

A collection of handwritten signatures and initials in black ink on a white background. The signatures are scattered across the page, including a large, stylized signature at the top left, a signature with the date '29.04.23' below it in the center, and several smaller initials and signatures around the edges. The handwriting is cursive and fluid.



# Graphic Era

Deemed to be University

Accredited by NAAC with Grade A

NBA Accredited Programs in ECE, CSE & ME

Approved by AICTE, Ministry of HRD, Govt. of India

Bell Road, Clement Town  
Dehradun-248002 Uttarakhand  
Ph. : 0135-2644183, 2642799,  
Fax : 0135-2644025  
www.geu.ac.in

## VISION

Vision of Department of Biotechnology is to make industry ready competent, ethically engaged, professionals that can transform the world with a potential to innovate, invent and disseminate knowledge for the benefit of society and environment as per the need and challenges.

## MISSION

M1: Regular updating of course curriculum as per the demand of Biotechnology industry and academia.

M2: Be recognized as centre of excellence in teaching, learning and research.

M3: Entrepreneurship skill development.

*Handwritten signatures and initials:*

- Large signature: *Sanjay*
- Initials: *GPY*, *2/*
- Signature: *Prat*
- Initials: *IT*
- Initials: *RV*
- Initials: *R*
- Initials: *Ra*
- Initials: *Ki*
- Initials: *Pr*

### PROGRAM OUTCOMES (POs)

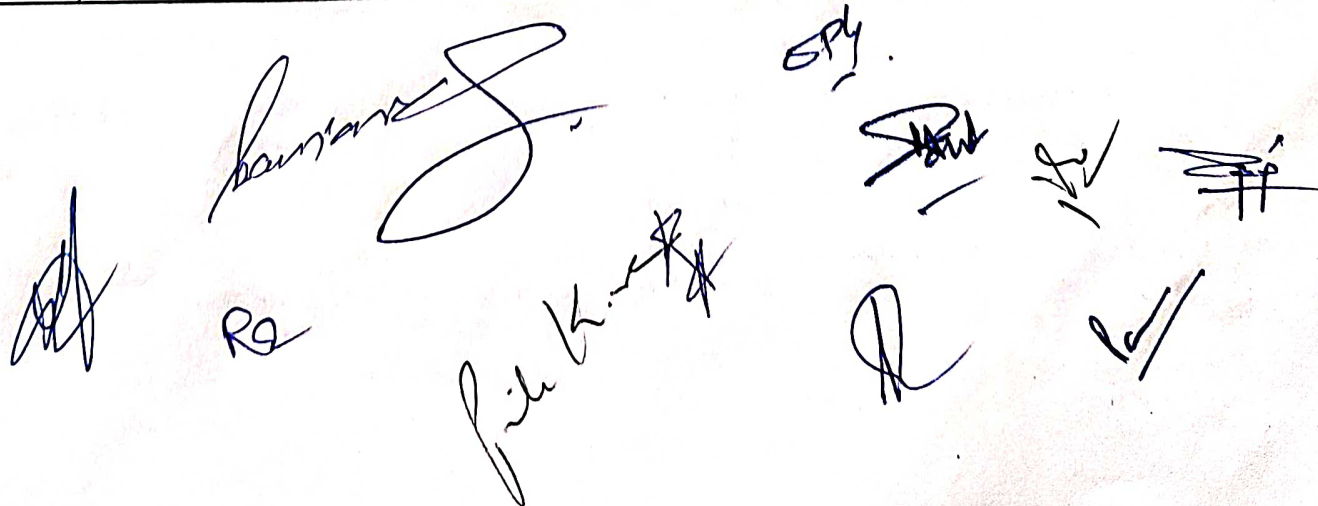
PO1	Students will acquire advanced knowledge of principles and processes underlying Biotechnology.
PO2	Students will develop high skills and research intelligence to conduct independent research in Life Sciences area such as Biochemistry, Microbiology and Biotechnology.
PO3	Students will understand and develop ability to solve problems related to society, health, environment, food security and sustainable development
PO4	Students will be able to understand regulatory norms, and will adopt ethical practices in the pursuit of science.
PO5	Students will be able to participate in scientific conferences, seminars and research paper writings.

### PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1	To provide basic knowledge of principles and processes involved in growth, evolution and classification of various microorganisms, plants and animals.
PSO2	To develop the postgraduates with essential skills in handling and processing living cells (microbes, plants and animals)
PSO3	To inculcate ability to solve problems related to society, health, environment, agriculture and food.
PSO4	To develop scientific temper, communication skill and ethical practices and biosafety guidelines in the pursuit of sciences

### PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1	Understand and apply the concepts of biotechnology, microbiology and food technology, including related aspects of science and technology for pursuing higher studies, successful careers in industry and as successful entrepreneur.
PEO2	Apply the acquired practical skills and broad biotechnological training in product, process and techniques development to meet the societal demands
PEO3	Participate in individual and team based multidisciplinary project, demonstrate professional and ethical attitude with awareness on health, environment and sustainable development.

