CURRICULUM OVERVIEW

The curriculum is based on choice based credit system (CBCS), spanning four semesters. The students have to obtain 24 credits in each semester. Out of 24 credits, 22 credits have to be obtained from the department of Biotechnology, while 2 credits are required to obtain either from other departments of school of Biological sciences (Named as ''Generic elective'' (GE), or from any other department of university other than the departments of Biological Sciences (Named as ''Open elective'' (OE).

The semester I, II and III are based on class teaching, tutorials and laboratory courses, while semester IV is exclusively devoted to 6 months of research project work.

Glossary of terms used in the curriculum

One Credit: 16 hours of Lecturers (L) or 32 hours of Tutorial (T) or 32 hours of practical(P)

IA: Internal Assessment

SEE: Semester End Examination

CR: Core

DCE: Discipline centric

GE: Generic Elective

OE: Open Elective

Self-Study Report (SSR) - Criterion-1

Information to be submitted by Departments/Directorates/Centres for Each Programme Offered

1	Department/Directorate/Centre/Institute:	Biotechnology
2	Name of the Programme Offered:	M.Sc Biotechnology
3	Departmental website link of the complete/updated syllabus:	https://biotechnology.uok.edu.in/Main/AboutUs.aspx
4	Number of Courses in the Programme?	**28** (17 core + 3 discipline centric + 5 General
5A	Number of New Courses introduced in the Programme since 2019?	

5B List of New Courses introduced since 2019:

Course Code	*Course Title*	*Brief Description*
Environmental Biotechnology	BT23204	The aim of the course is to introduce the biotechnological tools and microorganisms both native and genetically modified to address the problems of environment. The biotechnological approaches to provide alternatives to compounds, which are sources of pollution, will be presented in detail.
Nutritional Biotechnology	BT23304	This course will enable the student to learn about various food components, their nutritional aspects, diet management and biotechnological applications in agriculture and food production
Bioethics	BT23004	The main aim is to introduce students to Bioethics, its meaning, its philosophical foundations and bioethics principles.Imparting knowledge and skills that will enable students to develop ethical answers to these various issues especially related to research discoveries made in the field of biology.Identify the basic concepts of modern biology and explain how recent advancements in these areas have influenced current bioethical issues.
Bioethics, Biosafety and Intellectual property rights	BT23301	The main aim is to introduce students to Bioethics, Biosafety during reserach and how they can take their discoveris or innovations to patenting and publication.
Introduction to cancer biology	BT23001	This course will introduce students to central concepts of cancer biology, including causes and precautions aimed at its prevention
Bioistatistics	BT23102 DCE	The objective of the course is to provide insight of methods for effective data collection, data representation, and data use so as to make inferences and conclusions about issues faced by biology students.
Human Genetics	BT23304	Provide deep understanding of complex genetic principles and their human genetics applications. Equip students to analyze inheritance patterns, interpret genomic data, and grasp advanced techniques in genetics research
Cancer Immunology	BT23004	The objective of this course is to introduce current concepts and advances in the area of cancer biology. The Students will understand the role of oncogenes and suppressor genes and get knowledge on cancer related mutagens and pathways and cancer therapy

5C	Departmental website link in support of New Courses introduced in the Programme since 2019.	https://biotechnology.uok.edu.in/Main/AboutUs.aspx (updated syllabus and minutes)			
6A	Dates of syllabus revisions during the last five years. (2019-2023)	2019	X	X	2023
6B	Departmental website link in support of syllabus revisions.	https://biotechnology.uok.edu.in/Main/AboutUs.aspx (updated syllabus and minutes)			
7	Are Programme Outcomes (POs) clearly mentioned in the syllabus? (Y/N)	Yes			
8	Are the Course Outcomes (COs) mentioned for each course of the programme? (Y/N)	Yes			
9A	**Does POs & COs have relevance to local, regional & global developmental needs? (Y/N)**	Yes			

9B List of courses addressing Local Needs:

