



GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE, RAJNANDGAON (C.G.)

**FYUGP (NEP 2020 Course)**

**Department: Biotechnology**

Session: <b>2023-24</b>	Program: <b>B.Sc.</b>
Semester: <b>III</b>	Subject: <b>Biotechnology</b>
Course Type: <b>DSC</b>	Course Code: .....
Course Title: <b>General Microbiology</b>	
Credit: <b>4 (3+1)</b>	Lecture: <b>60</b>
M.M. 100 = <b>(ESE 80+IA 20)</b>	Minimum Passing Marks: <b>40%</b>

Title	Calculus
<b>Course Learning Outcome:</b>	<p>After the present course student will be able to -</p> <ul style="list-style-type: none"><li>• describe fundamentals about microbes.</li><li>• gain understanding of microbial nutrition.</li><li>• read and analyse about the microbial growth.</li><li>• understand the concept of control of microbes.</li></ul>

Title	Calculus
<b>Programme Specific Outcome:</b>	<p>Upon completion of this course student will be able to –</p> <ul style="list-style-type: none"><li>• determine types of microbes.</li><li>• describe cultivation and maintenance of microbes.</li><li>• understand the growth curve, factor affecting and reproduction</li><li>• explain physical, chemical control of microbes and food microbiology.</li></ul>

Approval of the Board of Studies						
Date:	Date: 13/05/2024					
Name	Prof. S. K. Jadhav	Sabiha Naz	Dr. Shubha Diwan	Shri Sanjay Bhagwat	Ku. Varsha Meshram	Dr. Pramod Kumar Mahish
Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature						

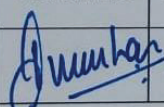
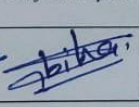
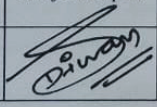
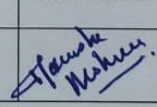
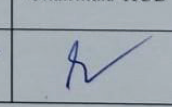
## Theory

Units	Lectures	Lectures	Credit
I	15	History of Microbiology; Classification of microorganisms: Microbial taxonomy, Molecular method – ribotyping, Burgey's classification of bacteria. Morphology and cell structure of major groups of microorganisms eg. Bacteria, Algae, Fungi, Protozoa and Unique features of viruses.	1
II	10	Cultivation and Maintenance of microorganisms: Nutritional categories of micro-organisms – autotrophs and parasites. Methods of isolation – pure culture methods, serial dilution. And preservation- metabolic active and suspended methods.	2
III	10	Growth – Curve, synchronous growth, measurement and factor affecting microbial growth. Reproduction: Conjugation, Hfr, Transduction and Transformation. Endospore – structure, endospore formation and sporulation mechanism.	
IV	10	Control of Microorganisms: By physical, chemical and chemotherapeutic Agents. Water Microbiology: Bacterial pollutants of water, coliforms. Food Microbiology: Important microorganism in food. Food preservation – canning, and traditional methods. Fermented Foods.	

## Practical Course

**Credit = 01; Lecture/Lab hour = 15**

- Preparation of liquid and solid media for growth of microorganisms.
- Isolation and maintenance of organisms by plating, streaking and serial dilution methods.
- Isolation of pure culture from soil and water.
- Growth; Growth curve; Measurement of bacterial population by turbidity and serial dilution methods.
- Effect of temperature, pH and carbon nitrogen sources on growth.
- Microscopic examination of bacteria, yeast and molds
- Study of organisms by Gram stain, Acid fast stain and staining for spores

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Date:	Date: 13/05/2024					
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Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature						

