



પરિપત્ર:

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી સંલગ્ન સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ કોલેજોનાં આચાર્યશ્રીઓને સવિનય જણાવવાનું કે સાયન્સ વિદ્યાશાખા હેઠળનો NEP-૨૦૨૦ અંતર્ગતનો લાઇફ-સાયન્સ વિષય (બાયોટેકનોલોજી વિથ ઓનર્સ) સેમેસ્ટર-૧ના અભ્યાસક્રમમાં રિવાઈઝડ પેપર સ્ટાઈલ (SOP, શિક્ષણ વિભાગ, ગુજરાત સરકાર ની ગાઈડલાઈન્સ પ્રમાણે) જેની સાથેનો ૨૦૨૩-૨૪નો અભ્યાસક્રમ આ સાથે સામેલ છે. જે આપને વિદિત થાય.

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



[Signature]
76/10/2024

ખાસ ફરજ પરના અધિકારી
(એકેડેમિક)

ક્રમાંક/બીકેએનએમયુ/ એકેડેમિક/૧૩૮૭/૨૦૨૪

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી,

સરકારી પોલીટેકનિક કેમ્પસ,

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી રોડ,

ખડીયા, જૂનાગઢ-૩૬૨૨૬૩

તા.૧૬/૧૦/૨૦૨૪

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, જુનાગઢ

નકલ રવાના જાણ તથા યોગ્ય કાર્યવાહી અર્થે:

- સીસ્ટમ મેનેજરશ્રી, આઈ.ટી.સેલ વિભાગ (વેબસાઇટ ઉપર પ્રસિદ્ધ થવા અર્થે.)



**BHAKTA KAVI NARSINH MEHTA UNIVERSITY
JUNAGADH**



**BOARD OF LIFE SCIENCE STUDIES
FACULTY OF SCIENCE
SYLLABUS FOR
B.Sc. (BIOTECHNOLOGY) (HONOURS)
PROGRAMME
(SEMESTER- I)
EFFECTIVE FROM JUNE, 2023**

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Bhakta Kavi Narsinh Mehta University, Junagadh

Faculty of Science

Subject: Biotechnology

Credit Structure for Semester – I

Sr. No.	Level UG/PG	Course Group	Paper No.	Paper Title	Credits	Teaching Hours	Internal Marks	External Marks	Practical Internal Marks	Practical External Marks	Total Marks	Page No.
1	UG	MAJOR	MAJBT T101	Biomolecules (Theory)	03	45	25	50	-	-	100	
2			MAJBT P101	Biomolecules (Practical)	01	30	-	-	25	-		
3	UG	MAJOR	MAJBT T102	Introduction to Biotechnology (Theory)	03	45	25	50	-	-	100	
4			MAJBT P102	Introduction to Biotechnology (Practical)	01	30	-	-	25	-		
5	UG	MINOR	MINBT T101	Biomolecules (Theory)	03	45	25	50	-	-	100	
6			MINBT P101	Biomolecules (Practical)	01	30	-	-	25	-		
7	UG	MDC/IDC	IDCBT T101	Introduction to Biotechnology (Theory)	03	45	25	50	-	-	100	
8			IDCBT P101	Introduction to Biotechnology (Practical)	01	30	-	-	25	-		
9	UG	SEC	SECBT 101	Mushroom Cultivation (Syllabus in SEC basket)	02	30	-	-	25	25	50	
10	UG	AEC	AEC-101	English Language-1 (Syllabus in AEC basket)	02	30	25	25	-	-	50	
11	UG	VAC	PHISE101	Indian Knowledge System-1 (Syllabus in VAC basket)	02	30	25	25	-	-	50	
			Total		22							

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

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	I	External Marks	50
Course Type	MAJOR	Internal Practical Marks	-
Course title	Biomolecules	External Practical Marks	-
Credit	03	Exam Duration	2:00 Hrs.
Course Code	MAJBTT101	Practical Exam Duration	-

Course Description:

Biotechnology is a field of science that involves the use of living organisms, cells, and biological systems to develop or create useful products and applications.

