

**Singhania University**

(UGC- recognized university per section 2(f) of the UGC Act 1956)

**COURSE OUTLINE**

<b>COURSE TITLE</b>	Microbial Genetics
Course Code	BIO-101
Credits	4 (L:3, P:2, 5)
Faculty Name	Dr. Pawan kumar
Program	B. Sc. in Biotechnology
Academic Year and	<i>w.e.f.</i> 2024-25, 1 <sup>st</sup> Semester

1. **Course Description:** The overview of Microbial Genetics and its application especially in bacteria and bacteriophage. Genetics of Bacteria and Phage, focusing on replication, repair, transcription, translation, gene regulation, genetic networks, plasmids, conjugation, transformation, microbial & phage interactions and their lifecycle.

**2. At the end of this course, students should be able to:** By completing this course students will be able to understand basic and applied genetics. They will gain knowledge of beneficial use of bacteria, virus and phages by applying different techniques.

**3. Required Textbook and Reference Material:**

Principles of Genetics by Eldon Gardner

- Material will be provided by faculty.

**4. Session Plan:**

Session plan will be provided by faculty members according to the syllabus.

**5. Evaluation:**

<b>COMPONENT</b>	<b>WEIGHTAGE</b>	<b>DETAILS</b>
Assignment	10%	Sheet Work (A-4 Size sheet in a well mannered

Tests	10%	Test would be taken to assess the <del>knowledge about topics related to daily</del>
Attendance & Classroom participation	10%	Students should have at least 75% attendance
Mid- Sem Exam	20%	Mid term exam must be cleared by students for <del>appearing in final examination.</del>
End- Sem Exam	50%	The end term exam must be cleared for appearing in next semester with a minimum passing criteria.

## 6. Academic Integrity:

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## 7. No Network Policy

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<b>COURSE TITLE</b>	Biomolecules
Course Code	Bio-102
Credits	4 ( L: 3, P:2, 5)

Faculty Name	Dr. Sumer Singh
Program	B. Sc. in Biotechnology
Academic Year and	w.e.f. 2024-25, 1 <sup>st</sup> sem

### 1. Course Description

This Course describes different types of biomolecules, General introduction, classification, Structure of Carbohydrates, Proteins, Nucleic acids and Lipids.

**2. Student Learning Outcomes:** This course will provide detailed knowledge of biomolecules for living systems. It will provide basic concepts of structural organization and characterization of different biomolecules. Students will be able to understand basics of biochemistry.

### 3. Required Textbook and Reference Material:

Principles of Biochemistry by Lehninger, Nelson and Cox. (Book)

- Material will be provided by faculty.

### 4. Session Plan:

Session plan will be provided by faculty members according to the syllabus.

### 5. Evaluation:

COMPONENT	WEIGHTAGE	DETAILS
Assignment	10%	Sheet Work (A-4 Size sheet in a well mannered)
Tests	10%	Test would be taken to assess the knowledge about topics related to daily
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<b>COURSE TITLE</b>	Principles of Microbiology
Course Code	Bio (M)-103
Credits	2 ( L: 1, P: 1,2)
Faculty Name	Dr. Pawan Kumar and Prabhat Kumar
Program	B. Sc. in Biotechnology
Academic Year and	w.e.f. 2024-25, 1 <sup>st</sup> Semester

**1. Course Description:** The Course Principles of Microbiology includes overview of History, scope of Microbiology, biogenesis, abiogenesis theory, Contribution of different scientists during golden period of Microbiology, classification of microbes, Concept of sterilization, identification of microbes by different staining techniques..

**2. Student Learning Outcomes:** After completing this course, students will gain knowledge regarding scope of Microbiology, diversity of microorganisms, cell structure and function of bacteria, bacterial growth, identification, and different ways to control microbial growth by

applying physical, chemical and radiation methods.

**2. Required Textbook and Reference Material:**

Prescott's Microbiology by Joanne M. Willey, Sherwood, and Christopher (Book)

- Material will be provided by faculty.

**4. Session Plan:**

- Session plan will be provided by faculty members according to the syllabus.

**5. Evaluation:**

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Assignment	10%	Sheet Work (A-4 Size sheet in a well mannered
Tests	10%	Test would be taken to assess the knowledge about topics related to daily
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<b>COURSE TITLE</b>	Cell Structure & Dynamics
Course Code	MDC-101
Credits	4 (L:3 ,T:1, 4)
Faculty Name	Dr. Sumer Singh
Program	B. Sc. in Biotechnology
Academic Year and	w.e.f. 2024-25, 1 <sup>st</sup> Semester

**1. Course Description:** This course includes basic cell biology (structure and functions), Cell theory, Difference between animal and plant cell, cellular organelles, their function and biosynthesis. Structure and function of Prokaryotic cell and its components. Mycelia of fungi and Actinomycetes, Cyanobacteria, Gliding and motility. Membrane structure and transport, Cell cycle, components of cell cycle control system, Extracellular & intracellular control of cell division, and Apoptosis.