<b>List of Books</b>	<ul style="list-style-type: none"> <li>• Prescott, L. M., Harley, J. P., Klein, D. A., Willey, J. M., Sherwood, L. M., &amp; Woolverton, C. J. (2008). Microbiology. Estados Unidos: McGraw-Hill.</li> <li>• Pelczar, M. J., Chan, E. C. S., &amp; Krieg, N. R. (2010). Microbiology. New Delhi: Tata McGraw-Hill.</li> <li>• Madigan MT, Martinko JM and Parker J. (2009). Brock Biology of Microorganisms. 12th edition. Pearson/Benjamin Cummings.</li> <li>• Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An Introduction. 9 th edition. Pearson Education.</li> <li>• Jay JM, Loessner MJ and Golden DA. (2005). Modern Food Microbiology. 7th edition, CBS Publishers and Distributors, Delhi, India.</li> </ul>
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### Evaluation Scheme

Exam Type	Mode of Exam	Marks
Theory	External	80
	Internal	20
Practical	External	40
	Internal	10

### Evaluation Scheme for Theory (External)

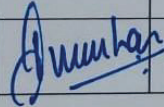
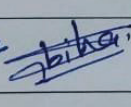
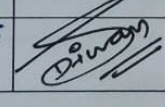
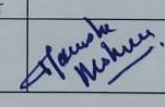
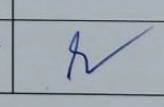
Type of Question	No. of questions	Marks	Word Limit	Choice	Total Marks
Very Short Answer	08	02	30	No	16
Short Answer	04	06	75	Yes	24
Long Answer	04	10	150	Yes	40

### Evaluation Scheme for Theory (Internal)

Based on Mid-term Exam	20
<b>Total</b>	<b>100</b>

### Evaluation Scheme for Practical

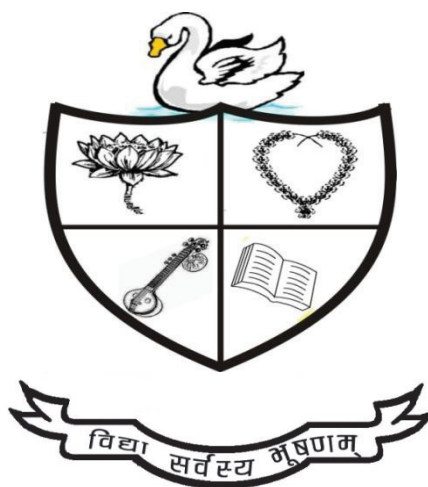
S. No.	Evaluation	Type	Marks
1	Experiment 1	External	10
2	Experiment 2	External	10
3	Experiment 3/ Instrumentation	External	05
4	Spotting	External	10
5	Viva	External	05
6	Sessional	Internal	10
<b>Total</b>			<b>50</b>

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# SYLLABUS FOR THE FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP)

As per provisions of NEP\_2020 to be implemented from  
academic year 2022 onwards.

Semester: <b>III</b>	Session: <b>2024-25</b>
Course Type: <b>DSE</b>	Title: <b>Environmental Biotechnology</b>



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**FYUGP (NEP 2020 Course)**

**Department: Biotechnology**

Session: <b>2024-25</b>	Program: <b>B.Sc.</b>
Semester: <b>III</b>	Subject: <b>Biotechnology</b>
Course Type: <b>DSE</b>	Course Code: .....
Course Title: <b>Environmental Biotechnology</b>	
Credit: <b>4 (3+1)</b>	Lecture: <b>60</b>
M.M. 100 = <b>(ESE 80+IA 20)</b>	Minimum Passing Marks: <b>40%</b>

Title	Calculus
<b>Course Learning Outcome:</b>	<p>After the present course student will be able to -</p> <ul style="list-style-type: none"><li>• describe fundamentals about pollution and fuels.</li><li>• gain understanding of bioremediation.</li><li>• read and analyse about the wastewater treatment.</li><li>• understand the concept of bioleaching and GMOs.</li></ul>

Title	Calculus
<b>Programme Specific Outcome:</b>	<p>Upon completion of this course student will be able to –</p> <ul style="list-style-type: none"><li>• determine types of pollution and biofuels.</li><li>• describe various pollutants using bioremediation and phytoremediation</li><li>• understand the treatment of municipal and industrial water</li><li>• explain enrichment of ores by biological method.</li></ul>