The course will discuss biochemistry's basic concepts, including the carbohydrate, protein, lipids and nucleic acid.

The study of biomolecules involves understanding their structure, function, interactions, and roles in living systems. Biomolecules are the fundamental components of living organisms, and the study of their properties and interactions forms the basis of bio-molecular biotechnology.

Course Objectives:

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

- Understand the basic concepts of life Science from molecular to organisms' level.
- Understand the importance of carbohydrates in living being.
- Understand the importance of proteins in living being.
- Understand the importance of lipids in living being.
- Understand the importance of vitamins in living being.
- Understand the importance of nucleic acid in living being.

Course Outcomes:

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

- Differentiate various types of carbohydrates.
- Use of essential and non-essential amino acid in living organism.
- Sources of vitamins.
- Structure and function of fatty acid.
- Nucleic acid types and their difference.

Bhakta Kavi Narsinh Mehta University
Syllabus of Bachelor of Science (B.Sc.) as per NEP
Effective from June 2023
Subject: B.Sc. BIOTECHNOLOGY
Paper: MAJBTT101 – Biomolecules (Theory)

UNIT-1 :- Carbohydrates

No. of Hrs: 13

- 1.1 Chemistry of Carbohydrates: Functions and Classifications, Monosaccharides: Configuration and Conformation
- 1.2 Reactions of Monosaccharides and Sugar Derivatives
- 1.3 Disaccharides
- 1.4 Polysaccharides: Classification and Functions
- 1.5 Glycoconjugates: Proteoglycans, Glycoproteins and Glycolipids.

UNIT-2 :- Proteins

No. of Hrs: 12

- 2.1 Amino Acids: Structures, General Properties, Classifications, Nomenclature, Nonstandard Amino Acid (Amino Acid Derivatives)
- 2.2 Proteins: An Overview of Four Levels of Structures in Proteins, Classifications of Proteins, Properties of Proteins, Biologically Important Peptides
- 2.3 Protein folding
- 2.4 DNA-protein and Protein-Protein Interactions

UNIT-3 :- Lipids and vitamins

No. of Hrs: 10

- 3.1 Lipids : Classifications of Lipids and Functions of Lipids
- 3.2 Structure of Fatty Acids, Triacylglycerols, Phospholipids and Steroids
- 3.3 Functions of Fatty Acids, Triacylglycerols, Phospholipids and Steroids
- 3.4 Vitamins : Classification, Functions and Sources

UNIT-4 :- Nucleic acids

No. of Hrs: 10

- 4.1 Basic Understanding of Nucleotides, Structure and Properties of Nitrogen Basis, Functions of Nucleotides. Nucleotide Analogs
- 4.2 Nucleic Acids: Historical aspects of DNA as Genetic Material, Semi Conservative Nature of DNA, Chargaff's Rule
- 4.3 Watson and Crick DNA Double Helix Structure, other Types of DNA Structure, denaturation and renaturation of DNA
- 4.4 Types of RNA and their Functions, Catalytic RNAs (Ribozymes)

Reference Books :-

1. Lehninger. Principles of Biochemistry, Nelson & Cox, 4th Edition.
2. Stryer – Biochemistry. W. H. Freeman & Co.
3. Cohn and Stumph. Outline of Biochemistry. Wiley eastern.
4. Zube's Biochemistry. 4th Edition Macmillan.
5. Voet & Voet Donald. 3rd Edition. Fundamentals of Biochemistry, J/W.
6. Boyer. 1999. Concepts in biochemistry. Thomson
7. A Text book of Biochemisrty, A.V.S.S. Rama Rao, UBS Publisher
8. Hames and Hooper. 2000. Instant notes in Biochemistry. BIOS Sci. Publ.
9. Smith G. 1996. Biotechnology. Cambeidge Univ. Press.
10. Geoffrey Cooper. 2000. The cell with CD- Rom. Sinauer Asso. Incorp.
11. Elliott & Elliot. 3rd Edition Biochemistry and molecular biology.