Course Code	*Course Title*	*Brief Justification*
BT23001	Introduction to cancer biology	This course will introduce students to central concepts of cancer biology, including causes and precautions aimed at its prevention
BT23004	Cancer Immunology	The objective of this course is to introduce current concepts and advances in the area of cancer biology. The Students will understand the role of oncogenes and suppressor genes and get knowledge on cancer related mutagens and pathways and cancer therapy
BT23002	Nutritional Biotechnology	This course will enable the student to learn about various food components, their nutritional aspects, diet management and biotechnological applications in agriculture and food production
BT23304	Human Genetics	Provide deep understanding of complex genetic principles and their human genetics applications. Equip students to analyze inheritance patterns, interpret genomic data, and grasp advanced techniques in genetics research

	BT23204	Environmental Biotechnology	The aim of the course is to introduce the biotechnological tools and microorganisms both native and genetically modified to address the problems of environment. The biotechnological approaches to provide alternatives to compounds, which are sources of pollution, will be presented in detail.
9C	List of courses addressing **Regional Needs:**		
	Course Code	*Course Title*	*Brief Justification*
	BT23201	Microbiology	The aim of this course is to give fundamental concepts of bacterial growth, mechanism of toxins, retroviral replication, mode of action of antimicrobial agent
	BT23302	Plant Biotechnology	The aim of this course is to provide skilled knowledge of biotechnology for the improvement of plants. The course deals with the concept of plant totipotency and its regulation .How to propagate plants in vitro by using tissue culture, Understanding the mechanism of genetic transformation of plants using agrobacterium system for the production of disease resistant, stress tolerant and to have altered nutrient content.
	BT23304	Human Genetics	Provide deep understanding of complex genetic principles and their human genetics applications. Equip students to analyze inheritance patterns, interpret genomic data, and grasp advanced techniques in genetics research
9D	List of courses addressing **Global Needs:**		
	Course Code	*Course Title*	*Brief Justification*
	BT23301	Bioethics, Biosafety, Intellectual property rights	The main aim is to introduce students to Bioethics, its meaning, its philosophical foundations and bioethics principles.Imparting knowledge and skills that will enable students to develop ethical answers to these various issues especially related to research discoveries made in the field of biology.Identify the basic concepts of modern biology and explain how recent advancements in these areas have influenced current bioethical issues.
		Cell Biology	To introduce students to Cell Biology concepts and their significance in understanding and unraveling mechanistic aspects of cell Biology. Moreover, focus will be to understand the basics and advanced aspects of Cellular Communication, cytoskeleton networks and regulation of cell proliferation and apoptosis.
		Molecular Biology	To Introduce DNA as molecular component of life and to emphasize the importance of DNA by providing information on its chemical nature, structure, replication and maintenance.
	BT23104CR	Biomolecules	To understand the physical and chemical properties of biomolecules, like amino-acids, proteins, nucleic acids, carbohydrates and lipids.
	BT23202DCE	Intermediary Metabolism	The objective of intermediary metabolism course is to provide fundamental knowledge regarding the various metabolic pathways and their regulation with reference to human cells and tissue.
	BT23002GE	Redox Biology	The goal of this course is to let students understand the basics of Oxidant molecules their production and their harmful effects.
	BT23302DCE	Systems and Computational Biology	To introduce the concepts of systems biology to student. To expose the students to high through put methods like proteomics and next generation sequencing based methods
	BT23003GE	Molecular Mechanism of Plant life	The aim of this course is to study the organization root apical meristem and shoot apical meristem, floral development, mode of action of new plant hormones.
	BT23102DCE	Biostatistics	The objective of the course is to provide insight of methods for effective data collection, data representation, and data use so as to make inferences and conclusions about issues faced by biology students.
10A	**Does the Programme offer focus on Employability/ Entrepreneurship/ Skill development courses? (Y/N)**		Yes
10B	List of **Employability Courses**:		
	Course Code	*Course Title*	*Brief Justification*
	BT23101DCE	Biotechniques	The course is aimed to acquaint the students with various techniques used in biological sciences and the emerging areas of biotechnology along with underlying principles.
	BT23303	Bioprocess Engineering and Fermentation technology	The objective of the course is to provide students with the knowledge of fermentation, bioreactor technology, and thus applications of the chemical engineering principles in biological systems.
	BT23302	Plant Biotechnology	The aim of this course is to provide skilled knowledge of biotechnology for the improvement of plants. The course deals with the concept of plant totipotency and its regulation .How to propagate plants in vitro by using tissue culture, Understanding the mechanism of genetic transformation of plants using agrobacterium system for the production of disease resistant, stress tolerant and to have altered nutrient content.
		Immunology	The objectives of this course is know the structure and functions of immune system. The major emphasis of this course will be on the response of human body against the pathogens (bacterial viral and parasitic) and on the regulation of immune system

