

Module (Course Syllabus) Catalogue 2023-2024

College/ Institute Erbil Technical Health and Medical College

Department Medical Laboratory Technology

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| Module Name | Human Genetics | | |
| Module Code | | | |
| Degree | Technical Diploma High Diploma | Master | Bachelor PhD |
| Semester | 6 th | | |
| Qualification | Bachelor | | |
| Scientific Title | Lecturer | | |
| ECTS (Credits) | 6 | | |
| Module type | Prerequisite | Core | Assist. |
| Weekly hours | 8 | | |

Weekly hours (Theory) (0)hr Class (70)Total hrs Workload

Weekly hours (Practical) (8)hr Class (70)Total hrs Workload

Number of Weeks 14

Lecturer (Theory) Dr. Nzar Ali Ameen Shwan

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Course Book

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| <p>Course Description</p> | <p>This course provides students with an understanding the human body anatomy and basic physical and chemical principles that underline physiological processes. Several biological systems are considered, including respiratory, circulatory, digestive and metabolic, thermoregulatory, osmosis regulatory, renal, nervous, musculoskeletal, neural, hormonal, and sensory. The weekly laboratory session will complement the lecture, mainly by providing hands-on experience in observation, data collection, measurement, and problem-solving skills</p> |
| <p>Course objectives</p> | <p>Upon successful completion of this course, students should be able to demonstrate the following competencies:</p> <ul style="list-style-type: none"> • An understanding of the central theories and methodologies that define the field of genetics and its various subdisciplines (traditional, molecular, and population genetics) and the ability to use the vocabulary that embodies this knowledge. • To describe and apply the principles of Mendelian genetics. <ol style="list-style-type: none"> a. Explain Mendel's Principles of Segregation and Independent Assortment b. Describe the chromosomal basis of inheritance c. Explain linkage, recombination, and the mapping of genes on chromosomes d. Describe non-Mendelian inheritance • Students will be able to explain how genes are regulated <ol style="list-style-type: none"> a. Explain the regulation of genes in prokaryotes b. Explain the regulation of genes in eukaryotes c. Describe cell-cycle regulation and the genetics of cancer d. Explain how genetics is used to study development e. Explain the relationship between environmental exposure and cancer genetics <ul style="list-style-type: none"> ➤ Students should be able to explain how variation in chromosome number and structure occur. a) Explain different types of change in the chromosome number b) Explain different types of mutation on chromosome level c) Understand the relationship of mutation and genetic (inheritance) disease d) Explain different types of structural variation in chromosomes e) Understand the consequences of change in chromosome number and structure f) Explain what epigenetics is and the role in development of cancer <p>External and internal factor that play a role in developing of cancer</p> |
| <p>Student's obligation</p> | <p>Student's obligation</p> <p>Attendance in lecture is expected. You are responsible for everything covered, mentioned, discussed and displayed in class. If you miss a class, get a classmate's notes as my notes will not be available. You cannot excel in this course if you do not come to class.</p> <ol style="list-style-type: none"> 1- Attendance: students are strongly encouraged to attend class on a regular basis, as participation is important to understanding of the material. This is student opportunity to ask questions. Students are responsible for obtaining any information during the class which provided. 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. |

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| | 4-Talking: During class, please refrain from side conversations. These can be disruptive to your fellow students and your professor | | | | |
| Required Learning Materials | - Printouts of weekly lectures taught at the college campus - Reviewing of internet | | | | |
| Forms of teaching | The material will be presented at a level suitable for undergraduates by lecturing, discussion, video, power points and seminar | | | | |
| Evaluation | Task | Weight (Marks) | Due Week | Relevant Learning Outcome | |
| | Paper Review | | | | |
| | Assignments | Homework | 5% | | Encourages students to search for more detailed knowledge relevant to the topics taught at campus. |
| | | Class Activity | 2% | | |
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| | | Seminar | 10% | | Enhances the preparation and presenting skills of the students |
| | | report | 10% | | To make students engage more with their favorite topics |
| | | Project | | | |
| | Quiz | 8% | | To encourage students, study every week. | |
| | Midterm Exam | 25% | | To evaluate students and their achievements at the middle of the term. | |
| | Final Exam | 40% | | Final evaluation and assessment. | |
| Total | 100% | | | | |
| Specific learning outcome: | <p>On successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> Explain the way in which genes code for proteins Understand patterns of inheritance Understand the genetic basis of cancer Understand the relationship of mutation and genetic (inheritance) disease Explain what epigenetics is and the role in development of cancer External and internal factor that play a role in developing of cancer | | | | |