Bhakta Kavi Narsinh Mehta University
Syllabus of Bachelor of Science (B.Sc.) as per NEP
Effective from June 2023
Subject: B.Sc. BIOTECHNOLOGY
Paper: MAJBTP101 – Biomolecules (Practical)

Course Level	U.G	Teaching Hours	30
Programme	B.Sc. Biotechnology	Internal Marks	-
Semester	I	External Marks	-
Course Type	MAJOR	Internal Practical Marks	25
Course title	Biomolecules	External Practical Marks	-
Credit	01	Exam Duration	-
Course Code	MAJBTP101	Practical Exam Duration	2:00 Hrs.

Course Description:

This course covers the study of practical handling error in analysis of various biomolecules.

The course is provide information regarding quantitative as well as qualitative analysis of biomolecules. It gives idea about solution preparation and colorimetric study. This program provides fundamental practical skills as a biochemical technician.

Course Objectives:

The course is design to understand the following:

- Good laboratory Practice and practical handling.
- Normal, molar, molal, percentage chemical preparation.
- Qualitative analysis of biomolecules.
- Quantitative analysis of biomolecules.

Course Outcomes:

This course aims to study:

- Prepare analytical quality solution.
- Correctly operate and calibrate, or understand principles of calibrations.
- Determine concentration of biomolecules by range of methods.
- Differentiate various biomolecules.

List of Experiments**No. of Hrs. - 30**

- Exp.1 Qualitative tests for carbohydrates.
- Exp.2 Estimation of reducing and non-reducing sugars.
- Exp.3 Titration curve of amino acids and determination of pI, pK1 and pK2.
- Exp.4 Qualitative tests for Amino acids.
- Exp.5 Estimation of protein by Biuret method.
- Exp.6 Estimation of protein by Folin-Lowry method
- Exp.7 Qualitative test for Lipids
- Exp.8 Titrimetric analysis of Ascorbic acid
- Exp.9 Estimation of Saponification value of Lipids
- Exp.10 Estimation of DNA by DPA method.
- Exp.11 Estimation of RNA by orcinol method.

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 Garrity. Experimental Biochemistry WH Freeman. 2nd Edition

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	I	External Marks	50
Course Type	MAJOR	Internal Practical Marks	-
Course title	Introduction to Biotechnology	External Practical Marks	-
Credit	03	Exam Duration	2:00 Hrs.
Course Code	MAJBTT102	Practical Exam Duration	-

Course Description:

Biotechnology is a dynamic field of science that focuses on harnessing biological processes and organisms to develop innovative solutions for various industries.

This course will explore the fundamental principles of biotechnology, delving into its historical evolution, diverse applications, and its pivotal role in shaping the modern world.

General characteristics of biotechnological processes, encompassing techniques, methods, and their impact on various sectors, will be comprehensively covered in this course.

Additionally, the course will delve into the nutritional requirements, environmental considerations, and ethical dimensions associated with biotechnology, providing students with a holistic understanding of this cutting-edge discipline.

Course Objectives:

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

- Identify the significant contributions of the early scientists and the historical milestones that laid the groundwork for biotechnology.
- Understand various types of biotechnology.
- Understand wide usage area of biotechnology.
- Understand the characteristics of cell.
- Understand the cell's organelles structure and functions.
- Understand the process of cell development.

Course Outcomes:

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

- To understand the term biotechnology and its scope
- An awareness of current and future issues related to biotechnology
- Multidisciplinary nature of biotechnology
- Scope of biotechnology in developed and development countries
- Origin and evolution of Life
- Differentiation of various cell types.
- Cell organelles structure and function.
- Development of cell through cell cycle.