**2. Student Learning Outcomes:** Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles, They will understand how these cellular components are used to generate and utilize energy in cells, Cell cycle, cellular control of cell division.

**2. Required Textbook and Reference Material:**

Cell Biology by Veer Bala Rastogi (Book)

- Material will be provided by faculty.

**4. Session Plan:**

- Session plan will be provided by faculty members according to the syllabus.

## 5. Evaluation:

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Assignment	10%	Sheet Work( A-4 Size sheet in a well mannered
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Attendance & Classroom	10%	Students should have at least 75% attendance
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<b>COURSE TITLE</b>	Animal & Plant Tissue Culture Techniques
Course Code	SEC-101
Credits	2 (L:1 ,T:1, 2)
Faculty Name	Dr. Prabhat Kumar
Program	B. Sc. in Biotechnology
Academic Year and	w.e.f. 2024-25, 1 <sup>st</sup> Semester

**1. Course Description:** The course Tissue culture techniques includes Introduction, history, advantages of different techniques, types of tissue culture, laboratory organization, media for culture, basic concept of cell culture. Approaches and methodologies to be used for the best results.

**2. Student Learning Outcomes:** Students will gain knowledge about different techniques of plant and animal tissue culture. The use of these techniques is very common in vaccine biological Industry so this course will increase job opportunity for our students.

**3. Required Textbook and Reference Material:**

Tissue Culture Techniques by Bernice M. martin (Book)

- Material will be provided by faculty.

**4. Session Plan:**

- Session plan will be provided by faculty members according to the syllabus.

**5. Evaluation:**

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Assignment	10%	Sheet Work (A-4 Size sheet in a well mannered
Tests	10%	Test would be taken to assess the knowledge about topics related to daily
Attendance & Classroom	10%	Students should have at least 75% attendance
Mid-Sem Exam	20%	Midterm exam must be cleared by students for appearing in final examination.



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<b>COURSE TITLE</b>	Principles of Immunology
Course Code	BIO-202
Credits	4 (L:3 ,T:1 ,4)
Faculty Name	Dr. Prabhat Kumar & Dr. Pawan Kumar
Program	B. Sc. in Biotechnology
Academic Year and	w.e.f. 2024-25, 2 <sup>nd</sup> Semester

**1. Course Description:** The course syllabus includes: Human immune system, components and functions of antigens, antibodies and T-Cell receptors. Immune responses against tumors & transplants. Pathogens and the Immune Response: bacterial, viruses, disease origins. Medical interventions: antibiotics & vaccines.

**4. Student Learning Outcomes:** This course will provide knowledge of basic and applied Immunology: Antigen, antibody and their reactions. Students will understand mechanism of different types of microbial, autoimmune diseases and their diagnosis.

**5. Required Textbook and Reference Material:**

Kuby Immunology by Jenni Punt & Shron Stanford (Book)

- Material will be provided by faculty.

**4. Session Plan:**

- Session plan will be provided by faculty members according to the syllabus.

**5. Evaluation:**

COMPONENT	WEIGHTAGE	DETAILS
Assignment	10%	Sheet Work (A-4 Size sheet in a well mannered
Tests	10%	Test would be taken to assess the knowledge about topics related to daily
Attendance & Classroom participation	10%	Students should have at least 75% attendance
Mid-Sem Exam	20%	Midterm exam must be cleared by students for appearing in final examination.
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<b>COURSE TITLE</b>	Biochemistry
Course Code	BIO-202
Credits	3 (L:2, T:1, 3)
Faculty Name	
Program	B. Sc. In Biotechnology
Academic Year and	w.e.f. 2024-25, 2 <sup>nd</sup> Semester

**1. Course Description:** Biochemistry course includes General features of metabolism: Structure and types of metabolic pathways. Principles and types of metabolic regulation. Citric acid cycle, the respiratory chain and phosphorylative oxidation, Carbohydrate metabolism, lipid and Amino acid metabolism.

- **2. Student Learning Outcomes:** After completing course of Biochemistry, Students will be able to frame a scientific question or problem. They will gain knowledge to

undertake investigation and perform analysis that provide information about biochemical questions and to help biochemical problems.

## 2. Required Textbook and Reference Material:

Principles of Biochemistry by Lehninger, Nelson and Cox. (Book)

- Material will be provided by faculty.

## 4. Session Plan:

- Session plan will be provided by faculty members according to the syllabus.

