List of Revised Courses

Department : *Biotechnology*

Program Name : *B.Sc.*

Academic Year : 2021-2022

List of Revised Courses

Sr. No.	Course Code	Name of the Course
1.	BTUCLT1	Laboratory-5 (based on core-5)
2.	BTUDLT1	Laboratory-8 based on core-8
3.	BTUDLT2	Laboratory-9 based on core-9
4.	BTUELT1	Laboratory-11 based on core-11
5.	BTUFLT2	Laboratory-14 based on core-14

Signature & Seal of HoD

विभागाध्यक्ष, जैव प्रौद्योगिकी विभाग
Head, Department of Biotechnology
गुरु घासीदास विश्वविद्यालय, बिलासपुर (छ.ग.)
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2021-22

School : ***School of Studies of Interdisciplinary Education and Research***

Department : ***Biotechnology***

Date and Time : ***04-03-2022 – 3:00 PM***

Venue : ***Room of Head, Department of Biotechnology***

MINUTES OF THE MEETING OF BOARD OF STUDIES IN BIOTECHNOLOGY GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR HELD ON 04/03/2022

A online meeting of the Board of Studies in Biotechnology under School of Interdisciplinary Education and Research was held on 04/03/2022 at 3:00 PM under the chairmanship of Dr. Renu Bhatt, Head Department of Biotechnology. The following members were present.

(i) Dr. Renu Bhatt, Head	Chairman
(ii) Prof. B.N. Tiwary, Professor	Member
(iii) Prof.Pradeep Verma	Expert present online
(iv) Dr. Naveen Kumar Vishvakarma	Member
(v) Dr. Jayabharat Reddy	Expert from Industry (online)

The agenda was placed to discuss:

To implement Learning Outcome Based Curriculum Framework (LOCF) syllabus in B.Sc (H) Biotechnology Programme

At the very outset the HOD, Chairman of Board of Studies welcomed all the BoS members and discussed the above agenda at length. Following resolutions were made in this meeting.

Resolutions: The syllabus of different courses (Core, General electives, ability enhancement course(AEC) and skill enhancement course(AEC) were reviewed by the BoS members very carefully and discussed the different course content as per university guideline and approved by the BoS.

The meeting ended with a vote of thanks by the Chairman

Prof. B. N. Tiwary, Member | Prof. Pradeep Verma, Expert present online | Dr Naveen Kumar Vishvakarma, Member | Dr. Jayabharat Reddy, Industry Expert present online

Dr. Renu Bhatt 04/03/22
Chairman

In the meeting of BOS-Biotechnology held on 04-03-2022, the following courses were revised in Syllabus of B. Sc.:

BTUCLT1	Laboratory-5 (based on core-5)
BTUDLT1	Laboratory-8 based on core-8
BTUDLT2	Laboratory-9 based on core-9
BTUELT1	Laboratory-11 based on core-11
BTUFLT2	Laboratory-14 based on core-14

The following new courses were introduced in the Syllabus of B. Sc.

Sr. No.	Course Code	Name of the Course
1.	BTUATT2	Biochemistry
2.	BTUATA1	Biotechnology and Human Welfare
3.	BTUATL1	Plant Tissue Culture
4.	BTUBTG1	Biostatistics
5.	BTUBTA1	Bio-management of environment
6.	BTUBTL1	Animal Tissue Culture
7.	BTUCTG1	Food Biotechnology
8.	BTUCLG1	Laboratory-GE3 (based on GE-3)
9.	BTUCTA1	Intellectual property rights and entrepreneurship
10.	BTUDTG1	Scientific Writing
11.	BTUDLG1	Laboratory-GE4 based on GE-4
12.	BTUDTA1	Molecular techniques in disease diagnosis.
13.	BTUELT1	Laboratory-11 based on core-11
14.	BTUETT2	Plant and Animal Biotechnology
15.	BTUELT2	Laboratory-12 based on core-12
16.	BTUETA1	Biotechnology in Societal Welfare
17.	BTUFTT1	Statistics in Biological Research
18.	BTUFLT1	Laboratory-13 based on core-13
19.	BTUFTD4	Molecular Diagnostics
20.	BTUFLD4	Laboratory (based on DSE-3 BTUETD2)

