

AGI5569 Molecular biology and biotechnology

Level	5
Course Code	AGI5569
Course Title	Molecular biology and biotechnology
Credit value	5
Core/Optional	Core
Course Aim/s	To provide theoretical and practical insights to develop the agriculture production.
Course Learning Outcomes (CLO):	<p>At the completion of this course student will be able to,</p> <p>CLO1: Explain the DNA; the basic unit of life [PO1] [PO2] [PO3] [PO4]</p> <p>CLO2: Discuss the major metabolic reactions in life; DNA replication and protein synthesis. [PO1] [PO2] [PO3]</p> <p>CLO3: Identify the basic techniques in gene manipulation. [PO1] [PO2] [PO3]</p> <p>CLO4: Explain the vectors and its activities [PO1] [PO2] [PO3]</p> <p>CLO5: Explain the DNA libraries. [PO1] [PO2] [PO3]</p> <p>CLO6: Discuss the use of probes in gene recombination. [PO1] [PO2] [PO3] [PO4]</p> <p>CLO7: Identify the PCR mediated gene cloning. [PO1] [PO2] [PO3] [PO4]</p> <p>CLO8: Explain the plant tissue culture techniques. [PO1] [PO2] [PO3] [PO4]</p> <p>CLO9: Discuss the different ways of utilising tissue culture in biotechnology. [PO1] [PO2] [PO3] [PO4]</p> <p>CLO10: Identify the Endogenous and Exogenous Factors in plant tissue culture [PO1] [PO2] [PO3] [PO4] [PO11]</p> <p>CLO11: Discuss the genetic problems and gene technology [PO1] [PO2] [PO3] [PO4] [PO11]</p>
Content (Main topics, sub topics)	<p>Outline Syllabus</p> <p>Unit 1: Molecular biology</p> <p style="padding-left: 20px;">Session 1: Studying the molecules of life.</p> <p style="padding-left: 20px;">Session 2: DNA: The repository of biological information</p> <p style="padding-left: 20px;">Session 3: Chemical basis of biological information</p> <p style="padding-left: 20px;">Session 4: Protein structure and function</p> <p style="padding-left: 20px;">Session 5: Genes and Genomes</p> <p style="padding-left: 20px;">Session 6: DNA replication</p> <p style="padding-left: 20px;">Session 7: DNA mutation and repair</p> <p style="padding-left: 20px;">Session 8: Protein synthesis</p> <p>Unit 2: Biotechnology - Recombinant DNA Technology and Genetic Engineering</p> <p style="padding-left: 20px;">Session 09: Basic techniques in gene manipulation</p> <p style="padding-left: 20px;">Session 10: Cutting and joining DNA molecules</p> <p style="padding-left: 20px;">Session 11: Introduction of plasmid and phage vectors</p> <p style="padding-left: 20px;">Session 12: Cosmids and other advanced vectors</p> <p style="padding-left: 20px;">Session 13: Gene cloning</p> <p style="padding-left: 20px;">Session 14: Constructing and screening DNA libraries</p> <p style="padding-left: 20px;">Session 15: Probes</p> <p style="padding-left: 20px;">Session 16: Reporter Genes</p> <p style="padding-left: 20px;">Session 17: Southern Blot Hybridization</p> <p style="padding-left: 20px;">Session 18: Northern Blot Hybridization</p> <p style="padding-left: 20px;">Session 19: Polymerase Chain Reaction</p> <p style="padding-left: 20px;">Session 20: Sequencing genes</p>

Session 21: PCR mediated gene cloning

Session 22: Restriction mapping

Session 23: Methods of selecting/screening desired Recombinants

Unit 3: Biotechnology - Plant tissue culture

Session 24: Introduction of plant tissue culture

Session 25: Establishment of tissue culture systems

Session 26: Types of *In Vitro* Cultures

Session 27: Endogenous and Exogenous Factors in plant tissue culture

Session 28: Cell Division, Cell Growth, Cell Differentiation

Session 29: Phytohormones and Growth Regulators

Session 30: Genetic Problems and Gene Technology

Laboratory Work: Yes

1. Maintaining a tissue culture cycle.
2. DNA isolation
3. PCR running
4. Gel electrophoresis
5. Southern blotting