M.Sc. Biotechnology

MANDSAUR UNIVERSITY

FACULTY OF LIFE SCIENCES

M.Sc. Biotechnology

PEOs, POs, PSOs, COs

Faculty of Life Sciences
Mandsaur University, Mandsaur

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About Faculty of Life Sciences:

The Faculty of Life Sciences (FLS) was established in the year 2016. It offers B.Sc. (Hons.) Biotechnology & Microbiology and M. Sc. Biotechnology & Microbiology courses. The intakes for bachelor programs are 30; while in postgraduate programs are 18. It offers top-class infrastructure, highly qualified and dedicated faculty members, and an excellent environment for academic and intellectual growth. FLS has international and national MoUs with various institutes and industries. The faculty has developed a modest academic infrastructure comprising of smart classrooms and Hi-tech laboratories with advanced instrumentation facilities to teach and conduct research in multifarious areas such as Molecular Diagnostics, Molecular Biology & Genetic Engineering, Microbiology, Biochemistry, Chemistry, Bioinformatics, Immunology, Food Science & Technology, Bioinstrumentation, Bioprocess technology and Biosafety. FLS endeavours not only to produce excellent academic results but also to produce entrepreneur and skilled professionals. The faculty has organized many workshops, seminars, staff/faculty/entrepreneur development programmes, adjunct and guest lectures sponsored by the industries related to Biotechnology. The faculty of life sciences is considered as a research hub by the Mandsaur University for guiding research scholar leading to Ph.D.

Programme Details:

Programme Name	Duration
M. Sc. Biotechnology	2 Years (Four Semesters)

Programme Structure:

Years	Odd Semester	Even Semester
First Year	Semester I	Semester II
Second Year	Semester III	Semester IV

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PEOs, POs, PSOs, COs:

Program Educational Objectives (PEOs)	
The M. Sc. Biotechnology program describe accomplishments that graduates are expected to attain the following:	
PEO1	Graduates will ascertain themselves in diverse fields of Biotech based industries as well as allied set ups such as pharma, clinical diagnostics, agriculture, food, textiles etc.
PEO2	Graduates will demonstrate their efficient skills in Research & Development in Biotechnology field at the state as well as global forums.
PEO3	Graduates will achieve comprehensive knowledge in the subject, acquire effectual communication skills and be excellent academicians
PEO4	Graduates are persuaded and stimulated to become entrepreneurs.

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Program Outcomes (POs)	
On successful completion of the M.Sc. Biotechnology program the students are expected to attain the following:	
PO1	Gain precise knowledge on a range of subjects related to the field of Biotechnology
PO2	Attain expertise pertaining to different branches of Biotechnology
PO3	Prepared to execute their learning in research fields.
PO4	Comprehend the inferences for the benefit of environment and society at large
PO5	Appreciate the ethical issues pertaining to the subject
PO6	Students will be able to create new biotechnological manufactured goods or processes by relating pioneering knowledge of various disciplines of biotechnology
PO7	Acquire skills to effectively carry out complex assignments and developments autonomously in diverse fields of biotechnology disciplines.
PO8	Exhibit skills to carry out the research schemes individually.
PO9	Widen the scope to materialize joint collaborations in multidisciplinary areas.
PO10	Increase the technical skills required for placements and research in various fields of Biotechnology.

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Program Specific Outcomes (PSOs)	
After the successful completion of M. Sc. Biotechnology program, the students are expected to attain the following:	
PSO1	Display the skill to devise, conduct experiments and examine information in the field of Biotechnology
PSO2	Exhibit the talent to work independently and carry out scientific research work in the field of Biotechnology
PSO3	Become skilled to work with suitable modern tools and procedures in genome modifications for the benefit of humanity.
PSO4	Attain knowledge of standards and principles in Biotechnology/product development/patent writing
PSO5	Will enlarge successful entrepreneurial skills, winning business opportunity
PSO6	Attain skills to decide logical and technical issues in biotech-based industries.

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SEMESTER-I

BIT070	**Biochemistry and Metabolism**	**Theory**	**Credit 4 (4+0)**
After successful completion, this course enables students:			
CO1	Understanding the laws of thermodynamics, concepts of entropy, enthalpy and free energy changes and their application to biological systems and various biochemical studies and reactions.		
CO2	Students will be able to demonstrate an understanding of fundamental biochemical principles, such as the structure/function of bimolecular, metabolic pathways, and the regulation of biological/biochemical processes.		
CO3	Students will gain proficiency in basic laboratory techniques in both chemistry and biology, and be able to apply the scientific method to the processes of experimentation and hypothesis testing.		
CO4	Students will be able to apply and effectively communicate scientific reasoning and data analysis in both written and oral forums.		
CO5	Students will understand and practice the ethics surrounding scientific research.		

