



પરિપત્ર:

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટીની સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજોનાં આચાર્યશ્રીઓને સવિનય જણાવવાનું કે સાયન્સ વિદ્યાશાખા હેઠળનો NEP-૨૦૨૦ અંતર્ગતનો બાયોટેકનોલોજી વિષયનો (બી.એસ.સી. વિથ ઓનર્સ) નો સેમેસ્ટર-૨ નો અભ્યાસક્રમ આ સાથે સામેલ છે.

માનનીય કુલપતિશ્રીની મંજૂરી અનુસાર સદર અભ્યાસક્રમ શૈક્ષણિક વર્ષ જુન, ૨૦૨૩થી અમલવારી કરવાની રહે છે. સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજો ધ્વારા તેની અમલવારી કરવા જણાવવામાં આવે છે.



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૧૨/૦૧/૨૦૨૪

ખાસ ફરજ પરના અધિકારી
(એકેડેમિક)

ક્રમાંક/બીકેએનએમયુ/ એકેડેમિક/૨૨૦/૨૦૨૪

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી,

સરકારી પોલીટેકનિક કેમ્પસ,

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી રોડ,

ખડીયા, જૂનાગઢ-૩૬૨૨૬૩

તા.૧૨/૦૧/૨૦૨૪

પ્રતિ,

- ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી સંલગ્ન સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમો ચલાવતી તમામ કોલેજોના આચાર્યશ્રીઓ તરફ....

નકલ સાદર રવાના:-

- માન.કુલપતિશ્રી/કુલસચિવશ્રીનાં અંગત સચિવશ્રી.
- પરીક્ષા નિયામકશ્રી, ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી, જૂનાગઢ

નકલ રવાના જાણ તથા યોગ્ય કાર્યવાહી અર્થે:



Bhakta Kavi Narsinh Mehta University Junagadh



BOARD OF LIFE SCIENCE
FACULTY OF SCIENCE
SYLLABUS FOR
BACHELOR OF SCIENCE (HONOURS) PROGRAMME
(SEMESTER- II)
EFFECTIVE FROM JUNE, 2023

Bhakta Kavi Narsinh Mehta University
Syllabus of Bachelor of Science (B.Sc.) as per NEP
Effective from June 2023
Subject: B.Sc. BIOTECHNOLOGY

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Credit Structure for Semester – II

Sr. No.	Level UG/PG	Course Group	Paper No.	Paper Title	Credits	Total Credits	Teaching Hours	Internal Marks	External Marks	Practical Internal Marks	Practical External Marks	Total Marks	Total Marks
1	UG	MAJOR	MAJBT T201	Biostatistics, Biocomputing and Bioinformatics (Theory)	3	4	45	25	50	-	-	75	100
2	UG	MAJOR	MAJBT P201	Biostatistics, Biocomputing and Bioinformatics (Practical)	1		30	-	-	25	-	25	
3	UG	MAJOR	MAJBT T202	Fundamental of Biochemistry (Theory)	3	4	45	25	50	-	-	75	100
4	UG	MAJOR	MAJBT P202	Fundamental of Biochemistry (Practical)	1		30	-	-	25	-	25	
5	UG	MINOR	MINBT T201	Biostatistics, Biocomputing and Bioinformatics (Theory)	3	4	45	25	50	-	-	75	100
6	UG	MINOR	MINBT P201	Biostatistics, Biocomputing and Bioinformatics (Practical)	1		30	-	-	25	-	25	
7	UG	MDC/IDC	IDCBT T201	Fundamental of Biochemistry (Theory)	3	4	45	25	50	-	-	75	100
8	UG	MDC/IDC	IDCBT P201	Fundamental of Biochemistry (Practical)	1		30	-	-	25	-	25	
9	UG	SEC	SECMB 201	Microbial Quality Control in Food & Pharmaceutical Industries (Syllabus in SEC basket)	2	2	30	25	25	-	-	50	50
Total						18	330	125	225	100		450	

