Specification for Genetic Engineering
2025/2026

1-Basic information

1.	**Course title**	Genetic engineering							
2.	**Course code**	AWD. 222							
3.	**Department offering the course**	Animal Wealth Development							
3.	**Level**	2nd year							
4.	**Semester**	Spring semester							
5.	**Number of units/credit hours**	Theoretical	1	Practical	1(2)	Other	0	Total	2(3)
6.	**Course Type**	√ **Obligatory** **Elective**							
7.	**Academic program**	Bachelor of Veterinary Medicine (BVM)							
8.	**University**	Benha University							
9.	**Faculty**	Veterinary medicine							
10.	**Course Specification Approval Date**	Ass.Prof\ Olla Adel Khalifa							
11.	**Date of Approval**	Faculty council 27-8-2025							
12	**Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)**	Department council/ 8-7-2025							

2-Course overview

- **Course contents written in the program bylaw:**

Ggenetic engineering; Gene transfer; DNA fingerprint; methods of studying the genome and farm animal improvement; Genetic and cancer, Genetic and animal disease; immunogenetics, Genetic and behavior.

3- Intended learning outcomes of the course (ILOs):

(NARS)			**Course ILOS**	
	Code	**Content**	**Code**	**Content**
			a1	Describe basis of genetic engineering
			a2	Mention different characteristics of genetic material and different

Knowledge and understanding	2.1	Basic sciences of biology, chemistry, biophysics, genetics, biostatics, computer science and veterinary terminology.		methods of its manipulation and applications.
			a3	Discuss and explain inherited diseases and their control .
			a4	Distinguish between the genetic material, diseases, immunity and the control of these diseases.
			a5	Identify the ability to coal late different pieces of accurate information
Intellectual skills	4.4	Proficiently secure diagnostic reasoning, develop problem lists and differential diagnosis in order to deductively and critically reach the most appropriate solution (s) and management of the addressed clinical problems.	b1	Evaluate the genetic expression.
			b2	Interpret the genetic problems.
			b3	Discover relationship between the genetic tool for control of inherited diseases.
			b4	Distinguish area where further research is necessary and is aware beyond current ethical codes list
			b5	Distinguish area where further research is necessary and is aware beyond current ethical codes list.
Professional and practical skills	3.8	Skillfully and appropriately gain and use new information remain current with the emerging biomedical knowledge and therapeutic options.	c1	Investigate genetic materials and gene expression.
			c2	Measure genotoxicity of different environmental pollutants.
			c3	Examine similarities and differences between different species based on DNA polymorphism.
			c4	Conduct appropriate range of Experimental techniques

	D			
General and transferable skills	5.1	Work under pressure and / or contradictory conditions.	d1	Work under pressure during lab session of genetics
	5.5	Search for new information and technology as well as adopt life–long self- learning ethics.	d2	Search for new information and technology
	5.6	Utilize computer and internet skills.	d3	Manipulate and organize tasks and Utilize computer and internet skills

4- Teaching and learning methods					
Lectures	√	**Discussion & seminar**	√	**Practical**	√
Presentation & movies	√	**Problem solving**	√	**Brain storming**	√
Others					

- Course Schedule:

Number of the Week	**Scientific content of the course (Course Topics)**		**Expected number of the Learning Hours**				
		Theoretical teaching (lectures/ discussion groups/ .....)	**Practical topics**	**Training (Practical/Clinical/ .....)**	**Self-learning (Tasks/ Assignments/ Projects/ ...)**	**Other (to be determined)**	**Total Weekly Hours**
W1	Replication & genetic code	**1**	Epistasis	**1(2)**		**0**	**2(3)**
W2	Transcription	**1**	Genetic problems	**1(2)**		**0**	**2(3)**
W3	Translation	**1**	Quantitative genetics	**1(2)**	**Formative quiz**	**0**	**2(3)**

W4	Regulation of protein synthesis	**1**	Quantitative genetics	**1(2)**		**0**	**2(3)**
W5	Mutation and DNA repair mechanism	**1**	phenotypic expression	**1(2)**		**0**	**2(3)**
W6	Mutation and DNA repair mechanism	**1**	phenotypic expression	**1(2)**	**Formative quiz**	**0**	**2(3)**
W7	Semester work including 1hr exam		----------				
W8	Recombinant DNA	**1**	Sex related inheritance	**1(2)**		**0**	**2(3)**
W9	Recombinant DNA	**1**	Sex related inheritance	**1(2)**		**0**	**2(3)**
W10	Methods for studying the genome	**1**	Genetic problems	**1(2)**	**Formative quiz**	**0**	**2(3)**
W11	Methods for studying the genome	**1**	Linkage & crossing over	**1(2)**		**0**	**2(3)**
W12	Inherited diseases of biochemical origin	**1**	Genetic problems	**1(2)**		**0**	**2(3)**
W13	Immunogenetics	**1**	Nucleic acid extraction	**1(2)**	**Formative quiz**	**0**	**2(3)**
W14	Genetic resistance and pathogens .Control of inherited diseases	**1**	Nucleic acid extraction	**1(2)**		**0**	**2(3)**
W15	Practical exam	----------					