A collection of handwritten signatures and initials in blue ink, including a large stylized signature, 'RQ', 'Sury', and several other initials.



# GraphicEra

Deemed to be University  
Accredited by NAAC with Grade A  
NBA Accredited Programs in ECE, CSE & ME  
Approved by AICTE, Ministry of HRD, Govt. of India

Bell Road, Clement Town  
Dehradun-248002 Uttarakhand  
Ph. : 0135-2644183, 2642799,  
Fax : 0135-2644025  
www.geu.ac.in

## M.Sc. Biotechnology

### COURSE COMPONENTS OF ACADEMIC PROGRAMME

Minimum duration: 4 Semesters (2 years)

Maximum Duration: 6 Semesters (3 years)

Total Number of Credits: 93 credits

	Course Components	Credits
1.	<b>Compulsory Course</b>	
	I. Foundation Course (FC)	00
	II. Core Course(CC)	61
2.	<b>Elective Course</b>	
	I.Departmental Electives (DE)	06
	II. Interdepartmental Electives (IE)	00
3.	<b>Discipline-Centric Ability Enhancement Course</b>	
	I. Seminar (SM)	03
	II. Project (PJ)	16
	III. Dissertation (DS)	00
	IV. Skill (SK) and Ability Enhancement Course (AEC)	04
	V. Comprehensive (CM)	00
4.	<b>General Course</b>	
	I. Human Values, Health Care and Professional Ethics (HP)	00
	II. Healthy Living and Fitness (HF)	00
	III. Disaster Management (DM)	00
	IV. General Proficiency (GP)	03

**Requirements of Award of Degree: Total Credits- 93; CGPA $\geq$ 4.5 and any other condition as per regulation and ordinance**

5. Audit Course

*SPY.*

*Sanjay*

*Re*

*Pratik*

*SPY*

*SPY*

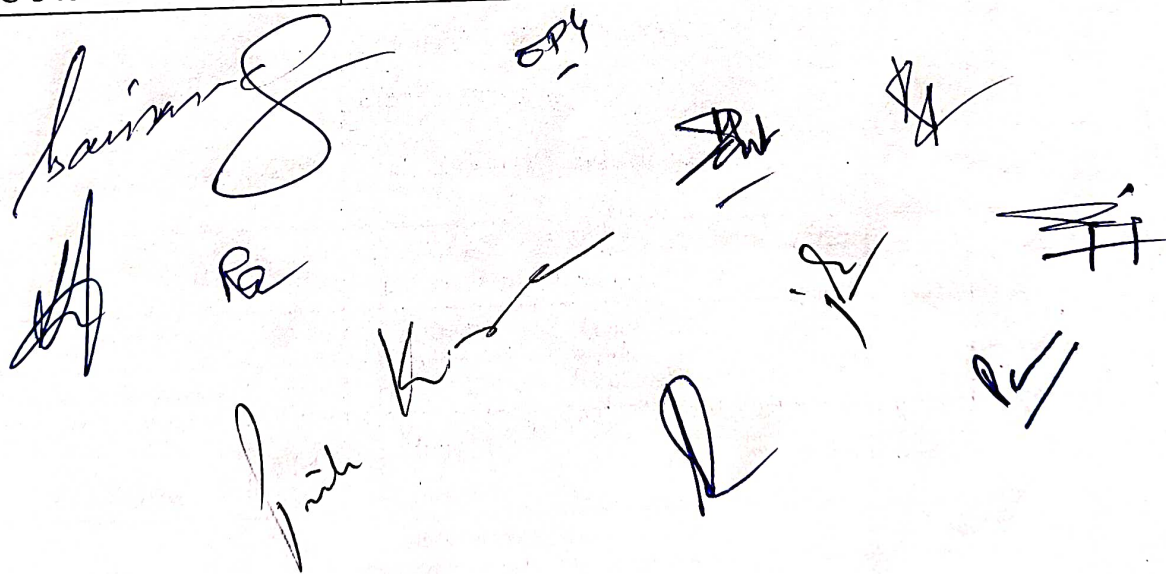
*SPY*

*SPY*

*SPY*

**CORE COURSES**  
(Total courses- 13, Total credits- 61)

S.No.	Course Code	Course Name	Credits (L+P)
1	MSC-110	Cell & Developmental Biology	3+2
2	MSC-120	Biochemistry	3+2
3	MSC-130	Microbial technology	3+2
4	MSC-140	Genetics & Molecular Biology	3+2
5	MSC-150	Computer Applications and Biomathematics	3+2
6	MSC-210	Immunology	3+2
7	MSC-220	Recombinant DNA Technology	3+2
8	MSC-230	Plant Biotechnology	3+2
9	MSC-240	IPR, Biosafety and Bioethics	3+0
10	MSC-250	Bioanalytical Techniques	3+0
11	MSC-310	Animal Biotechnology	3+2
12	MSC-320	Omics Technologies	3+2
13	MSC-340	Bioinformatics and computational Biology	3+2