DSC: Discipline Specific Course [**Major(Core), Minor(Elective)**]
MDC: Multi-Disciplinary Course, **IDC:** Inter Disciplinary Course
SEC: Skill Enhancement Course, **AEC:** Ability Enhancement Course
VAC: Value Added Course

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Subject: B.Sc. BIOTECHNOLOGY

Course Level	U.G	Teaching Hours	45+30=75
Programme	B.Sc. Biotechnology	Internal Marks	25
Semester	II	External Marks	50
Course Type	MAJOR	Internal Practical Marks	-
Course title	Biostatistics, Biocomputing and Bioinformatics	External Practical Marks	-
Credit	03	Exam Duration	2:00 Hrs.
Course Code	MAJBTT201	Practical Exam Duration	-

Course Description:

This course is designed to provide a comprehensive overview of three interconnected fields that are at the forefront of advancements in the life sciences.

Biostatistics, Biocomputing, and Bioinformatics play pivotal roles in the collection, analysis, and interpretation of biological data, contributing significantly to our understanding of complex biological systems and the development of innovative solutions in medicine and research.

Course Objectives:

- To establish the fundamental of biostatistics, exploring biocomputing, and navigating bioinformatics.
- Major objectives are to develop the critical thinking and problem-solving approach in the students.
- Student will utilize the computational methods for Research, Health, and pharma validation and interpretation of data.

Course Outcomes:

- Ability to design experiments, collect and analyze data, and draw meaningful conclusions in the context of biological and health research.
- ability to use computational methods for data analysis, modeling, and simulation in biology.

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Effective from June 2023
Subject: B.Sc. BIOTECHNOLOGY

Paper: MAJBTT201 – Biostatistics, Biocomputing and Bioinformatics
(Theory)

UNIT-1 :- : Biostatistics – 1

No. of Hrs: 12

- 1.1 Scope and applications of Biostatistics
- 1.2 Samples and population concept, Collection, Processing and Presentation of data
- 1.3 Measures of Central tendency- Arithmetic, Harmonic and Geometric Mean, Mode and Median, their applications, merits and demerits
- 1.4 Measures of dispersion- Range, Variance, Standard Deviation, Coefficient of Variance, their applications, merits and demerits

UNIT-2 :- Biostatistics – 2

No. of Hrs: 13

- 2.1 Probability and Conditional probability
- 2.2 Student's t-test- introduction and application in biology
- 2.3 Chi square test- introduction and application in biology
- 2.4 Analysis of variance- introduction and application in biology

UNIT-3 :- Biocomputing

No. of Hrs: 10

- 3.1 Structure of Computer (component, peripheral, use and types)
- 3.2 Creation of drawing
- 3.3 MS-Office (Word, Excel, Powerpoint)
- 3.4 Internet, Email and setup of Email address

UNIT-4 :- Bioinformatics

No. of Hrs: 10

- 4.1 Introduction of Bioinformatics, Basic terminology
- 4.2 Application of bioinformatics in various fields: Medicine, Agriculture, Industries etc.
- 4.3 File formats and Structure of database
- 4.4 Types of biological databases

Reference Books :-

1. P.S.S.Sundar Rao, An Introduction to Biostatistics, Eastern Economy Edition.
2. N.Gurumani, An Introduction to Biostatistics, 2nd Edition, MJP Publisher.
3. Saras Publication, Biostatistics applications
4. Microbiology-Fundamentals and Applications - Purohit, S.S., - 6 Edition, Agrobios Publications, Delhi
5. Principles and Techniques of biochemistry and molecular biology -Wilson and Walker – Cambridge University Press
6. Bio-analytical Techniques - Srivastava - Narsa Publication
7. Analytical biochemistry and separation techniques – 4th edition – Palanivelu - 21st Century Publication
8. Biophysical techniques - A Upadhyay, K Upadhyay and N Nath –Himalaya Publishing House.
9. Introduction to bioinformatics by Arthur M. Lesk. Oxford University Press.(2004)