BIT08	**Functional Cell Biology**	**Theory**	**Credit 4 (4+0)**
After successful completion, this course enables students:			
CO1	Be able to understand about the functions of different cellular components and cellular level.		
CO2	Be able to understand about the role of cytoskeleton in cell shape, support and movement inside the cell.		
CO3	Be able to interpret the way of transport of different molecules across the plasma membrane.		
CO4	Be able to interpret about the relationship between neighboring cells and extracellular environment as well as response of different cells against different type of signaling molecules.		
CO5	Be able to get inside the molecular event of cell cycle and cancer to understand possible mechanism and cure.		

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BIT090	**Microbiology**	**Theory**	**Credit 3 (3+0)**
After successful completion, this course enables students:			
CO1	To understand the principle and applications of important instruments (biological safety cabinets, autoclave, incubator, hot air oven, light microscope, pH meter) used in the microbiology laboratory. Students also learn the basics of preparing common microbial media used for isolation and maintenance of microbial isolates.		
CO2	To get an insight into the laboratory techniques for the isolation and enumeration of microorganisms from different environmental spheres like soil, water and air.		
CO3	Students also learn the basics of isolating bacteria in pure cultures by streaking method and determination of bacterial growth curve. To understand general bacteriology and microbial techniques for isolation of pure cultures of bacteria and fungi.		
CO4	To understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes and the structural similarities and differences among various physiological groups of bacteria/archaea.		
CO5	To master aseptic techniques and be able to perform routine culture handling tasks safely and effectively.		

BIT100	**Enzymology and Bioinstrumentation**	**Theory**	**Credit 3 (3+0)**
After successful completion, this course enables students:			
CO1	To have the concept of different terminologies in understanding enzymes as well as their historical perspective.		
CO2	To familiarize with basics of enzymes, their kinetics, inhibition and their applications in various fields.		
CO3	The course provides the basic understanding of enzyme classification, nomenclature and synthesis.		
CO4	The course highlights the concepts of Enzyme kinetics and mechanism of inhibition, units and underlying principle of measurement of enzyme activity.		
CO5	The students can earn the knowledge of different applications of enzymes in various industry and medical field.		

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SEMESTER-II

BIT110	**Molecular Biology**	**Theory**	**Credit 4 (4+0)**
After successful completion, this course enables students:			
CO1	Students will be able understand the application of renewable sources and explain their conversion process to meet the energy demand.		
CO2	Clarify application of microorganisms in varied fields of environmental biotechnology like bioremediation, biofertilizers and waste water treatment, organic waste management.		
CO3	Describe role of microorganism in recycling soil nutrients, biodegradation of complex plant polymers, sustaining and improving plant growth through improving nutrient availability, production of plant growth promoting substances and inhibiting pathogens		
CO4	Familiarize students with global environmental problem and their side effects on living organisms.		
CO5	Students will be able to understand the concept of solid waste as source of energy and apply their knowledge for converting them into a useful product.		

BIT120	**Genetic Engineering**	**Theory**	**Credit 4 (4+0)**
After successful completion, this course enables students:			
CO1	Students will be able understand the Cloning and Expression strategies including Vectors - plasmid, bacteriophage, viral, cosmids, Ti plasmid, Yeast; Expression of recombinant proteins.		
CO2	Students able to understand Molecular techniques including polymerase chain reaction; DNA Sequencing; In-situ hybridization; Random amplified polymorphic DNA, restriction fragment length polymorphism.		
CO3	Be able to explore construction of Library and Purification of recombinant proteins.		
CO4	Familiarize students with gene transfer and Selection of Recombinant Clones techniques.		
CO5	Students will be able to understand the concept of solid waste as source of energy and apply their knowledge for converting them into a useful product.		