 A collection of handwritten signatures and initials in black ink, scattered below the table. The signatures vary in style, including cursive and block letters. Some initials are accompanied by small marks or symbols.

**ELECTIVE COURSES (Departmental Electives -DE)**  
**(Total courses- 10 (to be opted 2), Total credits- 06)**

S.No.	Course Code	Course Name	Credits (L+P)
1	MSC-330a	-Environmental Biotechnology	3+0
2	MSC-330b	Bioprocess Engineering and Industrial Biotechnology	3+0
3	MSC- 330c	Metabolic Engineering	3+0
4	MSC-330d	Agricultural Biotechnology	3+0
5	MSC-330e	Advance Molecular Biology	3+0
6	MSC-350a	Pharmaceutical Biotechnology	3+0
7	MSC-350b	Food Bio Technology	3+0
8	MSC- 350c	Virology	3+0
9	MSC- 350d	Systems Biology	3+0
10	MSC- 350e	Embryology	3+0

### DISCIPLINE- CENTRIC ABILITY ENHANCEMENT COURSES

**DISCIPLINE- CENTRIC ABILITY ENHANCEMENT COURSES**  
Seminar (SM), Skill Enhancement Course (SK), Ability Enhancement Course (AEC), Project (PJ)

(Total courses-, Total credits- 23)

S.No.	Course Code	Course	Course Name	Credits (L+P)
1	MSCS-170	SM	Seminar and Research Orientation	1+0
2	MSCS-270	SM	Seminar and Research Orientation	1+0
3	MSCS-360	SM	Seminar and Research Orientation	1+0
6	MSC-160	AEC	Professional Communication	2+0
7	MSC-260	SK	Career Skills	2+0
10	MSC-410	PJ	Project Dissertation	16+0

~~Re~~ Rainang  
Re  
Pile Kh...  
SPY.  
~~Stink~~  
R  
Sh  
Th  
Pa

**GENERAL COURSES**  
General Proficiency (GP)  
(Total courses-3, Total credits- 03)

S.No.	Course Code	Course Name	Credits
1	GP-101	General Proficiency	1
2	GP-201	General Proficiency	1
3	GP-301	General Proficiency	1

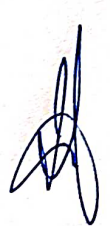
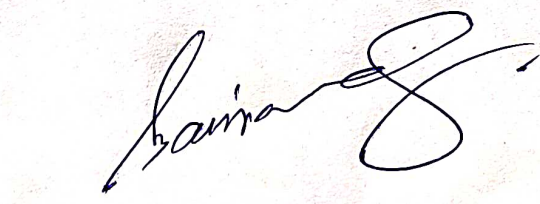
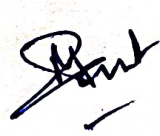


