



## MAHATMA GANDHI UNIVERSITY, KERALA

### Abstract

Bachelor of Science (Honours) Biotechnology - Fifth Semester - Modifications to the Course Outcomes, Course Content and Mode of Assessment - Approved - Orders Issued.

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### ACA 16

No. 5568/ACA 16/2026/MGU

Priyadarsini Hills, Dated: 02.06.2026

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*Read:-* 1. U.O.No.5797/AC A16/2024/MGU, dated.27.06.2024.

2. Minutes of the meeting of the Expert Committee on Biotechnology (UG).

3. Orders of the Vice Chancellor under Section 10(17), Chapter III of the Mahatma Gandhi University Act 1985, dated. 31.05.2026

### ORDER

The syllabi of various Honours Under Graduate Programmes coming under The MGU-UGP (Honours) Regulations, 2024, have been approved vide paper read as (1) above and published on the website of the University.

The Expert Committee on Biotechnology (UG), discussed the need to modify the Course Outcomes, Course Content and Mode of Assessment of DSC/DSE/SEC type courses, to modify the Course Details of the course MG5DSEBTG301: Basic Bioinformatics, to modify the Course Summary of DSE type courses, and to modify the Pre-requisites of DSE/SEC type courses, in the Fifth Semester syllabus of **Bachelor of Science (Honours) Biotechnology** programme, and has submitted recommendations vide paper read as (2) above.

### ***(Recommendations are attached as Annexure)***

Considering the urgency, sanction has been accorded by the Vice Chancellor, in exercise of the powers of the Academic Council vested upon him under Section 10(17), Chapter III of the Mahatma Gandhi University Act 1985, vide paper read as (3) above, to approve the said recommendations.

Hence, the Course Outcomes, Course Content and Mode of Assessment of the said courses in the Fifth Semester syllabus of **Bachelor of Science (Honours) Biotechnology** programme, stands modified to this extent.

Orders are issued accordingly.

SIJI ANNA KURIEN

ASSISTANT REGISTRAR III  
(ACADEMIC)  
For REGISTRAR

Copy To

1. PS to VC
2. PA to Registrar/CE
3. Convenor, Expert Committee, Biotechnology (UG)
4. JR 2 (Admin)/DR 2, AR 3 (Academic)
5. JR/DR/AR (Exam)
6. Tabulation/Academic Sections concerned
7. AC C1/AC C2 Sections
8. IT Cell 3/OQPM1 Sections
9. PRO/IQAC/Records Sections
10. Stock File/File Copy

File No. 11740/AC A16-3/2026/ACA 16.

Forwarded / By Order

Section Officer

The document is digitally approved. Hence signature is not needed.

## Annexure

### Semester V

**Course Name: Recombinant DNA Technology**

**Course Code: MG5DSCBTG300**

#### **COURSE OUTCOMES (CO)**

CO No.	Expected Course Outcome (Modified)	Learning Domains (Modified)	PO No. (Modified)	Page No
1	No Change			79
2	Understand cloning vectors' role in introducing recombinant DNA and the pros and cons of different expression systems.	U	No Change	
3	Analyse the components of a gene cloning experiment, evaluating variables and controls, and examine innovative applications of genetic engineering in emerging fields.	An, E		
4	Able to perform isolation of DNA and plasmid, restriction digestion, transformation and PCR.	S	1,2,3	
5	Removed			
6				

Typographical Error Rectified	<b>Evaluate (E)</b>	Page No: 79
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#### **COURSE CONTENT**

##### **Content for Classroom Transaction (Units)**

Module (Modified)	Units	Course Description (Modified)	Hrs.	CO No. (Modified)	Page No
1 Introduction and Tools in rDNA technology	1.1	No Change	No Change	No Change	80,81
	1.2				
	1.3	Cloning Vectors – Plasmids and their desirable properties, E coli based vectors – pBR, pSC, pUC, pGEM3Z. M13 based vectors. Bacteriophages λ EMBL Cosmids, Phasmid. Phagemids with special reference to pBluescript, pLITMUS.		1	

