

GOVT. BILASA GIRLS' POST - GRADUATE COLLEGE

[AUTONOMOUS]



BILASPUR (C.G.)

[Affiliated to Atal Bihari Vajpayee Vishwavidyalaya Bilaspur]

SYLLABUS

B.Sc. [Biotechnology]

Semester I to II

To fulfill certificate course in science

(Based on NEP 2020)

Session - 2022-23

Govt Bilasa Girls PG College Bilaspur

Syllabus for certificate course

B.Sc. (Biotechnology)

Semester I

Part A: Introduction				
Program: Certificate Course		Class: B.Sc. Sem I	Year: 2022	Session:2022-2023
1	Course Code	BBTCT-101		
2	Course Title	Fundamentals of Biotechnology and Microbiology		
3	Course Type	Theory		
4	Pre-requisite (if any)	As per Govt. Norms/ Institutional Scheme		
5	Objectives	<ol style="list-style-type: none">1. To study the fundamentals of Biotechnology and Microbiology.2. To study the different Sterilization techniques.3. To study the methods of food preservation.4. To study about eminent biotechnologist and their contribution		
6	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">● Learn the basic of Biotechnology and Microbiology● Understand the different Sterilization techniques● Apply the methods of food preservation● Become Familiar with the Eminent Biotechnologist and their contribution		
7	Credit Value	Theory : 3		
8	Total Marks	Max. Marks: 60+15	Min Passing Marks:21+6	

Part B: Content of the Course

Total No. of Lecturer (in hours per week):

Total Lecturer: 45

Unit	Topics	No. of Lectures
I	Introduction of Biotechnology: Concept, History, Objective & Scope of Biotechnology. Past, Present and future of Biotechnology. Eminent biotechnologist (Robert Koch, Edward Jenner, Louis Pasteur, Cesar Milstein) and their contribution. Status of Biotechnology in India.	12
II	Introduction of Microbiology: Microbiology introduction, history and its scope. General features of bacteria, fungi & Virus. Growth and nutrition bacteria and fungi. Staining - simple and differential. Sterilization methods- Physical and Chemical.	11
III	Bacterial reproduction and Recombination: Mode of asexual reproduction. Transformation (Griffith concept & mechanism); Transduction- types & mechanism, Lytic & Lysogenic cycles of Bacteriophage (T_4 & λ phage). Conjugation: types and mechanism.	11
IV	Applied Biotechnology & Microbiology: Food Production (Alcohol, Vinegar), Food spoilage, food preservation and Food borne diseases, Food and Dairy Microbiology: production of cheese, yogurt, butter milk. Microbial health food (single cell protein & edible mushroom), Production of plants through tissue culture & anther culture techniques.	11
Keywords: Eminent Biotechnologist, Sterilization Method, Food preservation, Food Spoilage		

Signature of the Convener & Members of the Board of Study:

Part C -Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. A test Book of Biotechnology: InduShekher Thakur, 2nd edition. I.K. International Pvt. Ltd. New Delhi.
2. Biotechnology (Fundamentals and Applications): S.S. Purohit - Agrobios (India), Jodhpur.
3. Fundamentals of Microbiology and Immunology: Ajit Kr. Banerjee, Nirmalya Banerjee – New Central Book Agency (NCBA); 1st edition (2017)
4. Biotechnology: Fundamental & Application (2005) S.S. Purohit
5. A textbook of Biotechnology: Dr R C Dubey- S. Chand Publication

E-learning Resources

<https://swayam.gov.in/>

<https://lecturenotes.in/subject/652/environmental-biotechnology-eb>

<https://britannica.com>

<https://en.wikibooks.org/wiki/Biochemistry>

<https://nptel.ac.in>

https://onlinecourses.nptel.ac.in/noc21_bt41/preview

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:- 75

Continuous Comprehensive Evaluation (CCE): 15Marks

Term end semester exam: 60Marks

Internal Assessment:

Continuous
Comprehensive Evaluation
(CCE)

Class Test
Assignment/Presentation
15(best of Two internal test) + 15
Assignment

15 Total Marks (Average of
Test & Assignment)
:

External Assessment:
Term end semester
exam
Time: 02.30 Hours

Section (A): Eight (8) Short Questions
Section (B): Four (4) Short Questions
Section (C): Four (4) Long Questions

16
16
28

Total Marks: 75

Part A: Introduction				
Program: Certificate Course		Class: B.Sc. I Year	Year: 2022	Session: 2022-2023
1	Course Code	BBTCP-101		
2	Course Title	Practical -Lab 1: Fundamentals of Biotechnology & Microbiology		
3	Course Type	Core course		
4	Pre-requisite (if any)	As per Govt. Norms/ Institutional Scheme		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: 1. Handling glasswares and laboratory equipments 2. Perform Simple and differential staining methods 3. Preparation of microbial culture		
6	Credit Value	01		
7	Total Marks	Max. Marks: 25	Min Passing marks:	

