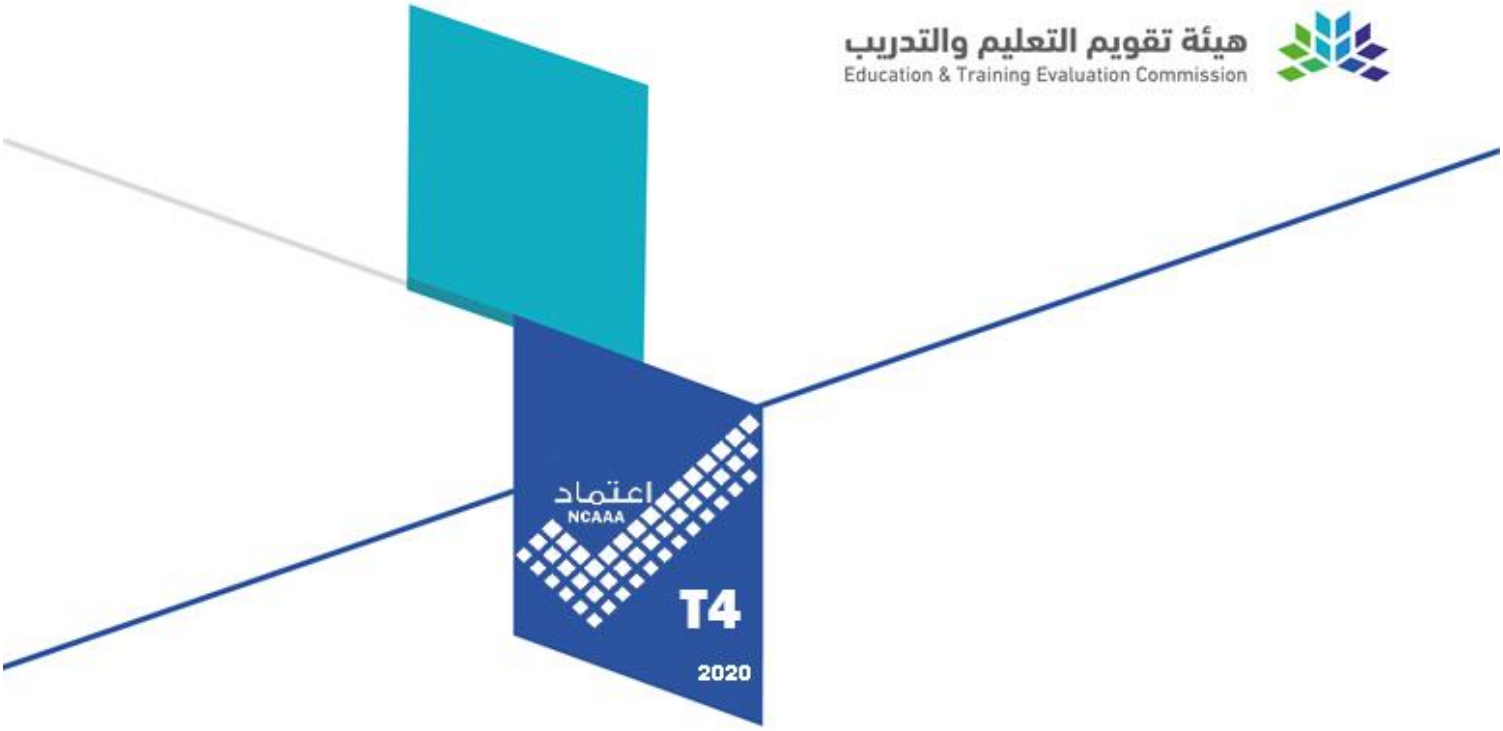
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	General Genetics
Course Code:	**222 BIO**
Program:	**Biology**
Department:	**Biology**
College:	**Science**
Institution:	**Jazan University**

Table of Contents

A. Course Identification

1. Credit hours: 2 hours
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Four /Two
4. Pre-requisites for this course (if any)**: Cell Biology**
5. Co-requisites for this course (if any)**: None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	13	86.7%
2	**Blended**	2	13.3%
3	**E-learning**		
4	**Correspondence**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	**15**
2	**Laboratory/Studio**	**30**
3	**Tutorial**	**-**
4	**Others** (specify)	-
	Total	**45**

B. Course Objectives and Learning Outcomes

1- Course Description

Course Title	Course No.	Number of Study Hours				Year	Level	Pre-Requisite
		Theo.	Tut	Lab.	Credit			
General Genetics	222BIO	1	-	1	2	2nd	4th	211BIO

(1) Brief Course Description:

- The general genetics course deals with the general principles in generics.
- This course describes some of the special topics in genetics like nucleic acids, chromosomes, mutations, Mendelian genetics and non-Mendelian genetics, multiple alleles, and genetic engineering.