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Course Level	U.G	Teaching Hours	30
Programme	B.Sc. Biotechnology	Internal Marks	-
Semester	II	External Marks	-
Course Type	MAJOR	Internal Practical Marks	25
Course title	Biostatistics, Biocomputing and Bioinformatics	External Practical Marks	
Credit	01	Exam Duration	-
Course Code	MAJBTP201	Practical Exam Duration	2:00 hrs

Course Description:

This course is designed to provide a comprehensive overview of three interconnected fields that are at the forefront of advancements in the life sciences.

Biostatistics, Biocomputing, and Bioinformatics play pivotal roles in the collection, analysis, and interpretation of biological data, contributing significantly to our understanding of complex biological systems and the development of innovative solutions in medicine and research.

Course Objectives:

- To provide the hands-on exercise on fundamental of Biostatistics, computer, internet and web browser Navigating Bioinformatics
- Course will aim to get Bioinformatics training by in silico-based exercise.

Course Outcomes:

- Students built their own ability to design experiments, collect and analyze data, and draw meaningful conclusions in the context of biological sciences.
- Student developed the computational methods for data analysis, modeling, and simulation in biology.

List of Practical

Sr. No.	Practical
1.	Calculation of Mean, Median and Mode
2.	Measures of dispersion- Range, Variance, Standard Deviation, Coefficient of Variance
3.	Significant test: Student's t-test for paired and unpaired data
4.	Chi-square test
5.	Analysis of variance (ANOVA) - Randomized Block Design (RBD)
6.	MS-Office

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7.	Use of Internet and creation of Email
8.	Basic Terminologies in Bioinformatics
9.	Biological databases
10.	NCBI Search for Gene Sequences

Reference Books :-

1. "Biostatistics: A Foundation for Analysis in the Health Sciences" by Wayne W. Daniel and Chad L. Cross
2. "Biostatistics: The Bare Essentials" by Geoffrey R. Norman and David L. Streiner
3. "Introduction to Biostatistics" by Ronald N. Forthofer, Eun Sul Lee, and Mike Hernandez
4. "Biostatistics: Basic Concepts and Methodology for the Health Sciences" by Wayne W. Daniel
5. "Statistical Methods in Medical Research" by Peter Armitage, Geoffrey Berry, and J. N. S. Matthews
6. "Bioinformatics: Sequence and Genome Analysis" by David W. Mount
7. "Bioinformatics: Sequence and Structure Analysis" by Michael Gribskov and John Devereux
8. "Bioinformatics: Sequence Alignment and Markov Models" by Richard Durbin, Sean R. Eddy, Anders Krogh, and Graeme Mitchison
9. "Bioinformatics: Converting Data to Knowledge" by Andreas D. Baxevanis and B. F. Francis Ouellette
10. "Introduction to Bioinformatics" by Arthur M. Lesk
11. "Bioinformatics for Dummies" by Jean-Michel Claverie and Cedric Notredame

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Course Level	U.G	Teaching Hours	45 +30 = 75
Programme	B.Sc. Biotechnology	Internal Marks	25
Semester	II	External Marks	50
Course Type	MAJOR	Internal Practical Marks	-
Course title	Fundamental of Biochemistry	External Practical Marks	-
Credit	03	Exam Duration	2:00 Hrs.
Course Code	MAJBTT202	Practical Exam Duration	-

Course Description:

In this course, we embark on a comprehensive exploration of the key components of biochemistry, ranging from the structure and function of biomolecules to the intricacies of cellular metabolism and signal transduction. Through this academic voyage, we aim to provide a solid foundation for understanding the molecular mechanisms that drive physiological processes, laying the groundwork for further studies in the life sciences.