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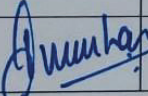
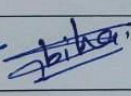
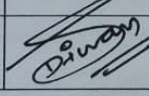
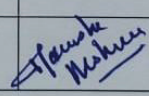

## Theory

Units	Lectures	Lectures	Credit
I	15	Pollution: source, effect and management of air, water, soil and noise pollution. Conventional fuels and their environmental impact – Firewood, and Coal. Modern fuels and their environmental impact – bio-methane, Biogas, Microbial hydrogen Production. Conversion of sugar to alcohol.	1
II	10	Bioremediation of pollutants from soil & water. Degradation of lignin and cellulose using microbes. Phyto-remediation. Degradation of pesticides and other toxic chemicals by microorganisms- degradation aromatic and chlorinated hydrocarbons and petroleum products.	2
III	10	Treatment of municipal waste and Industrial effluents. Bio-fertilizers Role of symbiotic and asymbiotic nitrogen fixing bacteria in the enrichment of soil. Algal and fungal biofertilizers (VAM)	
IV	10	Bioleaching, Enrichment of ores by microorganisms (Gold, Copper and Uranium). Environmental significance of genetically modified microbes, plants and animals.	

## Practical Course

**Credit = 01; Lecture/Lab hour = 15**

- To determine the total dissolved solids of water (TDS)
- Determination of Dissolved oxygen (DO) of water.
- Determination of chemical oxygen demand (COD) of water.
- Determination of biochemical oxygen demand (BOD) of water.
- Determination of effect of fungicide on the growth of fungi
- Effect of fungicide on the antagonism between fungi
- To determine the Most Probable number (MPN) of a given water sample.
- Microbial tolerance of heavy metals
- Composting of solid waste
- Effect of xenobiotics on growth of microorganisms.

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Signature						

<b>List of Books</b>	<ul style="list-style-type: none"> <li>Indu Shekhar Thakur – Environmental Biotechnology: Basic concepts and Applications. First Edition (2006). I. K. International Pvt. Ltd.</li> <li>A.K. Chatterji – Introduction to Environmental Biotechnology. First Edition (2002). Prentice Hall of India Pvt. Ltd. New Delhi.</li> <li>Environmental Biotechnology, Pradipta Kumar Mohapatra</li> <li>Environmental Biotechnology – Concepts and Applications, Hans-Joachim Jordening and Jesef Winter</li> <li>Environmental Microbiology : Methods and Protocols, Alicia L. Ragout De Spencer, John F.T. Spencer</li> </ul>
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### Evaluation Scheme

Exam Type	Mode of Exam	Marks
Theory	External	80
	Internal	20
Practical	External	40
	Internal	10

### Evaluation Scheme for Theory (External)

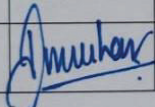
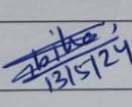
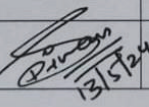
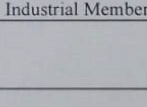
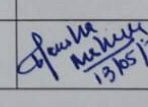
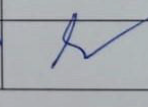
Type of Question	No. of questions	Marks	Word Limit	Choice	Total Marks
Very Short Answer	08	02	30	No	16
Short Answer	04	06	75	Yes	24
Long Answer	04	10	150	Yes	40