(2) **Course Objectives:**

This course is designed to provide students with the following concepts:

- To relate the structure and function of the DNA molecule.
- To describe normal chromosome number, structure, and behavior in biological cells.
- To understand the cause and effect of alterations in chromosome number and/or structure.
- To study how to identify and classify mutations in DNA.
- To understand the principles and mechanisms of the inheritance of traits from one generation to the next.
- To know the basics of genetic engineering.

(3) **Course Contents:**

A) Theoretical Part

1. Introduction: what is genetics? Development of Genetics
2. Chromosomes: Definition, Number, Size and Shape, Structure, Classification, General Properties.
3. Chromosomal Aberrations: i- Structural Chromosomal Aberrations (Chromosome Type Aberrations- Chromatid Type Aberrations – Translocation- Deletion- Duplication- Inversion-
   Reciprocal translocation) and ii- Numerical Chromosomal Aberrations (Aneuploidy – Euploidy).
4. Nucleic acids: Deoxyribonucleic acid (DNA) – Ribonucleic acid (RNA) - Nucleotide structure – DNA structure – Types and Function of RNA- Comparison between DNA and RNA
5. Genetic Code and Protein Synthesis: Definition of genetic code – Start code – Stop Code-
   Steps of protein synthesis.
6. Mutations: Definition of mutation – Site of mutations – Mutation types (Spontaneous mutations- Induced mutations – Lethal mutations – sublethal mutations – point or genetic mutations – chromosomal mutations- forward mutations – backward mutations) – mutations
   Characteristics – chemical mutants – physical mutants.
7. Mendelian Genetics: Mendel first law (law of segregation) – Complete dominance - Cross test – Mendel second law
   (law of independent assortment).
8. Non-Mendelian Genetics: Incomplete dominance – Codominance – Epistasis – Multiple alleles – Polymorphism. Ex, inheritance of skin color in short horn sheep.
9. Inheritance Related to Sex Linked: Sex chromosomes – Sex linked genes – Sex inheritance in

Humans (Hemophilia – Color Blindness)- Sex limited inheritance – Sex influenced inheritance

10. Inheritance of Blood Groups.: ABO system – Rh factor – Variation of Rh Factor – Genetics of Rh factor
11. Genetic Engineering: Development of genetic engineering – Tools used in genetic engineering (restriction enzymes – Plasmids – Gel Electrophoresis – DNA Sequencing – Taq polymerase – PCR) – Applications of Genetic Engineering in (Medical Field – Animal Production Field – Agricultural Production Field – Industrial Field – Environmental Field – Security Field) – Genomic Modified Organisms – Hazards of Genetic Engineering.

B) Practical Part:

This course is designed to reinforce the principles of general genetics. It includes the study of Cell Cycle - Cell Division (Mitosis and Meiosis) - Mendelian Genetics, Mendel's First Experiments, and First Law, Mendel's Second Experiments, and Second Law - Non Mendelian Genetics, Incomplete dominance, Codominance, Blood groups - Preparation of mitotic (metaphase) chromosomes – karyotype, Arm ratio, centromeric index - Chromosomal abnormalities.

(4) **Assessment Criteria:**

- Periodic Exams and Quizzes: 30 %
- Assignments, and Classroom Activities: 20 %
- Final exam: 50%

(5) **Course Teaching Strategies:**

- Lectures, Reports and Essay Assignments, Homework, and Web-based Assignments.

(6) **Text Book:**

علم الخلية والوراثة (2013 م). تأليف د. سعد بن حسين القحطاني. النشر العلمي والمطابع- جامعة الملك سعود- الرياض –المملكة العربية السعودية

Cell Biology and Genetics (2013) by Saad H. Al-Qahtani, King Saud University-Riyadh-KSA (in Arabic).

(7) Reference Books:

-Genetics: Analysis and Principles (6th ed.) (2017) by R. J. Brooker. McGraw-Hill Education, USA.

- Genetics: A Conceptual Approach (4rd Ed) (2016) by B. A. Pierce. W. H. Freeman and Company. NY, USA.

- Campbell, N., Reece, J.,Urry, L., Cain, M., Wasserman, S., Minorsky, P. and Jackson, R. (2008). Biology, 8th ed. Toronto: Benjamin Cummings. 1267 p

عبدالهادى ، عائدة وصفى . (٢٠٠٥). مقدمة فى علم الوراثة . ط٢ ، عمان (الأردن): دار الشروق للنشر والتوزيع.