	BT23103CR	Genetic engineering	The objective of genetic engineering course is to familiarise students with fundamentals of DNA recombinant technology and advanced aspects of genetic engineering.
10C	List of **Entrepreneurship Development Courses**:		
	Course Code	*Course Title*	*Brief Justification*
	BT23201	Animal Cell Science and technology	This Course will help students to familiarize themselves with animal cell, their culturing and maintaining them as in vitro cultures. The aim is to provide theoretical knowledge on animal cells for in vitro studies, manipulation of animal cells in vitro and application of molecular techniques to in vitro situations
	BT23203	Advanced Enzymology	The objective of the course is to provide a deeper insight into the fundamentals of enzyme structure and function and kinetics enzymes. Also it deals with current applications and future potential of enzymes.
	BT23103CR	Genetic engineering	The objective of genetic engineering course is to familiarise students with fundamentals of DNA recombinant technology and advanced aspects of genetic engineering.
	BT23304	Human Genetics	Provide deep understanding of complex genetic principles and their human genetics applications. Equip students to analyze inheritance patterns, interpret genomic data, and grasp advanced techniques in genetics research
10D	List of **Skill development Courses**:		
	Course Code	*Course Title*	*Brief Justification*
11A	**Does the programme have courses addressing Professional ethics/ gender/ human values/ environment/ sustainability & other value framework enshrined in NEP2020/etc. (Y/N)**		**No**
11B	List of courses addressing **Professional Ethics**:		
	Course Code	*Course Title*	*Brief Justification*
	BT23301	Bioethics, Biosafety, Intellectual property rights	The main aim is to introduce students to Bioethics, its meaning, its philosophical foundations and bioethics principles.Imparting knowledge and skills that will enable students to develop ethical answers to these various issues especially related to research discoveries made in the field of biology.Identify the basic concepts of modern biology and explain how recent advancements in these areas have influenced current bioethical issues.
11C	List of courses addressing **Gender Issues**:		
	Course Code	*Course Title*	*Brief Justification*
11D	List of courses addressing **Human Value Issues**:		
	Course Code	*Course Title*	*Brief Justification*
	BT23301	Bioethics, Biosafety, Intellectual property rights	The main aim is to introduce students to Bioethics, its meaning, its philosophical foundations and bioethics principles.Imparting knowledge and skills that will enable students to develop ethical answers to these various issues especially related to research discoveries made in the field of biology.Identify the basic concepts of modern biology and explain how recent advancements in these areas have influenced current bioethical issues.
	BT23201	Animal Cell Science and technology	This Course will help students to familiarize themselves with animal cell, their culturing and maintaining them as in vitro cultures. The aim is to provide theoretical knowledge on animal cells for in vitro studies, manipulation of animal cells in vitro and application of molecular techniques to in vitro situations
	BT23203	Advanced Enzymology	The objective of the course is to provide a deeper insight into the fundamentals of enzyme structure and function and kinetics enzymes. Also it deals with current applications and future potential of enzymes.

BT23103CR	Genetic engineering	The objective of genetic engineering course is to familiarise students with fundamentals of DNA recombinant technology and advanced aspects of genetic engineering.
BT23304	Human Genetics	Provide deep understanding of complex genetic principles and their human genetics applications. Equip students to analyze inheritance patterns, interpret genomic data, and grasp advanced techniques in genetics research

11E List of courses addressing **Environment Issues**:

Course Code	*Course Title*	*Brief Justification*
Not Applicable	**Not Applicable**	

11F List of courses addressing **Sustainability issues**:

Course Code	*Course Title*	*Brief Justification*
BT23201	Animal Cell Science and technology	This Course will help students to familiarize themselves with animal cell, their culturing and maintaining them as in vitro cultures. The aim is to provide theoretical knowledge on animal cells for in vitro studies, manipulation of animal cells in vitro and application of molecular techniques to in vitro situations
BT23203	Advanced Enzymology	The objective of the course is to provide a deeper insight into the fundamentals of enzyme structure and function and kinetics enzymes. Also it deals with current applications and future potential of enzymes.
BT23103CR	Genetic engineering	The objective of genetic engineering course is to familiarise students with fundamentals of DNA recombinant technology and advanced aspects of genetic engineering.