### Evaluation Scheme for Theory (Internal)

Based on Mid-term Exam	20
<b>Total</b>	<b>100</b>

### Evaluation Scheme for Practical

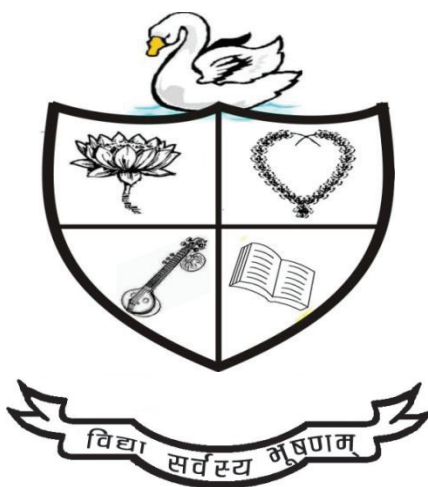
S. No.	Evaluation	Type	Marks
1	Experiment 1	External	10
2	Experiment 2	External	10
3	Experiment 3/ Instrumentation	External	05
4	Spotting	External	10
5	Viva	External	05
6	Sessional	Internal	10
<b>Total</b>			<b>50</b>

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**SYLLABUS FOR  
THE FOUR-YEAR UNDERGRADUATE PROGRAMME  
(FYUGP)**

As per provisions of NEP\_2020 to be implemented from  
academic year 2022 onwards.

Semester: <b>III</b>	Session: <b>2024-25</b>
Course Type: <b>SEC</b>	Title: <b>Enzymology</b>



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**FYUGP (NEP 2020 Course)**

**Department: Biotechnology**

Session: <b>2023-24</b>	Program: <b>B.Sc.</b>
Semester: <b>III</b>	Subject: <b>Biotechnology</b>
Course Type: <b>SEC</b>	Course Code: .....
Course Title: <b>Enzymology</b>	
Credit: 2	Lecture: 30
M.M. 50 = (ESE 40+IA 10)	Minimum Passing Marks: <b>40%</b>

Title	Calculus
<b>Course Learning Outcome:</b>	<p>After the present course student will be able to -</p> <ul style="list-style-type: none"><li>• describe fundamentals about enzyme and its type.</li><li>• gain understanding mechanism of enzymes.</li><li>• read and analyse about the enzyme inhibition.</li><li>• understand the application of enzymes.</li></ul>

Title	Calculus
<b>Programme Specific Outcome:</b>	<p>Upon completion of this course student will be able to –</p> <ul style="list-style-type: none"><li>• understand classification and category of enzyme.</li><li>• describe mechanism of some enzymes.</li><li>• understand the kinetics and inhibition of enzyme.</li><li>• explain immobilization and application in health and industry.</li></ul>

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Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature						

## Theory

Units	Lectures	Lectures	Credit
I	8	General Features of enzymes: Enzyme Classification. Characteristics of enzymes: Concept of active and binding sites, Specificity and ES complex formation.	1
II	7	Mechanism of enzyme action; Mechanisms of Isozyme, aldolase, RNase and alcohol dehydrogenase. Factors affecting initial rate, E, S, temp. & pH.	
III	8	Enzyme kinetics - Michaelis - Menten Equation, Vmax and Km, Enzyme inhibition - types of inhibitors, Allosteric enzyme, Isoenzyme and Ribozymes.	1
IV	7	Large scale production of enzyme, enzyme purification, Methods for immobilization of enzymes, Application of Immobilized enzyme.	

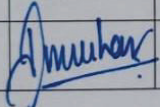
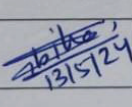
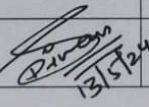
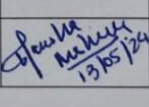
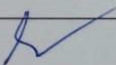
<b>List of Books</b>	<ul style="list-style-type: none"> <li>• Biochemistry, Lubert Stryer, 6th Edition, WH Freeman, 2006.</li> <li>• M.Botham, Peter J. Kennelly, Victor W. et al. 28th Edition, McGrawHill, 2009.</li> <li>• Biochemistry, Voet and Voet, 2nd Edition, Publisher: John Wiley andSons, 1995.</li> <li>• Fundamentals of Enzymology Nicholas Price and Lewis, Oxford Press 1999</li> <li>• Fundamentals of Enzyme Kinetics Athel Cornish-Bowden Portland Press 2004</li> <li>• Practical Enzymology Hans Bisswanger Wiley–VCH 2004</li> </ul>
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### Evaluation Scheme for Theory (External)