Bhakta Kavi Narsinh Mehta University
Syllabus of Bachelor of Science (B.Sc.) as per NEP
Effective from June 2023
Subject: B.Sc. BIOTECHNOLOGY
Paper: MAJBTT102 – Introduction to Biotechnology (Theory)

UNIT-1 :- : Introduction and scope of Biotechnology

No. of Hrs: 10

- 1.1 Historical perspective and Definitions of Biotechnology
- 1.2 Current Status of Biotechnology and Future of Biotechnology in Developing World.
- 1.3 Recombinant DNA Technology
- 1.4 Applications of Biotechnology- Agriculture, Medicine & Environment

UNIT-2 :- Basic concept and understanding of cell

No. of Hrs: 10

- 2.1 Concept of Life, Origin and Evolution of Cell and Cell Theory
- 2.2 Cell Structure (organization of plant and animal cell, chemical composition of cell, comparison of plant, animal and prokaryotic cell)
- 2.3 Diversity of Cell Size and Shape
- 2.4 Ultrastructure and Function of Prokaryotic cell and Virus

UNIT-3 :- Structure and function of cell organelles

No. of Hrs: 13

- 3.1 Cell Wall and Plasma Membrane
- 3.2 Mitochondria and Chloroplast
- 3.3 Endoplasmic Reticulum and Golgi Bodies
- 3.4 Lysosomes, Glyoxisomes and Peroxisomes
- 3.5 Ribosomes

UNIT-4 :- Nucleus, cell cycle and cell division

No. of Hrs: 12

- 4.1 Nucleus
- 4.2 Structure and Ultrastructure of chromosomes
- 4.3 overview of cell cycle
- 4.4 Mitosis and Meiosis
- 4.5 Regulation of cell cycle

Reference Books :-

1. Alberts. Molecular Biology of cell. Garland Pub.
2. Verma, Cell biology, Genetics, Molecular Biology, Evolution & Ecology. 2006
3. Lodish, Cell & Molecular Biology, W. H. Freeman. 5th Edn.
4. C.B.Powar, Cell Biology, Himalaya Press.
5. Nelson & Cox, Lehninger Principle Biochemistry, Freeman Pub.
6. Geoffrey Cooper, The Cell Molecular Approach, ASM Pub.
7. De Robertis, Cell Biology
8. Biotechnology, B. D. Singh
9. Biotechnology & Genomics, P. K. Gupta, Rastogi Pub.
10. Biotechnology, U. Satyanarayan
11. Cell & Molecular Biology, P. K. Gupta, Rastogi Pub.
12. Albert, Essential Cell Biology, Garland Science.
13. Glick, Molecular Biotechnology, ASM Publication.
14. Becker & Hardin, The world of the Cell, Pearson Pub.
15. Desiker, Cell & Development Biology, Dominant Pub.
16. Explore Life, Postlethwait J. H., & Hopson J. H., Thomson book Pub.
17. Essential Biology (3rd Edition), Campbell, Reece & Simon,
18. Biotechnology Fundamental & application, S. S. Purohit, Agrobios
19. Introduction to Biotechnology, Brown Campbell priest, Panima Pub. Cell Biology, Sadava, Panima Pub.

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

Subject: B.Sc. BIOTECHNOLOGY

Paper: MAJBTP102 – Introduction to Biotechnology (Practical)

Course Level	U.G	Teaching Hours	30
Programme	B.Sc. Biotechnology	Internal Marks	-
Semester	I	External Marks	-
Course Type	MAJOR	Internal Practical Marks	25
Course title	Introduction to Biotechnology	External Practical Marks	-
Credit	01	Exam Duration	-
Course Code	MAJBTP102	Practical Exam Duration	2:00 Hrs.

Course Description:

This course covers the study of basic skills in the subject of Biotechnology.

The course is segregated into different experiments as per their evolution from the very basic to slightly advanced.