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| Course References: | <p>Books:</p> <ol style="list-style-type: none"> 1. Robert J. Brooker (2012). Genetics: analysis & principles (4th edition). 2. Tamarin R.H. (2001). Principles of Genetics (7th edition). 3. Anthony J.F. Griffiths, Susan R. Wessler, Sean B. Carroll and John Doebley, (2015). Introduction to genetic analysis. 4. James D. Watson / Tania A. Baker / Stephen P. Bell / Alexander Gann / Michael Levine / Richard Losick (2013). “Molecular Biology of the Gene (7th edition). |
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| Course topics (Theory) | Week | Learning Outcome |
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| An Introduction to Human Genetics | First | Introducing the Human Genetics module. Describing the general characteristics of chromosomes |
| Chromosomes and Cellular reproduction (Mitosis) | Second | Understanding mitotic cell division and how chromosomes are duplicated and passed to the next generation |
| Chromosomes and Cellular reproduction (Meiosis) | Third | Understand meiosis and how chromosomes are become half in number during gamete formation, as well as the important event of crossing-over |
| Patterns of Inheritance: Mendelian inheritance | Fourth | Understand the classical genetics, or mendelian inheritance |
| Patterns of Inheritance: Non-Mendelian inheritance | Fifth | Understand the inheritance of traits that are not following Mendel's two laws of genetics |
| Variation in chromosome number and structure: Natural variation exists in chromosome structure | Sixth | Describing the structure of chromosomes and how there's a natural variation in chromosomes, in different species |
| Midterm Exam | Seventh | |
| Variation in chromosome number: Polyploidy | Eighth | Understand how the number of chromosomal |

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| | | sets are changed and what are their consequences |
| Variation in chromosome number: Aneuploidy | Ninth | Understand how the number of individual chromosomes is changed and what are their consequences |
| Variation in chromosome structure: Deletions, Duplications | Tenth | Describing the variation in chromosome structure, duplications and deletions |
| Variation in chromosome structure: Inversions, Translocations | Eleventh | Describing the variation in chromosome structure, Inversions and translocations |
| Nucleic acid structure and function | Twelfth | Understand the experimental proof that DNA is the genetic material |
| Chromosome packaging | Thirteenth | Genome packaging in different organisms |
| Genetic basis of Cancer | Fourteenth | Describing the genetic basis of different cancer types |

Questions Example Design (theoretical and practical exam):

All of the activities provided in the workload section are considered when awarding you a grade for this course. In order to pass this course, you will need to earn a 60% or higher on the final exam. Your score on the exam will be calculated as soon as you complete it. If you do not pass the exam on your first try, you may take it again in the second trial.

- Type of the exam (composition and multiple choice)
- Exam's duration (for example one hour)
- The number of the questions: at least four questions. The marks distributed evenly throughout.

The answer should contain preface, main contents and conclusion.

Example

Examinations (Type of the questions):

- **Open questions: Describe the consequences of chromosomal duplications and deletions.**
- **Fill in the blanks:** In cell cycle ----- phase known as synthetic phase.
- **Multiple choice questions:** The process of mitosis usually involves
 - a. Chromosome duplication and synapsis.

- b. DNA replication and separation of chromatids.
- c. Tetrad formation and fertilization.
- d. Reduction in chromosome number and formation of cell plate.

- **Short answer: Give short answers to the following questions.**

- What are the stages of Prophase of meiosis I?

- **Definition: Define the following terms:** a) homozygous, b) recessive, c) dominant

A. **Comparison questions:** Compare autosomal recessive and X-linked recessive inheritance patterns. Provide examples of disorders for each type.

Extra notes:

External Evaluator