Type of Question	No. of questions	Marks	Word Limit	Choice	Total Marks
Long Answer	05	08	150	Yes (attempt any 5 out of 8)	40

### Evaluation Scheme for Theory (Internal)

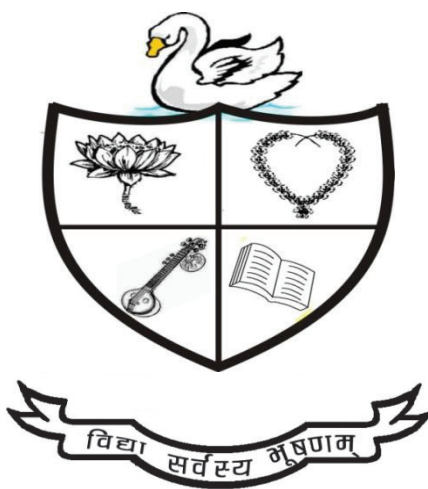
Based on Mid-term Exam I & II	10
<b>Total</b>	<b>50</b>

Approval of the Board of Studies						
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# SYLLABUS FOR THE FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP)

As per provisions of NEP\_2020 to be implemented from  
academic year 2022 onwards.

Semester: <b>IV</b>	Session: <b>2024-25</b>
Course Type: <b>DSC</b>	Title: <b>Molecular Biology</b>



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**FYUGP (NEP 2020 Course)**

**Department: Biotechnology**

Session: <b>2023-24</b>	Program: <b>B.Sc.</b>
Semester: <b>IV</b>	Subject: <b>Biotechnology</b>
Course Type: <b>DSC</b>	Course Code: .....
Course Title: <b>Molecular Biology</b>	
Credit: <b>4 (3+1)</b>	Lecture: <b>60</b>
M.M. 100 = <b>(ESE 80+IA 20)</b>	Minimum Passing Marks: <b>40%</b>

Title	Calculus
<b>Course Learning Outcome:</b>	<p>After the present course student will be able to -</p> <ul style="list-style-type: none"><li>• describe basics of DNA</li><li>• gain understanding of DNA damage and repair</li><li>• read and analyse about the transcription</li><li>• understand the concept of translation</li></ul>

Title	Calculus
<b>Programme Specific Outcome:</b>	<p>Upon completion of this course student will be able to –</p> <ul style="list-style-type: none"><li>• determine the Types and structure of DNA &amp; replication</li><li>• describe the causes of DNA damage and types of repairs</li><li>• understand the concept of transcription and RNA processing</li><li>• explain protein synthesis and regulation of gene expression</li></ul>

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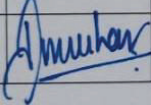
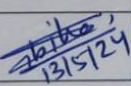
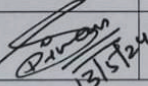
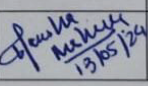
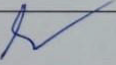
## Theory

Units	Lectures	Lectures	Credit
I	15	DNA structure and replication: DNA as genetic material, Structure of DNA, Types of DNA. DNA replication – Semiconservative nature of DNA replication, Bi-directional replication, DNA polymerases, The replication complex.	1
II	10	DNA damage and repair: causes and types of DNA damage, mechanism of DNA repair: Photoreactivation, base excision repair, nucleotide excision repair, mismatch repair. Homologous recombination: models and mechanism.	2
III	10	Transcription and RNA processing: RNA structure and types of RNA, Transcription in prokaryotes: Prokaryotic RNA polymerase, Initiation, elongation and termination of RNA chains. Transcription in eukaryotes: Eukaryotic RNA polymerases, Initiation and elongation. Splicing and processing of pre-mRNA.	
IV	10	Prokaryotic and eukaryotic translation: Genetic code. Ribosome structure and assembly, aminoacyl tRNA synthetases, Mechanism of initiation, elongation and termination of polypeptides. Regulation of gene expression in prokaryotes: Operon concept.	