Techniques of different staining methods to visualise cell as well as cell organelles. Preparation of different solution will help students to carry out advanced practical's in the next semesters.

Course Objectives:

- The course aims to provide a basic understanding of different instrument used in biotechnology.
- Understand the experiments in a laboratory and study of cell morphology and cellular structure.
- Understand the isolating and purifying a cell organelles.

Course Outcomes:

Understand the operation of various basic instruments in a Biotechnology Laboratory.

- Comprehend the principle and procedure of various types of staining techniques.
- Calibration of different cell size and measurement.
- Learn & Apply techniques of isolating cell organelles.
- Learn different stages of cell division.
- Study of chromosome structure and its related disease.

List of Experiments**No. of Hrs. - 30**

- Exp. 1 Introduction to LAB and lab environment
- Exp. 2 Preparation of solution
- Exp. 3 Monochrome staining
- Exp. 4 Negative Staining
- Exp. 5 Calibration of stage and ocular micrometer and measurement of given biological samples
- Exp. 6 Cytology and histology of various organs (Permanent slides or fresh preparation)
- Exp. 7 Preparation of slides showing different stages of cell division – Mitosis and meiosis
- Exp. 8 Human Karyotyping
- Exp. 9 Isolation of chloroplast and microscopic observation
- Exp. 10 Observation of bacterial motility by performing hanging drop method.

Reference Books :-

1. Practical manuals of biotechnology, S. Chand
2. Basic Biotechnology, Prave Fanst, Sitting & Sukatsch, Panima Pub.
3. Becker. 1996. Biotechnology: A laboratory course.
4. Karp, Cell & Molecular Biology: concepts & Experiments, 4th Edition.
5. Analyzing Chromosome, B. Czepulkowski, BIOS Scientific Publishers Ltd

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	I	External Marks	50
Course Type	MINOR	Internal Practical Marks	-
Course title	Biomolecules	External Practical Marks	-
Credit	03	Exam Duration	2:00 Hrs.
Course Code	MINBTT101	Practical Exam Duration	-

Course Description:

Biotechnology is a field of science that involves the use of living organisms, cells, and biological systems to develop or create useful products and applications.

The course will discuss biochemistry's basic concepts, including the carbohydrate, protein, lipids and nucleic acid.

The study of biomolecules involves understanding their structure, function, interactions, and roles in living systems. Biomolecules are the fundamental components of living organisms, and the study of their properties and interactions forms the basis of bio-molecular biotechnology.

Course Objectives:

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

- Understand the basic concepts of life Science from molecular to organisms' level.
- Understand the importance of carbohydrates in living being.
- Understand the importance of proteins in living being.
- Understand the importance of lipids in living being.
- Understand the importance of vitamins in living being.
- Understand the importance of nucleic acid in living being.

Course Outcomes:

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

- Differentiate various types of carbohydrates.
- Use of essential and non-essential amino acid in living organism.
- Sources of vitamins.
- Structure and function of fatty acid.
- Nucleic acid types and their difference.

Bhakta Kavi Narsinh Mehta University
Syllabus of Bachelor of Science (B.Sc.) as per NEP
Effective from June 2023
Subject: B.Sc. BIOTECHNOLOGY
Paper: MINBTT101 – Biomolecules (Theory)

UNIT-1 :- Carbohydrates

No. of Hrs: 13

- 1.1 Chemistry of Carbohydrates: Functions And Classifications, Monosaccharides: Configuration and Conformation,
- 1.2 Reactions of Monosaccharides and Sugar Derivatives
- 1.3 Disaccharides
- 1.4 Polysaccharides: Classifications and Functions
- 1.5 Glycoconjugates: Proteoglycans, Glycoproteins and Glycolipids.