Part B: Lab Course 01		
Total No. of lecture (1hour/ week): 30		
Unit	Topics (Tentative List of the Lab Work is provided, the lab work may be changed by the department/ teacher concerned)	No. of Lectures
1	<ol style="list-style-type: none"> Preparation of laboratory glasswares (Chemical washing, cleaning and drying) and preparation of culture media (liquid and solid) Microscopy - Different parts of compound microscope, Handling and care of compound microscope Handling and care of laboratory equipments - Autoclave, Hot air oven, Incubator, pH meter, High speed centrifuge, Laminar air flow Observation of microorganisms - Bacteria, Cyanobacteria, Protozoa, Fungi Staining - Simple and differential Aseptic transfer technique types - slant to slant, broth to broth, broth to agar Demonstration of spread plate, streak plate and pour plate method of bacterial culture 	
Keywords: Microscope, Autoclave, Hot air oven, Staining, Aseptic transfer, Culture.		

Part C: Learning Resources: Text Book, Laboratory Manual etc.
<p>Text Book Recommended:</p> <ol style="list-style-type: none"> Laboratory Manual in Biotechnology and Microbiology, Aneja K. R. Practical Microbiology, R. C. Dubey Laboratory Manual in Microbiology, P. Gunasekaran Any other Book Suggested by Teacher <p>Online resources</p> <p>https://www.vlab.co.in/ba-nptel-labs-biotechnology-and-biomedical-engineering</p> <p>https://www.vlab.co.in/broad-area-biotechnology-and-biomedical-engineering</p> <p>https://www.amrita.edu/research/project/virtual-amrita-laboratories-biotechnology/</p>
Part D: Assessment and Evaluation

- Examination will be conducted BBTCP101 at the end of Sem 1
- Examination will take place as per norms of the institution.

Name and Signature of the Convener & Members of the Board of Study:

Part D: Assessment and Evaluation	
Practical Exam at The end of Odd Semester: Maximum Marks:- 25	
	Total Marks: 25

Name and Signature of the Convener & Members of the Board of Study:

Govt Bilasa Girls PG College Bilaspur

Biotechnology

Semester II

Part A: Introduction

Program: Certificate Course		Class: B.Sc. II Semester	Year: 2022	Session: 2022-2023
1	Course Code	BBTCT-201		
2	Course Title	Biochemistry and Bioinstrumentation		
3	Course Type	Theory		
4	Pre-requisite (if any)	-		
5	Objectives	To study the fundamentals of biological molecules. To study the concept of proteins, carbohydrates, lipids, vitamins and nucleic acid. To study the types and structures of proteins, carbohydrates, lipids, vitamins and nucleic acid		
6	Course Learning Outcomes (CLO)	At the end of this course the student will be able to <ul style="list-style-type: none">• Understand on fundamentals of biological molecules.• Learn the concept of proteins, carbohydrates, lipids, vitamins and nucleic acid.• Understand the types and structures of proteins, carbohydrates, lipids, vitamins and nucleic acid.		
7	Credit Value	Theory : 3		
8	Total Marks	Max. Marks: 60+15	Min Passing Marks:21+6	

Part B:Content of the Course

Total No. of lectures (in hours) /week
Total Lecture - 45

Unit	Topics	No. of lectures
I	<p>Concept and Structure of Biomolecules:</p> <p>Introduction to Biochemistry: History, Scope and Development. Carbohydrates: Classification, Structure and Function of Mono, Oligo and Polysaccharides. Lipids: Structure, Classification and Function. pH, pK, buffer, covalent and non-covalent bond.</p>	12
II	<p>Concept & properties of Proteins& Enzymes</p> <p>Amino acids and Proteins: Classification, Structure and Properties of amino acids, Types of Proteins and their Classification and Function.</p> <p>Enzymes: Nomenclature and Classification of enzyme, Mechanism of enzyme action, Enzyme Kinetics and Factors affecting the enzymes action. Immobilization of enzyme and their application. Enzyme inhibition: Competitive and non-competitive, feedback mechanism</p>	11
III	<p>Biological Oxidation:</p> <p>Carbohydrates, Proteins and Lipid Metabolism - Glycolysis, Glycogenesis, Glyconeogenesis, Glycogenolysis and Krebs cycle. Electron Transport Chain, β-oxidation of Fatty acids and Urea cycle Vitamins - Structure, Classification and Function.</p>	11
IV	<p>Bio instrumentation:</p> <p>Principle of centrifugation, relative centrifugal force and other factors affecting sedimentation. Chromatography: principle and types (Partition, adsorption, ion exchange, exclusion and affinity chromatography), and its applications. Spectrophotometry: principle and types (UV and visible). Electrophoretic techniques: principle and types (agarose and polyacrylamide gel). Microscopy: principle & types (bright filed & dark filed).</p>	11
<p>Keywords: Carbohydrate, Lipid, Protein, Enzyme, Chromatography, Electrophoresis</p>		