## Practical Course

**Credit = 01; Lecture/Lab hour = 15**

- Isolation of DNA from plant cell
- Isolation of DNA from animal cell – blood, spleen
- Isolation of DNA from bacteria
- Isolation of RNA
- Isolation of plasmid DNA
- Agarose gel electrophoresis of isolated DNA/RNA
- SDS PAGE electrophoresis

Approval of the Board of Studies						
Date:	Date: 13/05/2024					
Name	Prof. S. K. Jadhav	Sabiha Naz	Dr. Shubha Diwan	Shri Sanjay Bhagwat	Ku. Varsha Meshram	Dr. Pramod Kumar Mahish
Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature						

<b>List of Books</b>	<ul style="list-style-type: none"> <li>• Gerald Karp - Cell and Molecular biology, 4th Edition (2005).</li> <li>• Lewis J. Klein Smith and Valerie M. Kish-Principles of cell and molecular biology-Third Edition (2002)</li> <li>• P.K. Gupta- Cell and molecular biology, Second Edition (2003), Rastogi publications.</li> <li>• Clark, David P., Nanette Jean Pazdernik, and Michelle R. McGehee. 2019. Molecular biology.</li> <li>• Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., (2008) Molecular Biology of the Gene (VI Edition.). Cold Spring Harbour Lab. Press, Pearson Pub.</li> </ul>
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Evaluation Scheme		
Exam Type	Mode of Exam	Marks
Theory	External	80
	Internal	20
Practical	External	40
	Internal	10

Evaluation Scheme for Theory (External)					
Type of Question	No. of questions	Marks	Word Limit	Choice	Total Marks
Very Short Answer	08	02	30	No	16
Short Answer	04	06	75	Yes	24
Long Answer	04	10	150	Yes	40

Evaluation Scheme for Theory (Internal)	
Based on Mid-term Exam	20
<b>Total</b>	<b>100</b>

Evaluation Scheme for Practical			
S. No.	Evaluation	Type	Marks
1	Experiment 1	External	10
2	Experiment 2	External	10
3	Experiment 3/ Instrumentation	External	05
4	Spotting	External	10
5	Viva	External	05
6	Sessional	Internal	10
<b>Total</b>			<b>50</b>

Approval of the Board of Studies						
Date: 13/05/2024						
Name	Prof. S. K. Jadhav	Sabiha Naz	Dr. Shubha Diwan	Shri Sanjay Bhagwat	Ku. Varsha Meshram	Dr. Pramod Kumar Mahish
Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature						

**SYLLABUS FOR  
THE FOUR-YEAR UNDERGRADUATE PROGRAMME  
(FYUGP)**

As per provisions of NEP\_2020 to be implemented from  
academic year 2022 onwards.

Semester: <b>IV</b>	Session: <b>2024-25</b>
Course Type: <b>DSE</b>	Title: <b>Biostatistics</b>



**Department of Biotechnology**  
GOVT. DIGVIJAY AUTONOMOUS POST GRADUATE  
COLLEGE, RAJNANDGAON (C.G.)



GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE, RAJNANDGAON (C.G.)

**FYUGP (NEP 2020 Course)**

**Department: Biotechnology**

Session: <b>2023-24</b>	Program: <b>B.Sc.</b>
Semester: <b>IV</b>	Subject: <b>Biotechnology</b>
Course Type: <b>DSE</b>	Course Code: .....
Course Title: <b>Biostatistics</b>	
Credit: <b>4 (3+1)</b>	Lecture: <b>60</b>
M.M. 100 = <b>(ESE 80+IA 20)</b>	Minimum Passing Marks: <b>40%</b>

Title	Calculus
<b>Course Learning Outcome:</b>	<p>After the present course student will be able to -</p> <ul style="list-style-type: none"><li>• describe fundamentals about data compilation.</li><li>• gain understanding of central value.</li><li>• read and analyse about the higher statistics tools.</li><li>• understand the concept of computational statistics.</li></ul>