UNIT-2 :- Proteins

No. of Hrs: 12

- 2.1 Amino Acids: Structures, General Properties, Classifications, Nomenclature, Nonstandard Amino Acid (Amino Acid Derivatives)
- 2.2 Proteins: An Overview of Four Levels of Structures in Proteins, Classifications of Proteins, Properties of Proteins, Biologically Important Peptides
- 2.3 Protein folding
- 2.4 DNA-protein and Protein-Protein Interactions

UNIT-3 :- Lipids and vitamins

No. of Hrs: 10

- 3.1 Lipids : Classifications of Lipids and Functions of Lipids
- 3.2 Structure of Fatty Acids, Triacylglycerols, Phospholipids and Steroids
- 3.3 Functions of Fatty Acids, Triacylglycerols, Phospholipids and Steroids
- 3.4 Vitamins : Classification, Functions and Sources

UNIT-4 :- Nucleic acids

No. of Hrs: 10

- 4.1 Basic Understanding of Nucleotides, Structure and Properties of Nitrogen Basis, Functions of Nucleotides. Nucleotide Analogs
- 4.2 Nucleic Acids: Historical aspects of DNA as Genetic Material, Semi Conservative Nature of DNA, Chargaff's Rule
- 4.3 Watson and Crick DNA Double Helix Structure, other Types of DNA Structure, Denaturation and Renaturation of DNA
- 4.4 Types of RNA and their Functions, Catalytic RNAs (Ribozymes)

Reference Books :-

1. Lehninger. Principles of Biochemistry, Nelson & Cox, 4th Edition.
2. Stryer – Biochemistry. W. H. Freeman & Co.
3. Cohn and Stumph. Outline of Biochemistry. Wiley eastern.
4. Zube's Biochemistry. 4th Edition Macmillan.
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6. Boyer. 1999. Concepts in biochemistry. Thomson
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Bhakta Kavi Narsinh Mehta University
Syllabus of Bachelor of Science (B.Sc.) as per NEP
Effective from June 2023
Subject: B.Sc. BIOTECHNOLOGY
Paper: MINBTP101 – Biomolecules (Practical)

Course Level	U.G	Teaching Hours	30
Programme	B.Sc. Biotechnology	Internal Marks	-
Semester	I	External Marks	-
Course Type	MINOR	Internal Practical Marks	25
Course title	Biomolecules	External Practical Marks	-
Credit	01	Exam Duration	-
Course Code	MINBTP101	Practical Exam Duration	2:00 Hrs.

Course Description:

This course covers the study of practical handling error in analysis of various biomolecules.

The course is provide information regarding quantitative as well as qualitative analysis of biomolecules. It gives idea about solution preparation and colorimetric study. This program provides fundamental practical skills as a biochemical technician.

Course Objectives:

The course is design to understand the following:

- Good laboratory Practice and practical handling.
- Normal, molar, molal, percentage chemical preparation.
- Qualitative analysis of biomolecules.
- Quantitative analysis of biomolecules.

Course Outcomes:

This course aims to study:

- Prepare analytical quality solution.
- Correctly operate and calibrate, or understand principles of calibrations.
- Determine concentration of biomolecules by range of methods.
- Differentiate various biomolecules.

List of Experiments**No. of Hrs. - 30**

- Exp.1 Qualitative tests for carbohydrates.
- Exp.2 Estimation of reducing and non-reducing sugars.
- Exp.3 Titration curve of amino acids and determination of pI, pK1 and pK2.
- Exp.4 Qualitative tests for Amino acids.
- Exp.5 Estimation of protein by Biuret method.
- Exp.6 Estimation of protein by Folin-Lowry method
- Exp.7 Qualitative test for Lipids
- Exp.8 Titrimetric analysis of Ascorbic acid
- Exp.9 Estimation of Saponification value of Lipids
- Exp.10 Estimation of DNA by DPA method.
- Exp.11 Estimation of RNA by orcinol method.