Signature & Seal of HoD

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Scheme and Syllabus

Scheme for Choice Based Credit System (CBCS) in B.Sc. Honours Biotechnology

Course		Course Code	Name of the course	Credit
Semester-I				
Core (C)	C1Theory	BTUATT1	Cell Biology	3
	C1 Practical	BTUALT1	Laboratory-1 based on core-1	2
	C2 Theory	BTUATT2	Biochemistry	3
	C2 Practical	BTUALT2	Laboratory-2 based on core-2	2
Generic Elective-1 (GE-1)	GE-1 Theory	BTUATG1	Bioethics and Biosafety	3
	GE-1 Practical	BTUALG1	Laboratory-GE1 based on GE-1	2
Ability Enhancement Course (AEC)	AEC1	BTUATA1	Biotechnology and Human Welfare	2
Skill Enhancement Course	SEC1	BTUATL1	Plant Tissue Culture	2
Additional Credit Course As per University Notification				
			TOTAL	**19**
Semester-II				
Core (C)	C3 Theory	BTUBTT1	General Microbiology	3
	C3 Practical	BTUBLT1	Laboratory-3 (based on core-3)	2
	C4 Theory	BTUBTT2	Genetics	3
	C4 Practical	BTUBLT2	Laboratory-4 (based on core-4)	2
Generic Elective-2 (GE-2)	GE-2 Theory	BTUBTG1	Biostatistics	3
	GE-2 Practical	BTUBLG1	Laboratory (based on GE-2)	2
Ability Enhancement Course (AEC)	AEC2	BTUBTA1	Bio-management of environment	2
Skill Enhancement Course	SEC2	BTUBTL1	Animal Tissue Culture	2
Additional Credit Course As per University Notification				
			Total	**19**
Semester-III				
Core (C)	Core5 Theory	BTUCTT1	Molecular Biology	3
	Core 5 Practical	BTUCLT1	Laboratory-5 (based on core-5)	2
	Core 6 Theory	BTUCTT2	Recombinant DNA Technology	3
	Core 6 Practical	BTUCLT2	Laboratory-6 (based on core-6)	2
	Core 7 Theory	BTUCTT3	Chemistry-1	3
	Core 7 Practical	BTUCLT3	Laboratory-7 (based on core-7)	2
Generic Elective-3 (GE-3)	GE-3 Theory	BTUCTG1	Food Biotechnology	3
	GE-3 Practical	BTUCLG1	Laboratory-GE3 (based on GE-3)	2
Ability Enhancement Course (AEC)	AEC3	BTUCTA1	Intellectual property rights and entrepreneurship	2
Additional Credit Course As per University Notification				
			Total	**22**
Semester IV				
Core (C)	Core-8 Theory	BTUDTT1	Bio-analytical Tools	3
	Core -8 Practical	BTUDLT1	Laboratory-8 based on core-8	2
	Core -9 Theory	BTUDTT2	Immunology	3
	Core -9 Practical	BTUDLT2	Laboratory-9 based on core-9	2
	Core 10 Theory	BTUDTT3	Chemistry-2	3
	Core 10Practical	BTUDLT3	Laboratory-10 based on core-10	2
Generic Elective-4 (GE-4)	GE-4 Theory	BTUDTG1	Scientific Writing	3
	GE-4 Practical	BTUDLG1	Laboratory-GE4 based on GE-4	2
Ability Enhancement Course (AEC)	AEC4	BTUDTA1	Molecular techniques in disease diagnosis	2
Additional Credit Course As per University Notification				
			TOTAL	**22**
SUMMER Internship: at least 15 days				06
Semester V				
Core (C)	Core-11Theory	BTUETT1	Bioprocess Technology	3
	Core11 Practical	BTUELT1	Laboratory-11 based on core-11	2
	Core12Theory	BTUETT2	Plant and Animal Biotechnology	3
	Core12 Practical	BTUELT2	Laboratory-12 based on core-12	2

Discipline Specific Elective (DSE-1)	DSE-1	BTUETD1	MOOC courses* to be selected/opted from SWAYAM portal [from a basket of course approved by BOS from time to time].	2-5*
Discipline Specific Elective (DSE-2)	DSE-2	BTUEED2	Review writing/case studies	5
Ability Enhancement Course (AEC)	AEC5	BTUETA1	Biotechnology in Societal Welfare	2
Additional Credit Course As per University Notification				
			TOTAL	**22***
Semester VI				
Core (C)	Core13 Theory	BTUFTT1	Statistics in Biological Research	3
	Core13 Practical	BTUFLT1	Laboratory-13 based on core-13	2
	Core14 Theory	BTUFTT2	Bioinformatics	3
	Core14 Practical	BTUFLT2	Laboratory-14 based on core-14	2
Discipline Specific Elective (DSE-3)	DSE-3 Theory (Any one)	BTUFTD1	Microbial Technology	3
		BTUFTD2	Biodiversity and Bio-prospecting	
		BTUFTD3	Genomics and Proteomics	
		BTUFTD4	Molecular Diagnostics	
	DSE-3 Practical (Any one)	BTUFLD1	Laboratory (based on DSE-3 BTUFTD1)	2
		BTUFLD2	Laboratory (based on DSE-3 BTUFTD2)	
		BTUFLD3	Laboratory (based on DSE-3 BTUETD3)	
		BTUFLD4	Laboratory (based on DSE-3 BTUETD4)	
Dissertation	Dissertation	BTUFPD1	Dissertation/project	7
Seminar	Seminar	BTUFPS1	Seminar	2
Additional Credit Course As per University Notification				
			Total	**24**

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COURSE: Core -5 Practical

Laboratory-5 based on core-5 (BTUCLT1) **CREDITS: 2**

Course Objective

- The objective of this course is to provide practical exposure of basic molecular biology techniques to study the DNA and RNA.