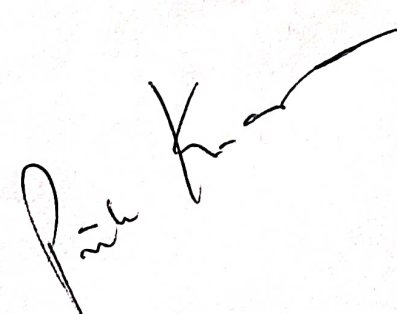


*Sanjay* *SP* *SP* *SP*  
*Ra* *SP* *SP* *SP*  
*R* *SP* *SP* *SP*

# CURRICULAR STRUCTURE AND EVALUATION SCHEME


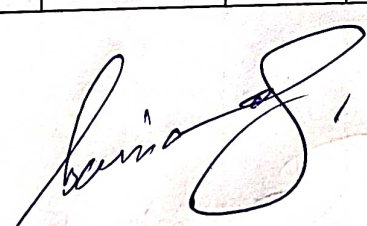

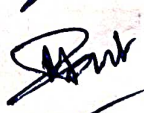




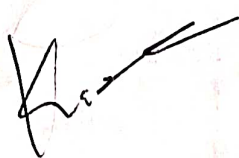


SESSION: Autumn					SEMESTER:I					
COURSE MODULE				TEACHING PERIODS			WEIGHTAGE : EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
MSC-110	Cell & Developmental Biology	CC	3	3	-	-	25	25	50	100
MSC-120	Biochemistry	CC	3	3	-	-	25	25	50	100
MSC-130	Microbial technology	CC	3	3	-	-	25	25	50	100
MSC-140	Genetics & Molecular Biology	CC	3	3	-	-	25	25	50	100
MSC-150	Computer Applications and Biomathematics	CC	3	3	-	-	25	25	50	100
MSC-160	Professional Communication	AEC	2	2	-	-	25	25	50	100
MSCS-170	Seminar and Research Orientation	SM	1	-	-	-	-	-	-	100
<b>LABS</b>										
MSCL-110	Cell & Developmental Biology Lab	CC	2	-	1	2	25	25	50	100
MSCL-120	Biochemistry Lab	CC	2	-	1	2	25	25	50	100
MSCL-130	Microbial technology Lab	CC	2	-	1	2	25	25	50	100
MSCL-140	Genetics & Molecular Biology Lab	CC	2	-	1	2	25	25	50	100
MSCL-150	Computer Application Lab	CC	2		1	2	25	25	50	100
GP-101	General Proficiency	GP	1	-	-	-	-	-	-	100
<b>Total</b>			<b>29</b>	<b>17</b>	<b>5</b>	<b>10</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1300</b>

SESSION: Spring			SEMESTER:II		
COURSE MODULE			TEACHING		WEIGHTAGE : EVALUATION

COURSE				PERIODS						
Code	Title	Component	Credits	L	T	P	CWA	MSE	ESE	Total
MSC-210	Immunology	CC	3	3	-	-	25	25	50	100
MSC-220	Recombinant DNA Technology	CC	3	3	-	-	25	25	50	100
MSC-230	Plant Biotechnology	CC	3	3	-	-	25	25	50	100
MSC-240	IPR, Biosafety and Bioethics	CC	3	3	-	-	25	25	50	100
MSC-250	Bioanalytical Techniques	CC	3	3	-	-	25	25	50	100
MSC-260	Career Skill	SK	2	2	-	-	25	25	50	100
MSCS-270	Seminar and Research Orientation	SM	1	-	-	-	-	-	-	100
<b>LABS</b>										
MSCL-210	Immunology Lab	CC	2	-	1	2	25	25	50	100
MSCL-220	Recombinant DNA Technology Lab	CC	2	-	1	2	25	25	50	100
MSCL-230	Plant Biotechnology Lab	CC	2	-	1	2	25	25	50	100
GP-201	General Proficiency	GP	1	-	-	-	-	-	-	100
<b>Total</b>			<b>25</b>	<b>17</b>	<b>3</b>	<b>6</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1100</b>






  
 RE
 



SESSION: Autumn					SEMESTER: III						
COURSE MODULE					TEACHING PERIODS			WEIGHTAGE: EVALUATION			
COURSE				Credits	L	T	P	C WA	MSE	ESE	Total
Code	Title	Component									
MSC-310	Animal Biotechnology	CC	3	3	-	-		25	25	50	100
MSC-320	Omics Technologies	CC	3	3	-	-		25	25	50	100
Elective-I			DE	3	3	-	-	25	25	50	100
MSC-330a	-Environmental Biotechnology										
MSC-330b	Bioprocess Engineering and Industrial Biotechnology										
MSC-330c	Metabolic Engineering										
MSC-330d	Agricultural Biotechnology										
MSC-330e	Advance Molecular Biology										
MSC-340	Bioinformatics & Computational Biology	CC	3	3	-	-		25	25	50	100

Elective-II											
MSC-350a	Pharmaceutical Biotechnology	DE	3	3	-	-	25	25	50	100	
MSC-350b	Food Bio Technology										
MSC 350c	Virology										
MSC 350d	Systems Biology										
MSC 350e	Embryology										
MSC-360	Seminar and Research Orientation	SM	1	-	-	-	-	-	-	100	
LABS											
MSCL-310	Animal Biotechnology Lab	CC	2	-	1	2	25	25	50	100	
MSCL-320	Omics Technology Lab	CC	2	-	1	2	25	25	50	100	
MSCL-340	Bioinformatics & Computational Biology Lab	CC	2	-	1	2	25	25	50	100	
GP-301	General Proficiency	GP	1	-	-	-	-	-	-	100	
Total			23	15	3	6	-	-	-	1000	

SESSION: Spring					SEMESTER			IV			
COURSE MODULE					TEACHING PERIODS			WEIGHTAGE:EVALUATION			
COURSE				Credits	L	T	P	C WA	MSE	ESE	Total
	Code	Title	Component								
	MSC-410	Project Dissertation	PJ	16	-	-	-	-	-	-	500