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 Garrity. Experimental Biochemistry WH Freeman. 2nd Edition

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	I	External Marks	50
Course Type	MDC/IDC	Internal Practical Marks	-
Course title	Introduction to Biotechnology	External Practical Marks	-
Credit	03	Exam Duration	2:00 Hrs.
Course Code	IDCBTT101	Practical Exam Duration	-

Course Description:

Biotechnology is a dynamic field of science that focuses on harnessing biological processes and organisms to develop innovative solutions for various industries.

This course will explore the fundamental principles of biotechnology, delving into its historical evolution, diverse applications, and its pivotal role in shaping the modern world.

General characteristics of biotechnological processes, encompassing techniques, methods, and their impact on various sectors, will be comprehensively covered in this course.

Additionally, the course will delve into the nutritional requirements, environmental considerations, and ethical dimensions associated with biotechnology, providing students with a holistic understanding of this cutting-edge discipline.

Course Objectives:

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

- Identify the significant contributions of the early scientists and the historical milestones that laid the groundwork for biotechnology.
- Understand various types of biotechnology.
- Understand wide usage area of biotechnology.
- Understand the characteristics of cell.
- Understand the cell's organelles structure and functions.
- Understand the process of cell development.

Course Outcomes:

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

- To understand the term biotechnology and its scope
- An awareness of current and future issues related to biotechnology
- Multidisciplinary nature of biotechnology
- Scope of biotechnology in developed and development countries
- Origin and evolution of Life
- Differentiation of various cell types.
- Cell organelles structure and function.
- Development of cell through cell cycle.

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Syllabus of Bachelor of Science (B.Sc.) as per NEP
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Subject: B.Sc. BIOTECHNOLOGY
Paper: IDCBTT101 – Introduction to Biotechnology (Theory)

UNIT-1 :- : Introduction and scope of Biotechnology

No. of Hrs: 10

- 1.1 Historical perspective and Definitions of Biotechnology
- 1.2 Current Status of Biotechnology and Future of Biotechnology in Developing World.
- 1.3 Recombinant DNA Technology
- 1.4 Applications of Biotechnology- Agriculture, Medicine & Environment

UNIT-2 :- Basic concept and understanding of cell

No. of Hrs: 10

- 2.1 Concept of Life, Origin and Evolution of Cell and Cell Theory
- 2.2 Cell Structure (organization of plant and animal cell, chemical composition of cell, comparison of plant, animal and prokaryotic cell)
- 2.3 Diversity of Cell Size and Shape
- 2.4 Ultrastructure and Function of Prokaryotic cell and Virus

UNIT-3 :- Structure and function of cell organelles

No. of Hrs: 13

- 3.1 Cell Wall and Plasma Membrane
- 3.2 Mitochondria and Chloroplast
- 3.3 Endoplasmic Reticulum and Golgi Bodies
- 3.4 Lysosomes, Glyoxisomes and Peroxisomes
- 3.5 Ribosomes

UNIT-4 :- Nucleus, cell cycle and cell division

No. of Hrs: 12

- 4.1 Nucleus
- 4.2 Structure and Ultrastructure of chromosomes
- 4.3 overview of cell cycle
- 4.4 Mitosis and Meiosis
- 4.5 Regulation of cell cycle

Reference Books :-

1. Alberts. Molecular Biology of cell. Garland Pub.
2. Verma, Cell biology, Genetics, Molecular Biology, Evolution & Ecology. 2006
3. Lodish, Cell & Molecular Biology, W. H. Freeman. 5th Edn.
4. C. B. Powar, Cell Biology, Himalaya Press.
5. Nelson & Cox, Lehninger Principle Biochemistry, Freeman Pub.
6. Geoffrey Cooper, The Cell Molecular Approach, ASM Pub.
7. De Robertis, Cell Biology
8. Biotechnology, B. D. Singh
9. Biotechnology & Genomics, P. K. Gupta, Rastogi Pub.
10. Biotechnology, U. Satyanarayan
11. Cell & Molecular Biology, P. K. Gupta, Rastogi Pub.
12. Albert, Essential Cell Biology, Garl and Science.
13. Glick, Molecular Biotechnology, ASM Publication.
14. Becker & Hardin, The world of the Cell, Pearson Pub.
15. Desiker, Cell & Development Biology, Dominant Pub.
16. Explore Life, Postlethwait J. H., & Hopson J. H., Thomson book Pub.
17. Essential Biology (3rd Edition), Campbell, Reece & Simon,
18. Biotechnology Fundamental & application, S. S. Purohit, Agrobios
19. Introduction to Biotechnology, Brown Campbell priest, Panima Pub. Cell Biology, Sadava, Panima Pub.

