



## Module (Course Syllabus) Catalogue 2023-2024

College/ Institute	Shaqlawala Technical College	
Department	Medical Lab. Technology	
Module Name	Human Genetics	
Module Code	HUG601	
Degree	Technical Diploma <input type="checkbox"/>	Bachler <input checked="" type="checkbox"/>
	High Diploma <input type="checkbox"/>	Master <input type="checkbox"/>
		PhD <input type="checkbox"/>
Semester	6 <sup>th</sup> semester	
Qualification	Ph.D.	
Scientific Title	Lecturer	
ECTS (Credits)		
Module type	Prerequisite <input type="checkbox"/>	Core <input checked="" type="checkbox"/>
		Assist. <input type="checkbox"/>
Weekly hours	6 Hrs.	
Weekly hours (Theory)	( 2 )hr Class	( 8 )Total hrs Workload
Weekly hours (Practical)	( 4 )hr Class	( 8 )Total hrs Workload
Number of Weeks	14	
Lecturer (Theory)	Dr. Salam Adil Ahmed	
E-Mail& Mobile NO.	<a href="mailto:salamadil@epu.edu.iq">salamadil@epu.edu.iq</a> , 07508174822	
Lecturer (Practical)	Dr. Salam Adil, Mr. niyaz	
E-Mail & Mobile NO.	<a href="mailto:salamadil@epu.edu.iq">salamadil@epu.edu.iq</a> , 07508174822	
Websites		

# Course Book

<b>Course Description</b>	<p>Knowledge of genetics is helpful in understanding the causation of diseases. It also helps us to understand how normal variations between individuals are brought about. Knowledge of genetics has also led to possible means of prevention of genetic disorders through genetic counseling and antenatal diagnosis. Genetics serves to solve even legal problems. Legal cases involving disputed parentage may be sorted out by an analysis of blood groups or other inherited characteristics.</p>
<b>Course objectives</b>	<ul style="list-style-type: none"><li>➤ Students will be able to explain how genes are regulated<ul style="list-style-type: none"><li>a. Explain the regulation of genes in prokaryotes</li><li>b. Explain the regulation of genes in eukaryotes</li><li>c. Describe cell-cycle regulation and the genetics of cancer</li><li>d. Explain how genetics is used to study development</li><li>e. Explain the relationship between environmental exposure and cancer genetics</li></ul></li><li>➤ Students should be able to explain how mutation occurs<ul style="list-style-type: none"><li>a) Explain different types of mutations on DNA level</li><li>b) Explain different types of mutation on chromosome level</li><li>c) Understand the relationship of mutation and genetic (inheritance) disease</li><li>d) Explain different types of mutagens</li><li>e) Understand the relationship between mutation and cancer development</li><li>f) Explain what epigenetics is and the role in development of cancer</li></ul></li></ul>

	g) External and internal factor that play a role in developing of cancer				
<b>Student's obligation</b>	<ul style="list-style-type: none"> <li>• Attendance 85-90% of lectures.</li> <li>• Completion of all the requirements quizzes, exams, reports, assignments, seminars, ....etc.</li> <li>• Participation in the laboratory works (practical lectures).</li> </ul>				
<b>Required Learning Materials</b>	<ul style="list-style-type: none"> <li>• The lectures showed by <b>data show</b> and the explanations discussed in the <b>hall</b> and at the same time the students will have a <b>copies of the lectures</b>.</li> <li>• The lectures will be available on line (<b>Moodle platform</b>)</li> <li>• Lab. <b>Instruments and materials</b> will used in Practical lectures.</li> </ul>				
<b>Evaluation</b>	<b>Task</b>	<b>Weight (Marks)</b>	<b>Due Week</b>	<b>Relevant Learning Outcome</b>	
	Paper Review				
	Assignments	Homework	14%		
		Class Activity	2%		
		Report	24%		
		Seminar			
		Essay			
		Project			
	Quiz		4%		
	Lab.				
	Midterm Exam		16%		
	Final Exam		40%		
Total		100%			
<b>Specific learning outcome:</b>	<p>On successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the fundamental molecular principles of genetics</li> <li>2. Understand the structure and function of DNA, RNA and protein</li> <li>3. Explain the way in which genes code for proteins</li> <li>4. Understand the relationship between phenotype and genotype in human genetic traits.</li> <li>5. Describe the basics of genetic mapping</li> </ol>				

	<p>6. Understand how gene expression is regulated</p> <p>7. Understand the genetic basis of cancer</p> <p>8. Comprehensive, detailed understanding of the chemical basis of heredity</p> <p>9. Comprehensive and detailed understanding of genetic methodology and how quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms.</p> <p>10. Understanding of how genetic concepts affect broad societal issues including health and disease, food and natural resources, environmental sustainability, etc.</p>	
<b>Course References:</b>	<ul style="list-style-type: none"> <li>1. Robert J. Brooker (2012). Genetics: analysis &amp; principles (4th edition).</li> <li>2. Tamarin R.H. (2001). Principles of Genetics (7th edition).</li> <li>3. Anthony J.F. Griffiths, Susan R. Wessler, Sean B. Carroll and John Doebley, (2015). Introduction to genetic analysis.</li> <li>4. James D. Watson / Tania A. Baker / Stephen P. Bell / Alexander Gann / Michael Levine / Richard Losick (2013).</li> <li>“Molecular Biology of the Gene (7th edition).</li> </ul>	
<b>Course topics (Theory</b>	<b>Week</b>	<b>Learning Outcome</b>
An Introduction to Genetics	<b>1</b>	
Genome organization	<b>2</b>	
Chromosomes and Cellular reproduction	<b>3</b>	
Mitosis	<b>4</b>	
Meiosis	<b>5</b>	
Mendelian inheritance	<b>6</b>	
Chromosome Mapping in Eukaryotes	<b>7</b>	
Variation in chromosome number and structure	<b>8</b>	
Variation in chromosome number: Polyploidy	<b>9</b>	
Variation in chromosome number: Aneuploidy	<b>10</b>	

Variation in chromosome structure: Deletions, Duplications	<b>11</b>	
Variation in chromosome structure: Inversions, Translocations	<b>12</b>	
Gene mutation	<b>13</b>	
Genetic basis of cancer	<b>14</b>	
<b>Practical Topics</b>	<b>Week</b>	<b>Learning Outcome</b>
Introduction to practical genetics and safety rules course outline, concept for Genetic	<b>1</b>	
Cell cycle& mitosis: simulation model & video	<b>2</b>	
Mitosis in prokaryotes	<b>3</b>	
The Study of Meiosis Division in eukaryotes	<b>4</b>	
Chromosome types	<b>5</b>	
Karyotype analysis	<b>6</b>	
Karyotyping: worksheets in groups	<b>7</b>	
Human genetics traits	<b>8</b>	
Mendelian inheritance: Monohybrid crosses	<b>9</b>	
Mendelian inheritance: Dihybrid crosses	<b>10</b>	
Organism model for genetics studies	<b>11</b>	
Fluorescent in situ hybridization	<b>12</b>	
Visiting external lab	<b>13</b>	

## Questions Example Design

### 1- *Compositional:*

1. What are the stages of Prophase of meiosis I?
2. Enumerate the appearances of down Syndrome.

**2- Define the following:**

1. Genetics      2. Variation

**3- Fill in the blanks:**

..... the movement of genetic material between non-homologous chromosomes or within the same chromosome.

**4- Matching:**

Match the words in column A to the best available answer in column B.

**5- MCQ**

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.

**Extra notes:**