Course Objectives:

After completing this course, the student able to:

- Understand the basic concepts of life Science from biochemical pathways.
- Explore enzyme structure and function.
- Understand various catalytic mechanisms employed by enzymes.
- Learn enzyme kinetics, including the Michaelis-Menten equation.
- Analyze factors affecting enzyme catalysis and interpret kinetic data.
- Examine modes of enzyme regulation, including allosteric regulation.
- Explore the role of enzymes in metabolic pathways and cellular regulation.
- Investigate the application of enzymes in biotechnological processes.
- Gain hands-on experience in enzyme assays and characterization techniques.
- Stay updated on recent advances in enzymology research.
- Develop critical thinking skills for analyzing complex enzyme-related scenarios.

Course Outcomes:

Upon completion of this course, the learner will be able to:

- Molecular structures and functions of enzymes
- Various catalytic mechanisms
- Enzyme kinetics principles (including Michaelis-Menten equation)
- Modes of enzyme regulation (focus on allosteric regulation) and inhibition
- Role of enzymes in metabolic pathways
- Critical thinking for complex enzymatic scenarios
- Molecular Transport Course Outcomes:
- Fundamental mechanisms of molecular transport across cell membranes
- Role of transport proteins in molecular movement within cells
- Structure and function of cellular membranes in molecular transport
- Involvement of molecular transport in cellular signal transduction pathwa

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Syllabus of Bachelor of Science (B.Sc.) as per NEP
Effective from June 2023
Subject: B.Sc. BIOTECHNOLOGY

Paper: MAJBTT202 – Fundamental of Biochemistry (Theory)

UNIT-1 :- Chemistry of Life

No. of Hrs: 10

- 1.1 Chemicals, Elements and structure of Atoms
- 1.2 Molecules and Chemical Bonds:
- 1.3 Chemical reactions
- 1.4 The Properties of Water
- 1.5 pH and Buffer

UNIT-2 :- Enzymes - I

No. of Hrs: 12

- 2.1 Introduction and Characteristics of Enzymes, Biocatalyst and Chemical Catalyst, Coenzymes, Cofactors, Isoenzyme and Allosteric Enzyme
- 2.2 Chemical and Physical Properties of Enzymes.
- 2.3 Classification and Nomenclature of Enzymes.
- 2.4 Catalytic Mechanism (Proximity and Orientation effects, Acid base Catalysis, Covalent Catalysis and Metal ion catalysis and Transition state analog)

UNIT-3 :- Enzymes - II

No. of Hrs: 13

- 3.1 Enzyme Kinetics (derivation of Michaelis–Menten constant, linear transformation of the equation)
- 3.2 Enzyme Inhibition: Mechanism and Types (Irreversible and Reversible)
- 3.3 Mechanism of Enzyme Regulation: Covalent and Allosteric Regulation
- 3.4 Differences between Prokaryotic & Eukaryotic Enzyme Regulation

UNIT-4 :- Molecular Transportation and Signaling

No. of Hrs: 10

- 4.1 Composition and architecture of membrane
- 4.2 Passive and facilitated diffusion.
- 4.3 Primary active transport, concept of uniport, sodium potassium pump and proton pump.
- 4.4 Secondary active transport, symport and antiport Group translocation Iron uptake.

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Reference Books :-

- 1) Principles and techniques of practical biochemistry by K.Wilson and Walker, Cambridge University press.
- 3) Tools of biochemistry by cooper.
- 4) Outlines of biochemistry by Eric Conn., P.K.Stumpf. John Wiley and Sons.
- 5) Lehninger's Principles of Biochemistry by Nelson, David & Cox., Macmillan NY.
- 6) Plummer. An introduction to practical Biochemistry, 3rd Edition
- 7) Price & Steven, Fundamentals of Enzymology, 3rd Edition

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Paper: MAJBTP202 – Fundamental of Biochemistry (Practical)