Title	Calculus
<b>ProgramMe Specific Outcome:</b>	<p>Upon completion of this course student will be able to –</p> <ul style="list-style-type: none"><li>• construct tables and figures.</li><li>• describe mean, median, mode and probability.</li><li>• understand and solve problem of t, chi square &amp; ANOVA</li><li>• deal with correlation, regression and computational average and SD.</li></ul>

Approval of the Board of Studies						
Date:	Date: 13/05/2024					
Name	Prof. S. K. Jadhav	Sabiha Naz	Dr. Shubha Diwan	Shri Sanjay Bhagwat	Ku. Varsha Meshram	Dr. Pramod Kumar Mahish
Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature						



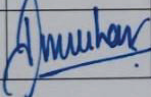
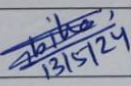
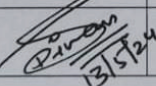
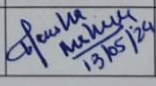
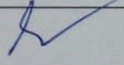
## Theory

Units	Lectures	Lectures	Credit
I	15	Scope of Biostatistics. Types of Data, Collection of data, Primary & Secondary data. Processing and presentation of data by table. Graphical presentation – bar, line and pie diagram.	1
II	10	Measurements of central tendency: Mean, Median and Mode and measures of dispersion - standard deviations. Probability Calculation: definition of probability, probability calculation rules.	2
III	10	Methods of sampling, confidence level, Hypothesis, test of significance - Chi square and Student t test.	
IV	10	Correlation – positive, negative and no correlation. method of calculation of r. Simple linear regression. Computation of average and standard deviation.	

## Practical Course

**Credit = 01; Lecture/Lab hour = 15**

- Presentation of data by table
- Presentation of data by bar, line and pie diagram.
- Calculate mean, median and mode of biological data
- Calculate standard deviation of given biological data.
- Calculate correlation (value of r) of given biological data.
- Perform probability related problems.
- Perform t test of given data
- Perform chi square test of given data
- Computation of average
- Computation of standard deviation

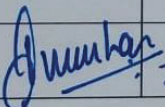
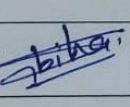
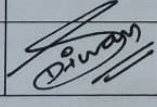
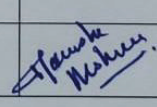
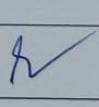
Approval of the Board of Studies						
Date:	Date: 13/05/2024					
Name	Prof. S. K. Jadhav	Sabiha Naz	Dr. Shubha Diwan	Shri Sanjay Bhagwat	Ku. Varsha Meshram	Dr. Pramod Kumar Mahish
Designation	VC Nominee	Subject Expert	Subject Expert	Employment/Industrial Member	Merit Alumni	Chairman/ HOD
Signature						

<b>List of Books</b>	<ul style="list-style-type: none"> <li>• Arora, P. N., &amp; Malhan, P. K. (2010). Biostatistics. Himalaya Pub. House.</li> <li>• Mariappan, P. (2013). Biostatistics: An introduction. Dorling Kindersley.</li> <li>• Williams, B. (2018). Biostatistics: Concepts and applications CRC Press.</li> <li>• Chaudhary, K. (2020). INTRODUCTION TO BIOTECHNOLOGY AND BIOSTATISTICS. Oakville, ON: DELVE Publishing.</li> <li>• Karl Schwartz : (2006) Guide of Micro Soft. Marina Raod, 4th Edition.</li> <li>• Rajaraman, V. Fundamentals of computers. PHI. 2014.</li> <li>• Bhatt, Pramod Chandra P. An introduction to operating systems: concepts and practice, 4th edition. PHI. 2014.</li> </ul>
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Evaluation Scheme		
Exam Type	Mode of Exam	Marks
Theory	External	80
	Internal	20
Practical	External	40
	Internal	10