	1.4	In vitro packaging, phage display. Gateway Cloning, TA cloning. Shuttle Vectors -pCAMBIA, Vectors for Yeast (YEP, YIP, YRP, YCP, YAC) Artificial Chromosomes-BAC, MAC, PAC		1	
	1.5	No Change	No Change	1	
2 Gene Transfer Techniques, Screening and Advanced technology in rDNA	2.1			No Change	
	2.2			2	
	2.3			2	
	2.4			2	
	2.5			2	
3 Bioinstrumentation and application in rDNA	3.1			3	
	3.2			3	
	3.3			3	
	3.4			3	
4 Practicals	4.1			4	
	4.2			4	
	4.3			4	
	4.4			4	
	4.5			4	
	4.6	4			
5	Teacher Specific Content				

### **MODE OF ASSESSMENT (Modified)**

#### **A. Continuous Comprehensive Assessment (CCA)**

<b>Theory</b>	<b>Page No</b>
20+5 (for Teacher Specific Content) = 25 Marks	82

#### **B. End Semester Evaluation (ESE)**

<b>1.Theory</b>			
<b>Max.Marks: 50</b>		<b>Duration: 1.5Hrs</b>	
<b>Type of Questions</b>	<b>Number of Questions to be answered</b>	<b>Marks</b>	<b>Page No</b>
One Word Answer	10 out of 12	10 x 2 = 20	82
Short Essay	4 out of 6	4 x 5 = 20	
Essay	1 out of 2	1 x 10 = 10	

<b>2. Practical</b>	<b>Page No</b>
<b>Max.Marks: 35</b>	<b>Duration : 3 Hrs.</b>
	82

**Course Name: Enzyme Technology**  
**Course Code: MG5DSCBTG301**

### **COURSE OUTCOMES (CO)**

CO No.	Expected Course Outcome (Modified)	Learning Domains (Modified)	PO No. (Modified)	Page No
	Upon completion of this course in Enzyme Technology, the students should be able to:			
1	Understand the biological importance of enzymes, their structure-function correlation, and classification using the EC numbering system.	No Change	No Change	84
2	Describe enzyme kinetics, including Michaelis-Menten dynamics and influencing factors.			
3	Explain enzyme regulation, including allosteric control and feedback inhibition.			
4	Analyze the role of enzymes in biotechnology, medicine, and environmental science, exploring their diverse applications and future trends in enzymology.	An		
5	Demonstrate the ability to determine the enzyme activity using amylase assays, study the effects of pH, temperature, metal ions, and inhibitors, and perform enzyme immobilization with activity analysis.	S	2,3	
6	Removed			
7				

### **COURSE CONTENT**

#### **Content for Classroom Transaction (Units)**

Module	Units	Course Description	Hrs.	CO No. (Modified)	Page No
1	1.1	No Change	No Change	No Change	85
	1.2			1	



**Course Name: Biotechnology and Entrepreneurship**  
**Course Code: MG5DSEBTG300**

<b>Course Summary (Modified)</b>	The course provides an insight into various legal and market perspectives along with awareness on opportunities globally. It also means to provide the students with a comprehensive understanding of Bio entrepreneurship and equip them with necessary skills.	<b>Page No : 87</b>
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**COURSE OUTCOMES (CO)**

<b>CO No.</b>	<b>Expected Course Outcome (Modified)</b>	<b>Learning Domains (Modified)</b>	<b>PO No. (Modified)</b>	<b>Page No</b>
1	Explore the evolution of bio-entrepreneurship, its scope, significance, and connection to biotechnology, highlighting its role in driving innovation and economic growth.	U	No Change	87,88
2	Critically evaluate the legal and ethical implications of intellectual property rights in entrepreneurship, and assess the effectiveness of market research and branding strategies in the biotechnology sector.	E	1,2,3	
3	Apply government policies, funding opportunities, and global collaborations to craft a comprehensive entrepreneurship business plan, demonstrating practical application.	No Change	No Change	
4	Assess the ethical implications and societal impacts of entrepreneurship in agricultural, medical, industrial and environmental biotechnology.			
5	Removed			
6				

## COURSE CONTENT

### Content for Classroom Transaction (Units)

Module	Units	Course Description	Hrs.	CO No. (Modified)	Page No									
1	1.1	No Change	No Change	No Change	88,89									
	1.2													
	1.3													
	1.4													
	1.5													
	1.6													
2	2.1			No Change		No Change	2	88,89						
	2.2						2							
	2.3						2							
	2.4						2							
3	3.1						No Change		No Change	3	88,89			
	3.2									3				
	3.3									3				
	3.4									3				
4	4.1									No Change		No Change	4	88,89
	4.2												4	
	4.3												4	
	4.4												4	
	4.5												4	
5	Teacher Specific Content													