5- Assessment timing and grading:

a- Assessment methods (summative and formative)

1. **Formative assessment**: including (weekly quizzes, homework assignments and surveys).
2. **Summative assessment** including (quizzes, class activities, 1hr exam, practical exam, oral exams and final written exams).

b- Assessment schedule and weight

Assessment method	Timing	Grade	Percent
Semester work 1hr exam	7th week	10	10%
Formative assessment	Throughout the semester	----------	----------
Practical exam	15th week	30	30%
oral exam	End of semester	10	10%
Written exam	End of semester	50	50%
Total		100	100%

6- Learning resources and supportive facilities:

Learning resources	**Main reference**	**Student handbook**: department notes
	Essential books (text books)	• P.S. Verma, V.K. Aggarwal (2006).Genetics • Philip W.H. (2006).Genetic of population • S. Sundara Rajan (2005)Cytogenetics • Course note. • P.S. Verma, V.K. Aggarwal (2006).Genetics. • William, Michael, Charlot (2006).Concept of genetics
	Periodicals, Web sites, . . . etc	\ • Journal of Animal Science. • Genomic Journal. • Genetics Journal • www.Pubmed.com • www.ekb.eg
	Learning platform	Thinqi
supportive facilities	**Devices & instruments**	**Microscope** **Mixer, Water Bath** **Sensitive Balance** **Horizontal Electrophoresis** **Vertical Electrophoresis** **Thermal cycler, Vortex** **Ordinary Centrifuge**
		• Lecture Hall: Writing board and Data

		show. • Genetics Lab. • Central laboratory. • Central research of experimental animals

Matrices:

A- Content and ILOs matrix:

Topic	A) Knowledge and understanding	B) Intellectual skills	C) Professional and practical skills	D) General and transferable skills
Genetic expression	a1,a2	b1,b2,b3,	c1,c2,c3	d1,d2,d3
Regulation of protein synthesis	a1,a2	-	-	d1
Mutation and DNA repair mechanism	a1,a2,	b1,b2,b3	c1,c2,	d1,d2,d3
The genetic manipulation	a1,a2,		c2,	d1,d2,d3
Recombinant DNA and genetic engineering	a1,a2,	b3	c2,	d1
Methods for studying the genome	a1,a2,	b1,b2,	c1,c2,	d1,d2,d3
Inherited diseases of biochemical origin	a1,a2,	b2,b3	c1,c2,	d1,d2,d3
Immunogenetics	a1,a2,	b2,b3	c1,c2,	d1,d2,d3
Genetic resistance and pathogens	a1,a2,a3,a4 a5	b2,b3	c1,c2,	d1,d2,d3
Control of inherited diseases	a1,a2,a3,a4 a5,	b4 b5	c1,c2,c3,c4	d1,d2,d3

B- Teaching, learning and assessment methods:

ILOs		Teaching and Learning methods					
		L	P&M	D&S	p	Ps	Bs
Knowledge and understanding	a1	√				√	
	a2	√				√	
	a3	√				√	
	a4	√				√	
	a5	√				√	
Intellectual skills	b1	√		√			√
	b2	√		√			√
	b3	√		√			√
	b4	√		√			

	b5	√		√			
al and practical	c1				√		
	c2				√		
	c3				√		
	c4				√		
Genera skills	d1			√	√		
	d2	√	√			√	√
	d3	√	√	√	√	√	√

L **:Lecture,** P&M**: Presentations & Movies,** D&S: **Discussions & Seminars** PT**: Practical training,** Ps: **Problem solving,** Bs: **Brain storming**

C- Assessment methods and ILOS:

ILOs		assessment method				
		Formative	Semester 1hr exam	oral	practical	written
Knowledge and understanding	a1		√	√		√
	a2		√	√		√
	a3		√	√		√
	a4		√	√		√
	a5		√	√		√
Intellectual skills	b1	√	√	√		√
	b2	√	√	√		√
	b3	√	√	√		√
	b4	√	√	√		√
	b5	√	√	√		√
al and practical	c1				√	
	c2				√	
	c3				√	
	c4				√	
Genera skills	d1			√		
	d2	√		√		
	d3	√		√		

Course coordinator: Ass.Prof\ Olla Adel Khalifa
Head of department Prof. Dr. Sherif Ramadan
-Program coordinator: Prof. Dr. Mahmoud Abouelroos