Course Level	U.G	Teaching Hours	30
Programme	B.Sc. Biotechnology	Internal Marks	-
Semester	II	External Marks	-
Course Type	MAJOR	Internal Practical Marks	25
Course title	Fundamental of Biochemistry	External Practical Marks	
Credit	01	Exam Duration	-
Course Code	MAJBTP202	Practical Exam Duration	2:00 hrs

Course Description:

In this course, we embark on a comprehensive exploration of the key components of biochemistry, ranging from the structure and function of biomolecules to the intricacies of cellular metabolism and signal transduction. Through this academic voyage, we aim to provide a solid foundation for understanding the molecular mechanisms that drive physiological processes, laying the groundwork for further studies in the life sciences.

Course Objectives:

After completing this course, the student should be able to:

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- Explore enzyme structure and function.
- Understand various catalytic mechanisms employed by enzymes.
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- Modes of enzyme regulation (focus on allosteric regulation) and inhibition
- Role of enzymes in metabolic pathways
- Critical thinking for complex enzymatic scenarios
- Molecular Transport Course Outcomes:
- Fundamental mechanisms of molecular transport across cell membranes
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List of Practical

Sr. No.	Practical
1.	Measurement of pH
2.	Making of Buffer
3.	Assay of enzyme - Amylases by KI-I2 method
4.	Assay of enzyme - phosphatase
5.	Assay of enzyme – invertase by GOD POD method.
6.	Effect of Substrate concentration (Determination of K_m and V_{max})
7.	Effect of pH and temperature on enzyme activity
8.	Effect of Enzyme inhibitors on enzyme activity

Reference Books :-

1. Plummer. An introduction to practical Biochemistry, 3rd Edition
2. J. Jayaraman. Lab Manual in Biochemistry.
3. Cohn and Stumph. Outline of Biochemistry. Wiley eastern.
4. Seidman and Moore. 2000. Basic laboratory methods for biotechnology. Lovgman
5. Switzer and Garritty. Experimental Biochemistry WH Freeman. 2nd Edition

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Course Level	U.G	Teaching Hours	45+30=75
Programme	B.Sc. Biotechnology	Internal Marks	25
Semester	II	External Marks	50
Course Type	MINOR	Internal Practical Marks	-
Course title	Biostatistics, Biocomputing and Bioinformatics	External Practical Marks	-
Credit	03	Exam Duration	2:00 Hrs.
Course Code	MINBTT201	Practical Exam Duration	-

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Subject: B.Sc. BIOTECHNOLOGY

Paper: MINBTT201 – Biostatistics, Biocomputing and Bioinformatics
(Theory)

UNIT-1 :- : Biostatistics – 1

No. of Hrs: 12

- 1.1 Scope and applications of Biostatistics
- 1.2 Samples and population concept, Collection, Processing and Presentation of data
- 1.3 Measures of Central tendency- Arithmetic, Harmonic and Geometric Mean, Mode and Median, their applications, merits and demerits
- 1.4 Measures of dispersion- Range, Variance, Standard Deviation, Coefficient of Variance, their applications, merits and demerits

UNIT-2 :- Biostatistics – 2

No. of Hrs: 13

- 2.1 Probability and Conditional probability
- 2.2 Student's t-test- introduction and application in biology
- 2.3 Chi square test- introduction and application in biology
- 2.4 Analysis of variance- introduction and application in biology

UNIT-3 :- Biocomputing

No. of Hrs: 10

- 3.1 Structure of Computer (component, peripheral, use and types)
- 3.2 Creation of drawing
- 3.3 MS-Office (Word, Excel, Powerpoint)
- 3.4 Internet, Email and setup of Email address

UNIT-4 :- Bioinformatics

No. of Hrs: 10

- 4.1 Introduction of Bioinformatics, Basic terminology
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- 4.3 File formats and Structure of database
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Paper: MINBTP201 – Biostatistics, Biocomputing and Bioinformatics (Practical)