2. Course Main Objective

- Relate the structure and function of the DNA molecule.
- Describe normal chromosome number, structure, and behavior in biological cells, and understand the cause and effect of alterations in chromosome number and/or structure.
- Understand how to identify and classify mutations in DNA.
- Understand the principles and mechanisms of the inheritance of traits from one generation to the next.
- Knowledge of the basics of genetic engineering.

3. Course Learning Outcomes

CLOs		Aligned PLOs
CLOs		**Aligned PLOs**
1	**Knowledge and understanding:**	
1.1	Define all principals, concepts, theories and aspects concerning with genetics	K1.1
1.2	Compare between different mechanisms, functions, practices and aspects related to genetics	K2.1
1.3	Explain all processes, mechanisms, definitions, theories, mode of actions of genetics.	K2.2
1.4	Interpret by using your knowledge and understanding some of phenomena concerning with genetics	K3.2
2	**Skills :**	
2.1	Apply the theoretical knowledge and understanding in laboratory experiments and techniques	S1.2
2.2	Propose solutions for different complex genetical problems	S3.2
2.3	Write a report about any practical or theoretical tasks related to genetics	S3.3
3	**Values:**	
3.1	Apply practices of life-long learning in genetics for their professional career	V1.1

C. Course Content

No	List of Topics	Contact Hours
1	Genetics introduction	1
2	Chromosomes (Definition- Number – Size and shape – Structure)	1
3	Chromosomal aberrations.	1
4	Nucleic acids (DNA structure – RNA)	1
5	Mutations	1
6	Mendelian Genetics	3
7	Sex linked inheritance (Sex inheritance in humans– sex limited inheritance - sex influenced inheritance).	2
8	Multiple alleles (inheritance of blood groups – Rhesus factor)	2
9	The relationship between relatives marriage and genetic diseases	1
10	Genetic engineering.	1
11	General revision	1
Total		15

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.1	Define all principals, concepts, theories and aspects concerning with genetics	Lectures – Group discussion	Final theory exam – Midterm theory exam
1.2	Compare between different mechanisms, functions, practices and aspects related to genetics	Lectures	Final theory exam – Midterm theory exam
1.3	Explain all processes, mechanisms, definitions, theories, mode of actions of genetics.	Lectures	Final theory exam
1.4	Interpret by using your knowledge and understanding some of phenomena concerning with genetics	Lectures	Final theory exam
2.0	**Skills**		
2.1	Apply the theoretical knowledge and understanding in laboratory experiments and techniques	Lectures – Lab work	Practical final exam
2.2	Propose solutions for different complex genetical problems	Lectures	Final theory exam-
2.3	Write a report about any practical or theoretical tasks related to genetics.	Lectures – Lab work	Practical and theory quizzes
3.0	**Values**		
3.1	Apply practices of life-long learning in genetics for their professional career	Lectures – Lab work	Homework, presentation. (practical +theory)

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Theoretical quiz 1	3	5
2	Written assignment or research assay	4	5
3	Midterm exam	7	10
4	Practical mid term exam	9	10
5	Theoretical quiz 2	11	5
6	Final practical exam	13	15
7	Final exam	15	50

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :
10 Office hours/faculty/week

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	علم الخلية والوراثة (2013 م). تأليف د. سعد بن حسين القحطاني. النشر العلمي والمطابع- جامعة الملك سعود- الرياض –المملكة العربية السعودية Cell Biology and Genetics (2013) by Saad H. Al-Qahtani, King Saud University-Riyadh- KSA

Essential References Materials	Genetics: Analysis and Principles (6th ed.) (2017) by R. J. Brooker. McGraw-Hill Education, USA. - Genetics: A Conceptual Approach (4rd Ed) (2016) by B. A. Pierce. W. H. Freeman and Company. NY, USA.
Electronic Materials	https://www.marefa.org/الوراثة
Other Learning Materials	---

2. Facilities Required

Item	Resources
Accommodation	1 Lecture room(s) for groups of 25students. 1 Laboratory for group of 15 students
Technology Resources	AV, data show, Smart Board
Other Resources	Light microscopes, glassware, chemicals, consumables

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students, Faculty	Direct (Questionnaire)
Effectiveness of assessment	Peer Reviewer	Direct (Cross Check marking)
Extent of achievement of course learning outcomes	Program Leader	Indirect (QA Committee)
Quality of learning resources	QA. Committee	Indirect (Benchmarking)

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Consultant Committee/ Board of Biology Department
Reference No.	
Date	