### MODE OF ASSESSMENT (Modified)

#### A. Continuous Comprehensive Assessment (CCA)

Theory	Page No
25+5 (for Teacher Specific Content) = 30 Marks	89

#### B. End Semester Evaluation (ESE)

Theory			
Max.Marks: 70		Duration: 2 Hrs	
Type of Questions	Number of Questions to be answered	Marks	Page No
One Word Answer	10 out of 12	10 x 2 = 20	89
Short Essay	4 out of 6	4 x 5 = 20	
Essay	2 out of 4	2 x 15 = 30	

**Course Name: Basic Bioinformatics****Course Code: MG5DSEBTG301**

<b>Course Summary (Modified)</b>	The course aims to equip students with the knowledge and skills needed to analyse and interpret data, fostering an understanding of the computational methods used in modern biological research. The course will update the students in advances in both biology and computational techniques.	<b>Page No : 91</b>
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<b>Course Details (Modified)</b>	<b>Learning Approach</b>	Lecture	Tutorial	Practical	Others	Total Hours	<b>Page No.</b>
		4	0	0	0	60	91

Typographical Error Rectified	<b>Evaluate (E)</b>	Page No: 91
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**COURSE CONTENT****Content for Classroom Transaction (Units)**

<b>Module</b>	<b>Units</b>	<b>Course Description (Modified)</b>	<b>Hrs. (Modified)</b>	<b>CO No.</b>	<b>Page No.</b>
1	1.1	No Change	3	No Change	92
	1.2		3		
	1.3		No Change		
2	2.1		5		
	2.2		3		
	2.3		5		
	2.4		3		
3	3.1		4		
	3.2		3		
	3.3		Phylogenetic analysis-Phylip. Homology modelling. Tivixe Activity:-Construct a phylogenetic tree using a small set of protein or DNA sequences		
	3.4	No Change	No Change		

4	4.1	No Change	5	No Change	
	4.2		No Change		
	4.3		5		
	4.4		No Change		
5	Teacher Specific Content				

### **MODE OF ASSESSMENT (Modified)**

#### **A. Continuous Comprehensive Assessment (CCA)**

<b>Theory</b>	<b>Page No</b>
25+5 (for Teacher Specific Content) = 30 Marks	93

#### **B. End Semester Evaluation (ESE)**

<b>Theory</b>			
<b>Max.Marks: 70</b>		<b>Duration: 2 Hrs</b>	
<b>Type of Questions</b>	<b>Number of Questions to be answered</b>	<b>Marks</b>	<b>Page No</b>
One Word Answer	10 out of 12	10 x 2 = 20	93
Short Essay	4 out of 6	4 x 5 = 20	
Essay	2 out of 4	2 x 15 = 30	

**Course Name: Bioprocess Technology**

**Course Code: MG5DSEBTG302**

#### **COURSE OUTCOMES (CO)**

<b>CO No.</b>	<b>Expected Course Outcome (Modified)</b>	<b>Learning Domains (Modified)</b>	<b>PO No. (Modified)</b>	<b>Page No.</b>
	<b>Upon completion of this course in Bioprocess Technology, students should be able to:</b>			
1	Define and explain the fundamental concepts of Bioprocess technology while understanding and differentiating various fermentation processes.	No Change		94
2	Perform isolation and screening of industrially important microorganisms.	A	1,2	
3	Formulate fermentation media and explain the principles of bioreactor design.	C	2,6,10	

4	Employ the proper downstream processing techniques to recover and purify products from fermentation processes.	A	1,6	
5	Removed			

## COURSE CONTENT

### Content for Classroom Transaction (Units)

Module	Units	Course Description	Hrs.	CO No. (Modified)	Page No			
1	1.1	No Change	No Change	No Change	95			
	1.2			1				
	1.3			1				
	1.4			1				
2	2.1			2				
	2.2			2				
	2.3			2				
3	3.1			3				
	3.2			3				
	3.3			3				
	3.4			3				
4	4.1			4				
	4.2			4				
	4.3			4				
5	Teacher Specific Content							

### MODE OF ASSESSMENT (Modified)

#### A. Continuous Comprehensive Assessment (CCA)

Theory	Page No
25+5 (for Teacher Specific Content) = 30 Marks	96

#### B. End Semester Evaluation (ESE)

Theory			
Max.Marks: 70		Duration: 2 Hrs	
Type of Questions	Number of Questions to be answered	Marks	Page No
One Word Answer	10 out of 12	10 x 2 = 20	96