Course Level	U.G	Teaching Hours	30
Programme	B.Sc. Biotechnology	Internal Marks	-
Semester	II	External Marks	-
Course Type	MINOR	Internal Practical Marks	25
Course title	Biostatistics, Biocomputing and Bioinformatics	External Practical Marks	
Credit	01	Exam Duration	-
Course Code	MINBTP201	Practical Exam Duration	2:00 hrs

Course Description:

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List of Practical

Sr. No.	Practical
11.	Calculation of Mean, Median and Mode
12.	Measures of dispersion- Range, Variance, Standard Deviation, Coefficient of Variance
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14.	Chi-square test

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15.	Analysis of variance (ANOVA) - Randomized Block Design (RBD)
16.	MS-Office
17.	Use of Internet and creation of Email
18.	Basic Terminologies in Bioinformatics
19.	Biological databases
20.	NCBI Search for Gene Sequences

Reference Books :-

1. "Biostatistics: A Foundation for Analysis in the Health Sciences" by Wayne W. Daniel and Chad L. Cross
2. "Biostatistics: The Bare Essentials" by Geoffrey R. Norman and David L. Streiner
3. "Introduction to Biostatistics" by Ronald N. Forthofer, Eun Sul Lee, and Mike Hernandez
4. "Biostatistics: Basic Concepts and Methodology for the Health Sciences" by Wayne W. Daniel
5. "Statistical Methods in Medical Research" by Peter Armitage, Geoffrey Berry, and J. N. S. Matthews
6. "Bioinformatics: Sequence and Genome Analysis" by David W. Mount
7. "Bioinformatics: Sequence and Structure Analysis" by Michael Gribskov and John Devereux
8. "Bioinformatics: Sequence Alignment and Markov Models" by Richard Durbin, Sean R. Eddy, Anders Krogh, and Graeme Mitchison
9. "Bioinformatics: Converting Data to Knowledge" by Andreas D. Baxevas and B. F. Francis Ouellette
10. "Introduction to Bioinformatics" by Arthur M. Lesk
11. "Bioinformatics for Dummies" by Jean-Michel Claverie and Cedric Notredame

Bhakta Kavi Narsinh Mehta University
Syllabus of Bachelor of Science (B.Sc.) as per NEP
Effective from June 2023
Subject: B.Sc. BIOTECHNOLOGY

Course Level	U.G	Teaching Hours	45
Programme	B.Sc. Biotechnology	Internal Marks	25
Semester	II	External Marks	50
Course Type	Interdisciplinary Course	Internal Practical Marks	-
Course title	Fundamental of Biochemistry	External Practical Marks	-
Credit	03	Exam Duration	2:00 Hrs.
Course Code	IDCBTT201	Practical Exam Duration	-

Course Description:

In this course, we embark on a comprehensive exploration of the key components of biochemistry, ranging from the structure and function of biomolecules to the intricacies of cellular metabolism and signal transduction. Through this academic voyage, we aim to provide a solid foundation for understanding the molecular mechanisms that drive physiological processes, laying the groundwork for further studies in the life sciences.

Course Objectives:

After completing this course, the student should be able to:

- Understand the basic concepts of biochemical pathways of the biological systems.
- Explore enzyme structure and function.
- Understand various catalytic mechanisms employed by enzymes.
- Learn enzyme kinetics, including the Michaelis-Menten equation.
- Analyze factors affecting enzyme catalysis and interpret kinetic data.
- Examine modes of enzyme regulation, including allosteric regulation.
- Explore the role of enzymes in metabolic pathways and cellular regulation.
- Investigate the application of enzymes in biotechnological processes.
- Gain hands-on experience in enzyme assays and characterization techniques.
- Stay updated on recent advances in enzymology research.
- Develop critical thinking skills for analyzing complex enzyme-related scenarios.