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

Subject: B.Sc. BIOTECHNOLOGY

Paper: IDCBTP101 – Introduction to Biotechnology (Practical)

Course Level	U.G	Teaching Hours	30
Programme	B.Sc. Biotechnology	Internal Marks	-
Semester	I	External Marks	-
Course Type	MDC/IDC	Internal Practical Marks	25
Course title	Introduction to Biotechnology	External Practical Marks	-
Credit	01	Exam Duration	-
Course Code	IDCBTP101	Practical Exam Duration	2:00 Hrs.

Course Description:

This course covers the study of basic skills in the subject of Biotechnology.

The course is segregated into different experiments as per their evolution from the very basic to slightly advanced.

Techniques of different staining methods to visualise cell as well as cell organelles. Preparation of different solution will help students to carry out advanced practical's in the next semesters.

Course Objectives:

- The course aims to provide a basic understanding of different instrument used in biotechnology.
- Understand the experiments in a laboratory and study of cell morphology and cellular structure.
- Understand the isolating and purifying a cell organelles.

Course Outcomes:

Understand the operation of various basic instruments in a Biotechnology Laboratory.

- Comprehend the principle and procedure of various types of staining techniques.
- Calibration of different cell size and measurement.
- Learn & Apply techniques of isolating cell organelles.
- Learn different stages of cell division.
- Study of chromosome structure and its related disease.

List of Experiments**No. of Hrs. - 30**

- Exp. 1 Introduction to LAB and lab environment
- Exp. 2 Preparation of solution
- Exp. 3 Monochrome staining
- Exp. 4 Negative Staining
- Exp. 5 Calibration of stage and ocular micrometer and measurement of given biological samples
- Exp. 6 Cytology and histology of various organs (Permanent slides or fresh preparation)
- Exp. 7 Preparation of slides showing different stages of cell division – Mitosis and meiosis
- Exp. 8 Human Karyotyping
- Exp. 9 Isolation of chloroplast and microscopic observation
- Exp. 10 Observation of bacterial motility by performing hanging drop method.

Reference Books :-

1. Practical manuals of biotechnology, S. Chand
2. Basic Biotechnology, Prave Fanst, Sitting & Sukatsch, Panima Pub.
3. Becker. 1996. Biotechnology: A laboratory course.
4. Karp, Cell & Molecular Biology: concepts & Experiments. 4th Edition.
5. Analyzing Chromosome, B. Czepulkowski, BIOS Scientific Publishers Ltd

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

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

No.	Particulars	Weightage
1	Test (MCQ/Descriptive)	10
2	Assignment	5
3	Seminar	5
4	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

Bhakta Kavi Narsinh Mehta University
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Theory External Evaluation Paper Style [Major/Minor/MDC/IDC]

EXTERNAL ASSESSMENT BY UNIVERSITY			50 Marks
Que. No.	Particulars	Unit	Marks
Que-1	Question 1	1	10
	OR		
	Question 1		
Que-2	Question 2	2	10
	OR		
	Question 2		
Que-3	Question 3	3	10
	OR		
	Question 3		
Que-4	Question 4	4	10
	OR		
	Question 4		
Que-5	Write a Short Note (A) (B)	From Any Unit	10
	OR		
	Write a Short Note (A) (B)		