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BIT130	**Environmental Biotechnology**	**Theory**	**Credit 3 (3+0)**
After successful completion, this course enables students:			
CO1	Students will be able understand the application of renewable sources and explain their conversion process to meet the energy demand.		
CO2	Clarify application of microorganisms in varied fields of environmental biotechnology like bioremediation, biofertilizers and waste water treatment, organic waste management.		
CO3	Describe role of microorganism in recycling soil nutrients, biodegradation of complex plant polymers, sustaining and improving plant growth through improving nutrient availability, production of plant growth promoting substances and inhibiting pathogens		
CO4	Familiarize students with global environmental problem and their side effects on living organisms.		
CO5	Students will be able to understand the concept of solid waste as source of energy and apply their knowledge for converting them into a useful product.		

BIT140	**Bioprocess Engineering**	**Theory**	**Credit 3 (3+0)**
After successful completion, this course enables students:			
CO1	To understand biological and kinetic concepts underlying bioprocesses engineering		
CO2	To explain procedures for the design and control of bioreactors to get relevant experience for industries especially in Production unit.		
CO3	Understand and attain essential skills for carrying out basic upstream processing process including the requirements of scaling up.		
CO4	To apply the bioprocess engineering concepts in different industries for the benefit of mankind primarily in Biopharma, Food processing and agriculture-based industries.		
CO5	To understand biological and kinetic concepts underlying bioprocesses engineering		

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SEMESTER-III

BIT350	**Applied Biotechnology**	**Theory**	**Credit 3 (3+0)**
After successful completion, this course enables students:			
CO1	Be able to know the concept and fundamentals of applied biotechnology.		
CO2	Be able to understand the concept of nanotechnology, post-harvest technology and dairy technology.		
CO3	Be able to understand the technology in the food industry.		
CO4	Be able to understand the basics of startup mission s		
CO5	Be able to understand to synthesis nonmaterial.		

BIT360	**Immunology**	**Theory**	**Credit 3 (3+0)**
After successful completion, this course enables students:			
CO1	Be able to know the concept and fundamentals of immunology.		
CO2	Be able to understand the concept of antigen, antibody and hypersensitivity reaction.		
CO3	Be able to understand the role of MHC molecule in graft transplantation and cancer immunology.		
CO4	Be able to perform the antigen antibody reaction including agglutination, precipitation, immuno-electrophoresis		
CO5	Be able to understand technologies like hybridoma.		

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BIT370	**Plant and Agricultural Biotechnology**	**Theory**	**Credit 3 (3+0)**
After successful completion, this course enables students:			
CO1	Be able to apply different plant tissue culture techniques for the plant regeneration		
CO2	Be able to explore greenhouse and commercialization of plant tissue culture products		
CO3	Be able to understand the utility of PGPR and genetic engineering technique for quality production		
CO4	Be able to understand the selection of trait of interest using molecular marker		
CO5	Be able to understand the production of useful products using metabolic engineering and importance of IPR		

BIT390	**Biostatistics and Bioinformatics**	**Theory**	**Credit 3 (3+0)**
After successful completion, this course enables students:			
CO1	To develop an understanding of basic theory of computational tools to solve biological problems.		
CO2	To gain working knowledge of these computational tools and methods in order to validate and facilitate wet lab work.		
CO3	To appreciate, apply & develop relevant algorithms for investigating specific contemporary biological questions across scientific community.		
CO4	Critically carry out the biological data analysis and interpret results using advanced statistical tools & methods.		
CO5	To develop an understanding of basic theory of computational tools to solve biological problems.		

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BIT381	**Animal Biotechnology**	**Theory**	**Credit 3 (3+0)**
After successful completion, this course enables students:			
CO1	Students will be able to describe the principle and techniques used in animal biotechnology and different cell culture media and their preparation methods.		
CO2	Students will be able to identify the cell characterization parameters and analyze causes of contamination.		
CO3	To familiarize with the techniques of animal cell culture., mechanisms of gene transfer, and various molecular Marker-assisted methods in improvement of live stocks.		
CO4	Students will be able to understand Gene transfer methods for mammalian cells and animal transgenics.		
CO5	Students will acquire the knowledge of ethics and safety issues related to animal cell culture**.**		

BIT382	**IPR, Biosafety & Bioethics**	**Theory**	**Credit 3 (3+0)**
After successful completion, this course enables students:			
CO1	Be able to understand the Intellectual Property right (IPR) and different types of IPR.		
CO2	Be able to know the basics of patents and different types of patents.		
CO3	To get an insight into the Patent filing and Infringement		
CO4	Be able to understand the basics of biosafety and bioethics and its impact on all the biological sciences and the quality of human life.		
CO5	Be able to understand the Introduction of bioethics and ethical conflicts in biological sciences.		