Course Outcomes:

Upon completion of this course, the learner will be able to:

- Molecular structures and functions of enzymes
- Various catalytic mechanisms
- Enzyme kinetics principles (including Michaelis-Menten equation)
- Modes of enzyme regulation (focus on allosteric regulation) and inhibition
- Role of enzymes in metabolic pathways
- Critical thinking for complex enzymatic scenarios
- Molecular Transport Course Outcomes:
- Fundamental mechanisms of molecular transport across cell membranes
- Role of transport proteins in molecular movement within cells
- Structure and function of cellular membranes in molecular transport
- Involvement of molecular transport in cellular signal transduction pathways

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Subject: B.Sc. BIOTECHNOLOGY

Paper: IDCBTT201 – Fundamental of Biochemistry (Theory)

UNIT-1 :- Chemistry of Life

No. of Hrs: 10

- 1.1 Chemicals, Elements and structure of Atoms
- 1.2 Molecules and Chemical Bonds:
- 1.3 Chemical reactions
- 1.4 The Properties of Water
- 1.5 pH and Buffer

UNIT-2 :- Enzymes - I

No. of Hrs: 12

- 2.1 Introduction and Characteristics of Enzymes, Biocatalyst and Chemical Catalyst, Coenzymes, Cofactors, Isoenzyme and Allosteric Enzyme
- 2.2 Chemical and Physical Properties of Enzymes.
- 2.3 Classification and Nomenclature of Enzymes.
- 2.4 Catalytic Mechanism (Proximity and Orientation effects, Acid base Catalysis, Covalent, Catalysis and Metal ion catalysis and Transition state analog)

UNIT-3 :- Enzymes - II

No. of Hrs: 13

- 3.1 Enzyme Kinetics (derivation of Michaelis–Menten constant, linear transformation of the equation)
- 3.2 Enzyme Inhibition: Mechanism and Types (Irreversible and Reversible)
- 3.3 Mechanism of Enzyme Regulation: Covalent and Allosteric Regulation
- 3.4 Differences between Prokaryotic & Eukaryotic Enzyme Regulation

UNIT-4 :- Molecular Transportation and Signaling

No. of Hrs: 10

- 4.1 Composition and architecture of membrane
- 4.2 Passive and facilitated diffusion.
- 4.3 Primary active transport, concept of uniport, sodium potassium pump and proton pump.
- 4.4 Secondary active transport, symport and antiport Group translocation Iron uptake.

Reference Books :-

- 1. Plummer. An introduction to practical Biochemistry, 3rd Edition
- 2. J. Jayraman. Lab Manual in Biochemistry.
- 3. Cohn and Stumph. Outline of Biochemistry. Wiley eastern.
- 4. Seidman and Moore. 2000. Basic laboratory methods for biotechnology. Lovgman
- 5. Switzer and Garrity. Experimental Biochemistry WH Freeman. 2nd Edition

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Effective from June 2023
Subject: B.Sc. BIOTECHNOLOGY

Paper: IDCBTP201 – Fundamental of Biochemistry (Practical)

Course Level	U.G	Teaching Hours	30
Programme	B.Sc. Biotechnology	Internal Marks	-
Semester	II	External Marks	-
Course Type	Interdisciplinary course	Internal Practical Marks	25
Course title	Fundamental of Biochemistry	External Practical Marks	
Credit	01	Exam Duration	-
Course Code	IDCBTP201	Practical Exam Duration	2:00 hrs

Course Description:

In this course, we embark on a comprehensive exploration of the key components of biochemistry, ranging from the structure and function of biomolecules to the intricacies of cellular metabolism and signal transduction. Through this academic voyage, we aim to provide a solid foundation for understanding the molecular mechanisms that drive physiological processes, laying the groundwork for further studies in the life sciences.

