IX. Gene Recombination

A. Recombination of unlinked gene
B. Frequency of recombination
C. Construction of linkage maps

X. The Genetics of Viruses

A. The Discovery of Viruses
B. The component and structure of virus
C. Classification of virus
D. Viral Reproductive Cycles
E. Destruction of phage DNA

XI. The evolution of virus

A. How did viruses originate
B. Viral Diseases in Animals and plants
C. Immune system & viral infections
D. Emerging New Viruses
E. The structure of viroids and prions

XII. The Genetics exchange in Bacteria

A. Transformation and cloning
B. Plasmids: biological features and technical uses
C. Conjugation
D. Transduction: Phage biological features & technical uses

IX. Central dogma of molecular Biology (Gene Expression 1, 2, and 3)

A. Evidence of DNA as genetic materials
B. Structure of DNA
C. DNA replication
D. Structure of RNA and Transcription
E. Translation

XI. Gene regulation

A. Regulation of a metabolic pathway
B. Jacob & Monod: Operon model
C. Jacob & Monod: Operon model
D. Lac operon and Trp operon

XII. Mutations and chromosomal abnormality

A. Types of point mutation
B. Alterations of chromosome number
C. Alterations of chromosome structure

XIII. Genomic imprinting

A. Genomic Imprinting in mammals
B. Angelman syndrome and Prader-willi syndrome

XIV. Population Genetics

A. Natural selection
B. Gene and allele frequency

C. Genes in Pedigrees

XV. Human Inherited Disorders

A. Identifying Human Disease Genes
B. Genetic Testing in Individuals
C. Cancer Genetics
D. Making Disease Models
E. Gene Therapy