Evaluation Scheme for Theory (External)					
Type of Question	No. of questions	Marks	Word Limit	Choice	Total Marks
Very Short Answer	08	02	30	No	16
Short Answer	04	06	75	Yes	24
Long Answer	04	10	150	Yes	40
Evaluation Scheme for Theory (Internal)					
Based on Mid-term Exam					20
<b>Total</b>					<b>100</b>

Evaluation Scheme for Practical			
S. No.	Evaluation	Type	Marks
1	Experiment 1	External	10
2	Experiment 2	External	10
3	Experiment 3/ Instrumentation	External	05
4	Spotting	External	10
5	Viva	External	05
6	Sessional	Internal	10
<b>Total</b>			<b>50</b>

Approval of the Board of Studies						
Date:	Date: 13/05/2024					
Name	Prof. S. K. Jadhav	Sabiha Naz	Dr. Shubha Diwan	Shri Sanjay Bhagwat	Ku. Varsha Meshram	Dr. Pramod Kumar Mahish
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Signature						

# SYLLABUS FOR THE FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP)

As per provisions of NEP\_2020 to be implemented from  
academic year 2022 onwards.

Semester: <b>IV</b>	Session: <b>2024-25</b>
Course Type: <b>SEC</b>	Title: <b>Project on Molecular Diagnostics</b>



**Department of Biotechnology**  
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**FYUGP (NEP 2020 Course)**

**Department: Biotechnology**

Session: <b>2023-24</b>	Program: <b>B.Sc.</b>
Semester: <b>IV</b>	Subject: <b>Biotechnology</b>
Course Type: <b>SEC</b>	Course Code: .....
Course Title: <b>Project on Molecular Diagnostics</b>	
Credit: <b>2</b>	Lecture: <b>30</b>
M.M. 50 = (ESE 40+IA 10)	Minimum Passing Marks: <b>40%</b>

Title	Calculus
<b>Course Learning Outcome:</b>	<p>After the present course student will be able to -</p> <ul style="list-style-type: none"><li>• describe fundamentals about Immunological diagnostics.</li><li>• gain understanding mechanism DNA study.</li><li>• read and analyse about the diagnostics tools.</li><li>• understand the application of protein study.</li></ul>

Title	Calculus
<b>Programme Specific Outcome:</b>	<p>Upon completion of this course student will be able to –</p> <ul style="list-style-type: none"><li>• understand Ag-Ab Interaction and applications.</li><li>• describe mechanism of DNA profiling.</li><li>• understand the principle and working of Equipment of diagnostic interest.</li><li>• explain diagnosis based on proteomics.</li></ul>

Approval of the Board of Studies						
Date:	Date: 13/05/2024					
Name	Prof. S. K. Jadhav	Sabiha Naz	Dr. Shubha Diwan	Shri Sanjay Bhagwat	Ku. Varsha Meshram	Dr. Pramod Kumar Mahish
Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature						

**Make detailed report on (any three) following project topic**

• Microarray	• PCR
• RFLP	• RAPD
• ELISA	• Autoradiography
• DNA Sequencer	• Flow Cytometer
• DNA Fingerprinting	• Karyotyping

<b>List of Books</b>	<ul style="list-style-type: none"> <li>• Practical Biochemistry, Principles and Techniques, Keith Wilson and John Walker</li> <li>• Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes,</li> <li>• Hofmann, Andreas, Samuel Clokie, Keith Wilson, and John Walker. Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology. 2018.</li> <li>• Upadhyay, A., Upadhyay, K., &amp; Nath, N. (2009). Biophysical Chemistry (Principles and Techniques). Chandi Chowk: Global Media.</li> </ul>
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**Evaluation Scheme**

<b>Evaluation</b>	<b>Marks</b>	<b>Pattern</b>
Project Report	30	Internal
Viva based on project report	10	Internal and Inter-departmental
Internal test	10	Internal

Approval of the Board of Studies						
Date:	Date: 13/05/2024					
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Signature	