Signature of the Convener & Members of the Board of Study:

Part C -Learning Resource	
Text Books, Reference Books, Other Resources	
Suggested Readings:	
6. Fundamental of Biochemistry: J.L. Jain- S. Chand Publication	
7. Lehninger Principal of Biochemistry- David L Nelson and Michael M Cox	
8. A test Book of Biotechnology: InduShekher Thakur, 2 nd edition. I.K. International Pvt. Ltd. New Delhi.	
9. Biotechnology (Fundamentals and Applications): S.S. Purohit - Agrobios (India), Jodhpur.	
10. Fundamentals of Microbiology and Immunology: Ajit Kr. Banerjee, Nirmalya Banerjee – New Central Book Agency (NCBA); 1st edition (2017)	
11. Biotechnology: Fundamental & Application (2005) S.S. Purohit	
12. A textbook of Biotechnology: Dr R C Dubey- S. Chand Publication	
E-learning Resources	
https://swayam.gov.in/	
https://lecturenotes.in/subject/652/environmental-biotechnology-eb	
https://britannica.com	
https://en.wikibooks.org/wiki/Biochemistry	
https://nptel.ac.in	
https://onlinecourses.nptel.ac.in/noc21_bt41/preview	

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:- 75		
Continuous Comprehensive Evaluation (CCE): 15Marks		
Term end semester exam: 60Marks		
Internal Assessment:	Class Test	
Continuous Comprehensive Evaluation (CCE)	Assignment/Presentation 15(best of Two internal test) + 15 Assignment	15 Total Marks (Average of Test & Assignment) :
External Assessment:	Section (A): Eight (8) Short Questions	16
Term end semester exam	Section (B): Four (4) Short Questions	16
Time: 02.30 Hours	Section (C): Four (4) Long Questions	28
		Total Marks: 75

Name and Signature of the Convener & Members of the Board of Study:

Part A: Introduction			
Program: Certificate Course		Class: B.Sc. I year	Year: 2022 Session: 2022-2023
1	Course Code	BBTCP-201	
2	Course Title	Biochemistry and Bioinstrumentation	
3	Course Type	Core course	
4	Pre-requisite (if any)	As per Govt. Norms/ Institutional Scheme	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: 1. Perform the qualitative test of Carbohydrate & lipid 2. Learn to estimate the Protein & Nucleic acid 3. Learn to perform the chromatography & electrophoresis	
6	Credit Value	01	
7	Total Marks	Max. Marks: 25	Min Passing marks -

Part B: Content of the Course		
Total No. of lectures (1hour/week): 30		
Unit	Topics (Tentative List of the Lab Work is provided, the lab work may be changed by the department/ teacher concerned)	No. of Lectures
1	8. Qualitative tests for Carbohydrates 9. Qualitative tests for Lipids 10. Qualitative tests for Protein 11. Qualitative test of Nucleic acid 12. Estimation of protein by Biuret / Folin Lowry's method. 13. Separation and identification of amino acid mixture by Paper chromatography. 14. Separation and identification of amino acid mixture by Thin Layer Chromatography.	
Keywords: Qualitative test of Carbohydrates, protein, lipid.		

Part C: Learning Resources: Text Book, Laboratory Manual etc.
<p>Text Book Recommended:</p> <p>5. Laboratory Manual in Biotechnology and Microbiology, Aneja K. R. 6. Practical Microbiology, R. C. Dubey 7. Laboratory Manual in Microbiology, P. Gunasekaran 8. Any other Book Suggested by Teacher</p> <p>Online resources https://www.vlab.co.in/ba-nptel-labs-biotechnology-and-biomedical-engineering https://www.vlab.co.in/broad-area-biotechnology-and-biomedical-engineering https://www.amrita.edu/research/project/virtual-amrita-laboratories-biotechnology/</p>
Part D: Assessment and Evaluation

- Examination will be conducted BBTCP201 at the end of Sem 2
- Examination will take place as per norms of the institution.

Part D: Assessment and Evaluation

Practical Exam at The end of Even Semester:

Maximum Marks:- 25

		Total Marks: 25
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Name and Signature of the Convener & Members of the Board of Study: