TISHK INTERNATIONAL UNIVERSITY
FACULTY OF APPLIED SCIENCE
Department of MEDICAL ANALYSIS,
-2022 Fall
Course Information for MA 205 GENETİCS

Course Name:	GENETİCS

Code	Regular Semester	Theoretical	Practical	Credits	ECTS
MA 205	3	2	2	3	4

Name of Lecturer(s)-Academic Title:	Shatha Jumaah - Lecturer
Teaching Assistant:	Mr. Adam Jalal
Course Language:	English
Course Type:	Main
Office Hours	Thursday 1:00-2:00 PM
Contact Email:	shatha.saadi@tiu.edu.iq Tel:07731329529
Teacher's academic profile:	PhD Holder
Course Objectives:	Learning Objective 1- Understand how the behavior of chromosomes during Meiosis can explain Mendel's Laws of Equal Segregation and Independent Assortment What are the key features of chromosomal behavior in meiosis that cause alleles to be segregated equally? What are the key features of chromosomal behavior in meiosis that cause alleles of different genes to assort independently? What are the differences between mitosis and meiosis that result in identical vs.non-identical products, respectively? How does chromosomal behavior in meiosis explain dominant and recessive inheritance patterns? Understand how inheritance patterns are affected by position on chromosomes What happens to the chromatids, and DNA molecules, when crossing-over occurs? . Describe the stages of the cell cycle, of mitosis, and of meiosis. Describe the major function of each step in each cycle, specifically with regards to the chromosomes (have they doubled? are they pairing with homologs? are they joined via a kinetochore or by chiasmata? are they separating? when does "crossing over" occur?) 4. Be able to perform problems similar to those we've done in class, in Problem Set 1, and those at the end of each chapter covered. In summary, (a) be able to predict the phenotypic classes and their ratios from a monohybrid cross involving dominant and recessive alleles; (b) be able to predict the phenotypic classes and their ratios from a cross involving co-dominant or incompletely dominant alleles; (c) be able to predict the ratio of a specific genotype and/or phenotype from a cross involving multiple independently assorting genes (with each gene exhibiting only dominant and recessive alleles); (d) be able to recognize when two interacting genes are influencing the expression of each other (e.g. epistatically), which will be reflected in the numbers and ratios of phenotypic classes of the F2 progeny resulting from a dihybrid cross (alterations of a 9:3:3:1 ratio); (e) given the phenotypes of parents and the phenotypes and ratios of F1 and/or F2 progeny, be able to distinguish between a trait that is determined by two alleles at one gene manifesting incomplete dominance versus two genes interacting with each other epistatically; *Be able to list features of an organism that could make it a good genetic model. *Be able to cite features of peas and flies that make them ideal organisms in which to study many aspects of genetics. *Be able to perform and interpret the results of a Chi Square analysis. (You will notb e asked to perform an analysis on an exam, but you will be asked to interpret a test that I show you.) *Be able to distinguish between maternal effect, sex-linked, and cytoplasmic modes of inheritance. *Be able to look at a pedigree chart and discern the most likely mode of inheritance. *Be able to explain and provide examples of how continuous traits are "quantitative traits" and that phenotypic variation may be due to genetic variation within a population and/or environmental variation experienced by individuals within a population. Explain the polygenic theory of genetic variance and the nature of additive alleles, and the assumptions that accompany these ideas. Be able to provide competing hypotheses that explain a distribution data set of phenotypes. 10. Be able to summarize the history of eugenics in the United States and defend an informed opinion on the role of genetic testing in promoting "neo-eugenics."
Course Description (Course overview):	This course covers the fundamentals of genetics and how they apply to the study of biological function at the molecular, cellular, and multicellular levels, including humans. The subjects covered include gene structure and function, chromosomes and genomes, biological diversity caused by recombination, mutation, and selection, population genetics, protein function analysis using genetic methods, gene control, and inherited illness.

COURSE CONTENT

Week	Hour	Date	Topic
1	2	4-7/10/2021	Introduction to Genetics & Genetic terms
2	2	10-14/10/2021	History of genetics, the genetic theories, the subject matter of genetics includes, genotype and phenotype
3	2	17-21/10/2021	DNA Structure
4	2	24-28/10/2021	RNA Structure, Types & Function
5	2	31/10-4/11/2021	Cell cycle
6	2	7-11/11/2021	Mitosis & meiosis
7	2	14-18/11/2021	Midterm Exam
8	2	21-25/11/2021	Midterm Exam
9	2	28/11-2/12/2021	Genetic aberrations (Mutations)
10	2	5-9/12/2021	Epigenetic variations (Histon Modification)
11	2	12-16/12/2021	Epigenetic variations (DNA Methylation)
12	2	19-23/12/2021	Mitochondrial & extra-nuclear inheritance
13	2	26-30/12/2021	Genetic base of Cancer
14	2	2-5/1/2022	Apoptosis
15	2	9-13/1/2022	Final Exam
16	2	16-20/1/2022	Final Exam

COURSE/STUDENT LEARNING OUTCOMES

1	Recognize pattern of inheritance.
2	Have knowledge of several Mendelian and chromosomal conditions.
3	Recognize the genetic and environmental contribution to multifactorial conditions.
4	To know the genetic and environmental basis of sex determination.
5	Learned approaches which can be used for the diagnosis of genetic disease and carrier detection.

COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES

(Blank : no contribution, I: Introduction, P: Profecient, A: Advanced)

	Program Learning Outcomes	Cont.
1	Evaluate clinical laboratory data by interpreting laboratory results and relating the data to various disease states.	A
2	apply principles of evidence-based medicine to determine clinical diagnoses.	A
3	apply the basic principles of gross and microscopic anatomy, physiology, biochemistry, immunology, microbiology/virology.	A
4	formulate and implement acceptable treatment modalities to various disease states.	A
5	use technology effectively in the delivery of instruction, assessment, and professional development.	A
6	exhibit essential employability qualities by demonstrating laboratory safety, analyzing laboratory results, and displaying professional conduct.	A
7	exhibit organizational skills, accountability, and ethical behavior.	A
8	apply skills needed in operating laboratory equipment for testing, assessing quality assurance for lab equipment, and adhering to standard safety practices in the laboratory environment.	A
9	apply problem-solving and decision-making skills.	A
10	apply and promote health policies and regulatory standards in the field career.	A
11	develop research in the field of medical analysis using qualitative and quantitative methods.	A

Prerequisites (Course Reading List and References):	1- Tamarin, R.H. (1995). Principles of genetics (5th edi.). Wm. C. Brown publisher. U.S.A 2- Tamarin, R.H. (1996). Principles of genetics (6th edi.). Wm. C. Brown publisher. U.S.A 3- Nester, E.W.; Anderson, D.G.; Roberts, Jr. C.E.; Pearsall, N.N.; Nester, M.T. (2001). Microbiology a human perspective (3rd ed.). Mc Graw Hill, U.S.A . 4- Tortora, G.J. ; Funke, B. R. and Case, Christine, L. (2004). Microbiology: an introduction (6th edi.). Pearson, Benjamin Cummings. U.S.A . 5- Brooker, Robert J. (2005). Genetics (analysis and

	principles). Mc Graw Hill. U.S.A . 6-Pierce B.A. (2006). Genetics, A conceptual approach (2nd edi.). W.H. Freeman and Company. New York, U.S.A .
Student's obligation (Special Requirements):	*Exam policy: Student Should take 2 examinations during the course. There will be no make-up exams for absences students without medical report. *Classroom polices: 1- Attendance: You are strongly encouraged to attend class on a regular basis, as participation is important to your understanding of the material. This is your opportunity to ask questions. You are responsible for obtaining any information you miss due to absence. 2- Lateness: Lateness to class is disruptive. 3- Electronic devices: All cell phones are to be turned off at the beginning of class and put away during the entire class. 4- Talking: During class please refrain from side conversations. These can be disruptive to your fellow students and your professor. 5- No Disrespectful to both the professor and to your fellow students.
Course Book/Textbook:	1. Kaplan, B.J. (1978) Preparation of the normal karyotype (workbook). hicago: American Society of Clinical Pathologists. 2. Macgregor, H.C. & Narley, J.M. (1983). Working with animal chromosome. NewYork: John Wiley & Sons 3. Hartl, D.L. and Jones, E.W. (2000). Genetics. Analysis of Genes and Genomes. Fifth Edition. Jones and Bartlett Publishers, Boston. 4. Mertens, T.R. & Hammersmith, R.L. (2001). Genetics: Laboratory Investigations. Twelfth Edition. Prentice Hall, Englewood Cliffs, NJ.
Other Course Materials/References:	Browsing websites Articles Academic Journals.
Teaching Methods (Forms of Teaching):	Lectures, Presentation, Project, Assignments, Poster exhibition , Mind Map, Scientific Trip

COURSE EVALUATION CRITERIA

Method	Quantity	Percentage (%)
Attendance	1	5
Participation	1	5
Quiz	1	5
Homework	1	5
Presentation	1	15
Presentation	1	15
Lab/Practical Exam(s)	1	10
Final Exam	1	40
Total		**100**

Examinations: Essay Questions, True-False, Fill in the Blanks, Multiple Choices, Short Answers, Matching, , ,

Extra Notes:

ECTS (ALLOCATED BASED ON STUDENT) WORKLOAD

Activities	Quantity	Workload Hours for 1 quantity*	Total Workload
Theoretical Hours	16	2	32
Practical Hours	16	2	16
Final Exam	1	2	2
Attendance	1	3	3
Participation	1	2	2
Quiz	1		0
Homework	1		0
Presentation	1		0
Presentation	1		0
Lab/Practical Exam(s)	1		0
Total Workload			**55**
ECTS Credit (Total workload/25)			**2.2**

Peer review

Signature:	Signature:	Signature:
Name:	Name:	Name:
Lecturer	Head of Department	Dean