11G List of courses addressing **Other Value Framework** enshrined **in NEP2020/etc.**:

Course Code	*Course Title*	*Brief Justification*

12A **Does the Department/Directorate/Institute/ Centre offer Diploma Programme?** (Y/N) — No

12B Details of the **Diploma Programmes** offered by the institutions where the students of the institution have enrolled and successfully completed during the last five years (2019-2023)

Programme Code	*Name of Diploma Programme*	*Mode of Programme (Online/Offline)*	*Year of Offering/enrolment*	*Contact hours of course*	*Number of students enrolled in the year*	*Number of Students completing the course in the year*	*Departmental website link to the relevant document*	*Number of students enrolled in the year*

13A **Does the Department/Directorate/Institute/ Centre offer Certificate Courses? (Y/N)** — No

13B Details of the **Certificate Courses** offered by the institutions where the students of the institution have enrolled and successfully completed during the last five years (2019-2023)

Course Code	*Name of Certificate Course*	*Mode of Course (Online/Offline)*	*Year of Offering/enrolment*	*Contact hours of course*	*Number of students enrolled in the year*	*Number of Students completing the course in the year*	*Departmental website link to the relevant document*	*Number of students enrolled in the year*

14A **Does the Department/Directorate/Institute/ Centre offer Value-Added Courses? (Y/N)** — No

14B Details of the **Value Added Courses** offered by the institutions where the students of the institution have enrolled and successfully completed during the last five years (2019-2023)

	Course Code	Name of Value-Added Course	Mode of Course (Online/Offline)	Year of Offering/enrolment	Contact hours of course	Number of students enrolled in the year	Number of Students completing the course in the year	Departmental website link to the relevant document	Number of students enrolled in the year

15A	**Does the Department/Directorate/Institute/ Centre offer Online Courses of MOOCs, SWAYAM/e-PG Pathshala/ NPTEL and other recognized platforms? (Y/N)**	No

15B Details of **Online Courses of MOOCs, SWAYAM/e-PG Pathshala/ NPTEL and other recognized platforms** where the students of the institution have enrolled and successfully completed during the last five years (2019-2023)

Course Code	Name of the Course	Mode of the Course-offered by the HEI or Online (Specify the platform like MOOCS, SWAYAM, etc.)	Year of Offering/enrolment	Contact hours of course	Number of students enrolled in the year	Number of Students completing the course in the year	Departmental website link to the relevant document	Number of students enrolled in the year

16A	**Does the programme have Field Projects/ Research Projects /Internship in the programme? (Y/N)**	Yes

16B Details of components of **Field Projects / Research Projects / Internships implemented** during last five years **(2019-2023)**

Course Code	Name of the course pertaining to field projects/ Research Projects /Internship	Number of Credits	Number of students undertaking course	Departmental website link to the relevant document
BT23401	Research proposal writing	1		https://biotechnology.uok.edu.in/Main/AboutUs.aspx
BT23402	Research based project	14		https://biotechnology.uok.edu.in/Main/AboutUs.aspx
BT23403	Seminar and Journal club	2		https://biotechnology.uok.edu.in/Main/AboutUs.aspx
BT23404	Project presentation	3		https://biotechnology.uok.edu.in/Main/AboutUs.aspx
BT23405	Project viva	2		https://biotechnology.uok.edu.in/Main/AboutUs.aspx

17 **Any other Relevant Information:**

Signature of the Head/Director of the Department/Centre/Institute

General Instructions:

1. ***Kindly format the syllabus in light of the instruction and discussions held in past meetings and upload the syllabus on the Departmental Website.***
2. ***Upload valid proofs on the Departmental Website.***