Short Essay	4 out of 6	4 x 5 = 20	
Essay	2 out of 4	2 x 15 = 30	

**Course Name: Marine Biotechnology**  
**Course Code: MG5DSEBTG303**

<b>Pre-requisites (Modified)</b>	Need to complete difficulty level 200-299 level courses.	<b>Page No : 97</b>
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**COURSE OUTCOMES (CO)**

CO No.	Expected Course Outcome (Modified)	Learning Domains (Modified)	PO No. (Modified)	Page No.
1	Define the scope of Marine Biotechnology, covering basic marine biology concepts, identification of key marine organisms, and fundamentals of genetic diversity in marine life.	No Change	No Change	97,98
2	Able to design strategies for the sustainable production of Marine bioproducts, Drugs and Therapeutics.	An		
3	Differentiate various techniques for sampling and analysis and molecular techniques for marine identification of marine microbes	U		
4	They can discuss the challenges and opportunities in marine pollution, bioremediation and conservation.	An	1,2,9	
5	Removed			

**COURSE CONTENT**

**Content for Classroom Transaction (Units)**

Module	Units	Course Description	Hrs.	CO No. (Modified)	Page No
4	4.1	No Change		2	98
	4.2			4	
5	Teacher Specific Content				

## MODE OF ASSESSMENT (Modified)

### A. Continuous Comprehensive Assessment (CCA)

<b>Theory</b>	<b>Page No</b>
25+5 (for Teacher Specific Content) = 30 Marks	99

### B. End Semester Evaluation (ESE)

<b>Theory</b>			
<b>Max.Marks: 70</b>			<b>Duration: 2 Hrs</b>
<b>Type of Questions</b>	<b>Number of Questions to be answered</b>	<b>Marks</b>	<b>Page No</b>
One Word Answer	10 out of 12	10 x 2 = 20	99
Short Essay	4 out of 6	4 x 5 = 20	
Essay	2 out of 4	2 x 15 = 30	

**Course Name: Scientific Communication in Research**

**Course Code: MG5SECBTG300**

<b>Pre-requisites (Modified)</b>	Need to complete 200-299 level courses	<b>Page No : 100</b>
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### COURSE OUTCOMES (CO)

<b>CO No.</b>	<b>Expected Course Outcome (Modified)</b>	<b>Learning Domains (Modified)</b>	<b>PO No. (Modified)</b>	<b>Page No</b>
1	Students will be able to recall the principles of scientific communication, develop creative research concepts, apply inductive and deductive reasoning, and formulate testable hypotheses with structured reasoning and appropriate validation strategies.	No Change	No Change	100
2	Students will be able to produce structured scientific documents, use visual aids effectively, navigate peer review, practice in	S		

	scientific writing and presentations, and uphold research ethics.		
3	Students will understand the significance of scientific publication indexing, navigate major indexing databases, evaluate and select reputable journals, interpret citation metrics, and explore the benefits and challenges of open-access publishing.	U,E	1,2,3
4	Students will be able to address ethical issues in scientific publishing, including plagiarism and authorship, and effectively navigate indexing databases through practical exercises and case study analysis.	A	No Change
5	Removed		

## COURSE CONTENT

### Content for Classroom Transaction (Units)

Module	Units	Course Description (Modified)	Hrs.	CO No (Modified)	Page No
1	1.1	No Change	No Change	No Change	101,102
	1.2				
	1.3				
	1.4				
	1.5				
	1.6				
	1.7				
	1.8	Presentations-thumb rules and good practice. Ethics in research reporting.		2	
2	2.1	No Change	No Change	No Change	101,102
	2.2				
	2.3				
	2.4				
	2.5				
	2.6				
3	3.1	No Change	No Change	No Change	101,102
	3.2				
4	Teacher Specific Content				

## MODE OF ASSESSMENT (Modified)

### A. Continuous Comprehensive Assessment (CCA)

Theory	Page No
20+5 (for Teacher Specific Content) = 25 Marks	102

### B. End Semester Evaluation (ESE)

1.Theory			
<b>Max.Marks: 50</b>		<b>Duration: 1.5Hrs</b>	
Type of Questions	Number of Questions to be answered	Marks	Page No
One Word Answer	10 out of 12	$10 \times 2 = 20$	102
Short Essay	4 out of 6	$4 \times 5 = 20$	
Essay	1 out of 2	$1 \times 10 = 10$	