Course Objectives:

After completing this course, the student should be able to:

- Understand the basic concepts of life Science from biochemical pathways.
- Explore enzyme structure and function.
- Understand various catalytic mechanisms employed by enzymes.
- Learn enzyme kinetics, including the Michaelis-Menten equation.
- Analyze factors affecting enzyme catalysis and interpret kinetic data.
- Examine modes of enzyme regulation, including allosteric regulation.
- Explore the role of enzymes in metabolic pathways and cellular regulation.
- Investigate the application of enzymes in biotechnological processes.
- Gain hands-on experience in enzyme assays and characterization techniques.
- Stay updated on recent advances in enzymology research.
- Develop critical thinking skills for analyzing complex enzyme-related scenarios.

Course Outcomes:

Upon completion of this course, the learner will be able to:

- Molecular structures and functions of enzymes
- Various catalytic mechanisms
- Enzyme kinetics principles (including Michaelis-Menten equation)
- Modes of enzyme regulation (focus on allosteric regulation) and inhibition
- Role of enzymes in metabolic pathways
- Critical thinking for complex enzymatic scenarios
- Molecular Transport Course Outcomes:
- Fundamental mechanisms of molecular transport across cell membranes
- Role of transport proteins in molecular movement within cells
- Structure and function of cellular membranes in molecular transport
- Involvement of molecular transport in cellular signal transduction pathways

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List of Practical

Sr. No.	Practical
1.	Measurement of pH
2.	Making of Buffer
3.	Assay of enzyme - Amylases by KI-I2 method
4.	Assay of enzyme - phosphatase
5.	Assay of enzyme – invertase by GOD POD method.
6.	Effect of Substrate concentration (Determination of Km and Vmax)
7.	Effect of pH and temperature on enzyme activity
8.	Effect of Enzyme inhibitors on enzyme activity

Reference Books :-

1. Plummer. An introduction to practical Biochemistry, 3rd Edition
2. J. Jayraman. Lab Manual in Biochemistry.
3. Cohn and Stumph. Outline of Biochemistry. Wiley eastern.
4. Seidman and Moore. 2000. Basic laboratory methods for biotechnology. Lovgman
5. Switzer and Garrity. Experimental Biochemistry WH Freeman. 2nd Edition

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Subject: B.Sc. BIOTECHNOLOGY

Theory Internal Evaluation [Major/Minor/MDC/IDC]

No.	Particulars	Weightage
1	Test (MCQ/Descriptive)	10
2	Assignment	10
3	Attendance	5
	Total	25

Practical Internal Evaluation [Major/Minor/MDC/IDC]

No.	Particulars	Weightage
1	Practical Performance	10
2	Practical Awareness	10
3	Practical Attendance	5
	Total	25

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Theory External Evaluation Paper Style [Major/Minor/MDC/IDC]

Time: 2 Hours

Total Marks: 50

Instructions:

1. Illustrate your answer with neat and labelled diagrams.
2. Figure to the right side indicates full marks of questions.

QUESTION-1: (From UNIT-1) (10 Marks)

(1)..... (05)

(2).....(05)

OR

QUESTION-1: (From UNIT-1) (10 Marks)

(1)..... (05)

(2).....(05)

QUESTION-2: (From UNIT-2) (10 Marks)

(1)..... (05)

(2).....(05)

OR

QUESTION-2: (From UNIT-2) (10 Marks)

(1)..... (05)

(2).....(05)

QUESTION-3: (From UNIT-3) (10 Marks)

(1)..... (05)

(2).....(05)

OR

QUESTION-3: (From UNIT-3) (10 Marks)

(1)..... (05)

(2).....(05)

QUESTION-4: (From UNIT-4) (10 Marks)

(1)..... (05)

(2).....(05)

OR

QUESTION-4: (From UNIT-4) (10 Marks)

(1)..... (05)

(2).....(05)

QUESTION-5: (From UNIT-1 and UNIT-2) (10 Marks)

(1)..... (05)

(2).....(05)

OR

QUESTION-5: (From UNIT-3 and UNIT-4) (10 Marks)

(1)..... (05)

(2).....(05)