GENETICS PRINCIPLES

ISCED UNIT CODE: 0511 551 18A

TVET CDACC UNIT CODE: APB/CU/AB/CC/01/6/MA

Relationship to occupational standards

This unit addresses the unit of competency: **Apply Genetics Principles**

Duration: 130hours

Unit Description

This unit describes the competencies required by an applied biology technologist to apply genetics principles. It involves applying cell division concepts, applying knowledge on Structure of nucleic acids, applying Mendelian law of inheritance, applying protein synthesis knowledge and carrying out animal and plant breeding.

Summary of Learning Outcomes

By the end of this unit, the learner should be able to:

S/No	Learning Outcomes	Duration (Hours)
1.	Apply cell division concepts	20
2.	Apply knowledge on structure of nucleic acids	30
3.	Apply mendelian law of inheritance	30
4	Apply protein synthesis knowledge	20
5	Carry out animal and plant breeding	30
	TOTAL	**130**

Learning Outcomes, Content and suggested methods of assessment

Learning Outcome	Content	Suggested methods of assessment
1. Apply Cell division concepts	1.1 Cell cycle 1.2 Cell division 1.2.1 Mitosis 1.2.2 Meiosis 1.3 Genetic crossing.	• Practical assessment • Project • Portfolio of evidence • Third party report • Written tests
2. Apply knowledge on Structure of nucleic acids	2.1 Structure of the chromosome 2.2 DNA structure and function 2.3 RNA structure and function 2.4 Mutation 2.4.1 Chromosomal mutations 2.4.2 Gene mutations 2.4.3 Advantageous and deleterious mutations 2.4.4 Causes of mutations 2.4.5 Mutation disorders	• Practical assessment • Project • Portfolio of evidence • Third party report • Written tests
3. Apply Mendelian law of inheritance	3.1 Mendelian principle of inheritance and deviations from the laws. 3.2 Punnet squares 3.2.1 Monohybrid and dihybrid crosses 3.3 Genes, DNA and Chromosomes 3.4 Gene interactions 3.4.1 Types of dominance 3.5 Genetic disorders 3.5.1 Sickle cell anaemia	• Practical assessment • Project • Portfolio of evidence • Written tests • Oral assessment

	3.5.2 Muscular dystrophy 3.5.3 Cystic fibrosis 3.5.4 Albinism 3.5.5 Huntington's disease 3.5.6 Down's syndrome 3.5.7 Klinefelter's syndrome 3.5.8 Turner's Syndrome 3.5.9 Erythroblastis fetalis 3.5.10 Haemophilia	
4. Apply rotein synthesis nowledge	4.1 DNA replication 4.2 DNA transcription 4.3 DNA translation	• Practical assessment • Project • Portfolio of evidence • Written tests • Oral assessment
5. Carry out Animal and plant breeding	5.1 Animal and plant breeding materials 5.1.1 Sex determination 5.2 Types of breeding 5.2.1 Natural and artificial breeding 5.2.2 Selective breeding 5.2.3 Inbreeding 5.2.4 Crossbreeding 5.2.5 Outbreeding/outcrossing 5.2.6 Hybridization breeding 5.2.7 Line breeding 5.2.8 Cloning 5.2.9 Captive breeding 5.3 Sexual reproduction 5.3.1 Pollination 5.3.2 Fertilization	• Practical assessment • Project • Portfolio of evidence • Written tests • Oral assessment

	1.4 Results of breeding 1.5 Effects of breeding	

Suggested Methods of instruction

- Practical
- Projects
- Group discussions
- Demonstration
- Field trips/site visits

Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	Learning Materials			
1)	Power point presentations	For trainer's use	1	1:25
2)	Relevant videos	For trainees and trainer's use	Varies	Varies
B	Learning Facilities & infrastructure			
3)	Lecture/theory room	For trainees and trainer's use	1	1:25
4)	Well-equipped Biology laboratory	For trainees and trainer's use	1 facility	1:25
5)	Computers	For trainee's	5	1:5
6)	Whiteboard	For trainer's use	1	1:15
7)	Internet	For trainees and trainer's use	1 connection	1:25
C	Consumable materials			
8)	Printing papers	For trainees use		

9)	White board makers	For trainees and trainer's use		
D	Tools and Equipment			
10)	Microscopes	For trainee's use	5	1:5
11)	Centrifuges	For trainee's use	2	1:13
12)	Refrigerator	For trainer's use	1	1:25
13)	Spectrophotometer	For trainee's use	1	1:25
14)	Incubator	For trainee's use	1	1:25
15)	PCR thermocycler	For trainee's use	1	1:25
16)	Gel Electrophoresis equipment	For trainee's use	1	1:25
17)	Assorted molecular biology equipment and reagents	For trainers and trainee's use	Varies	Varies
18)	Gel Doc system	For trainee's use	1	1:25
19)	Assorted laboratory animals	For trainee's use	5	1:5
20)	Projector	For trainer's use	1	1:25