## 5. Evaluation:

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Assignment	10%	Sheet Work (A-4 Size sheet in a well mannered
Tests	10%	Test would be taken to assess the knowledge about topics related to daily
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<b>COURSE TITLE</b>	Microscopy & Instrumentation
Course Code	BIO (M)-203
Credits	3 (L:2, T:1, 3)
Faculty Name	Dr. Prabhat Kumar & Dr. Pawan Kumar
Program	B. Sc. in Biotechnology
Academic Year and	w.e.f. 2024-25, 2 <sup>nd</sup> Semester

**1. Course Description:** Microscopy and Instrumentation course describes developmental history of Microscopy, its use and types, Basic Principle of Centrifugation, types of centrifuge, Ultracentrifuge, Factors affecting Sedimentation velocity, Standard Sedimentation Coefficient, Centrifugation of associating systems, Rate-Zonal centrifugation, sedimentation equilibrium Centrifugation. General Biophysical methods, Measurement of pH, Radioactive labeling & counting, Autoradiography, Use of Chromatography for Separation & Identification of Materials and gel electrophoresis.

- **2. Student Learning Outcomes:** After completing this course students will learn safe and smooth working practices on laboratory and industrial instruments.

### 1. 3. Required Textbook and Reference Material:

Prescott's Microbiology by Christopher, Willey and Sherwood. (Book)

- Material will be provided by faculty.

### 4. Session Plan:

- Session plan will be provided by faculty members according to the syllabus.

### 5. Evaluation:

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<b>COURSE TITLE</b>	Industrial Biotechnology
Course Code	MDC-201
Credits	4 (L:3, T:1, 4)
Faculty Name	Dr. Prabhat Kumar
Program	B. Sc. in Biotechnology
Academic Year and	w.e.f. 2024-25 2 <sup>nd</sup> Semester

**1. Course Description:** This course describes Commercial Production of Microorganisms, Industrial Fermenters, Single-cell Protein. Use of Microorganisms in Agriculture, Waste water treatment, Biocontrol agents., Microbial pesticides, Bioconversions, Biomining and microbiology Bio-gas, Bio-leaching, Bio-diesel, Bioremediation, and bioreactor.

**2. Student Learning Outcomes:** Students will be able to understand and apply biological science, technical skills, and industry based practical knowledge for betterment of human life.

**2. Required Textbook and Reference Material:**

A Text Book of biotechnology by R.C. Dubey

- Material will be provided by faculty.

**4. Session Plan:**

- Session plan will be provided by faculty members according to the syllabus.

**5. Evaluation:**

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<b>COURSE TITLE</b>	Biodiversity
Course Code	SEC-201
Credits	2 (T:2 , P: 0 , 2)
Faculty Name	Dr. Preeti Sengar
Program	B. Sc. in Biotechnology
Academic Year and	w.e.f. 2024-25 2 <sup>nd</sup> Semester

**1. Course Description:** Basic concept of Biodiversity, Ecosystem Diversity, Genetic Diversity, Species Abundance & Diversity, Patterns of Species Diversity, Global patterns of Biodiversity, Biodiversity conservation, and Ethics of Conservation.

**2. Student Learning Outcomes:** Students will realize that people are dependent on intact habitats that sustain the various organisms we need to produce food, medicines, clothing, and other materials. Students will learn about certain species' roles in an ecosystem. Students will discover that life can be found almost everywhere on earth.

**3. Required Textbook and Reference Material:**

The diversity of Life by Edward O. Wilson.

Biodiversity and Climate Change by Thomas E. Lovejoy, Lee Hannah, Edward O. Wilson.

- Material will be provided by faculty.

**4. Session Plan:**

- Session plan will be provided by faculty members according to the syllabus.

**5. Evaluation:**

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<b>COURSE TITLE</b>	Mushroom Technology
Course Code	AEC-201
Credits	4 (T:3, P:1, 4)
Faculty Name	Dr. Prabhat Kumar
Program	B. Sc. in Biotechnology
Academic Year and	w.e.f. 2024-25 2 <sup>nd</sup> Semester

**1. Course Description:** Introduction: Mushrooms -Taxonomical rank -History and Scope of mushroom cultivation - Edible and Poisonous Mushrooms. Common edible mushrooms, Principles of mushroom cultivation, problems in cultivation and health benefits of mushrooms.

**2. Student Learning Outcomes:** students will be able to identify edible and poisonous mushrooms, they will be training for the preparation of bed for mushroom cultivation,

production and cultivation methods. After completing proper training, students can start self-employment and income generation.

#### 4. Required Textbook and Reference Material:

Handbook on Mushrooms by Nita Bhal (Book)

- Material will be provided by faculty.

#### 4. Session Plan:

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#### 5. Evaluation:

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