Course Learning Outcomes

- Student will acquire skills to isolate the chromosomal DNA from bacterial cells/plant cells/ animal cells.
- Student will acquire skill to isolate the RNA from bacterial cells/plant cells/ animal cells.
- Student will acquire skills to quantitate genomic DNA & plasmid DNA with the help of Spectrophotometer.
- Student will acquire skills to check the quality of isolated genomic DNA & plasmid DNA, RNA with the help of agarose gel electrophoresis.

Course contents

1. To isolate the chromosomal DNA from bacterial cells/plant cells/ animal cells
2. To isolate the Plasmid DNA by alkaline lysis method
3. To quantify the genomic DNA & plasmid DNA with the help of Spectrophotometer
4. To check the quality of isolated genomic DNA & plasmid DNA with the help of Agarose Gel Electrophoresis.
5. To isolate the RNA from plant cells/ animal cells
6. To quantify the RNA with the help of Spectrophotometer
7. To check the quality of isolated RNA with the help of Agarose gel Electrophoresis.

Suggested Reading

1. Karp, G Cell and Molecular Biology: Concepts and Experiments. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. Cell and Molecular Biology. Lippincott Williams and Wilkins, Philadelphia.
3. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. The World of the Cell. Pearson Benjamin Cummings Publishing, San Francisco.
4. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., Molecular Biology of the Gene Cold Spring Harbour Lab. Press, Pearson Pub.

COURSE: Core -8 Practical

Laboratory-8 based on core-8 (BTUDLT1) CREDITS: 2

Course Objective

The objective of this course is to provide practical exposure of various bioanalytical techniques which are commonly used in a laboratory and applied in biological studies.

Course Learning Outcomes

- Students will obtain hands-on training in spectrophotometry and gain expertise in qualitative and quantitative analysis of biomolecules.
- Students will obtain hands-on training in chromatography to separate biomolecules.
- Student will acquire skills to separate proteins with the help of electrophoresis.

Course contents

1. To study relation between absorbance and % transmission using spectrophotometer
2. To separate different types of amino acids by paper chromatography (ascending method).
3. To separate the proteins by SDS-polyacrylamide gel electrophoresis.
4. To identify the lipids in a given sample by TLC.
5. To verify the validity of Beer's law and determine the molar extinction coefficient of NADH.
6. To separate the plant pigments by adsorption column chromatography

Suggested Reading

1. Keith Wilson and John Walker: Principles and Techniques of Biochemistry and Molecular Biology, Cambridge University Press, Cambridge, UK.
2. Karp, G. Cell and Molecular Biology: Concepts and Experiments. John Wiley& Sons. Inc.
3. De Robertis, E.D.P. and De Robertis, E.M.F. Cell and Molecular Biology. Lippincott Williams and Wilkins, Philadelphia.
4. Cooper, G.M. and Hausman, R.E. The Cell: A Molecular Approach. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
5. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. The World of the Cell. Pearson Benjamin Cummings Publishing, San Francisco.

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COURSE: Core -9 Practical

Laboratory-based on core-9 (BTUDLT2) **CREDITS: 2**

Course Objective

This course aims at introducing the various methods to study the components of immune system, evaluating the immune response; and immunological assays. In this course students will get familiar with the methods, and procedures of various assays related to immunology. This will help the students study and understand the components immune system, learn about methods to evaluate immune reactions and apply the immunological assays.

Course Learning Outcomes

On the successful completion of the course, students will be able to:

1. Identify various cells of immune system
2. Qualitatively Differentiate between antigens.
3. Perform assays based on antigen antibody interactions.
4. Detect the presence of specific antigen/antibody.
5. Apply the immunological assay for studying immune reactions.

Course contents

1. Total RBC count of blood sample using haemocytometer
2. To analyse the haemagglutination assay
3. To analyse the haemagglutination inhibition assay
4. To separation the serum and plasma from blood sample
5. To study the double immunodiffusion test using specific antibody and antigen.
6. To study the different types of ELISA

Suggested Reading

Abbas AK, Lichtman AH, Pillai S. Cellular and Molecular Immunology. Saunders Publication, Philadelphia.

2. Delves P, Martin S, Burton D, Roitt IM. Roitt's Essential Immunology. Wiley-Blackwell Scientific Publication, Oxford.

3. Goldsby RA, Kindt TJ, Osborne BA. Kuby's Immunology. W.H. Freeman and Company, New York.

4. Murphy K, Travers P, Walport M. Janeway's Immunobiology. Garland Science Publishers, New York.

5. Peakman M, and Vergani D. Basic and Clinical Immunology. Churchill Livingstone Publishers, Edinberg.

6. Richard C and Geiffrey S Immunology. Wiley Blackwell Publication.

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COURSE: Core -11 Practical

Laboratory-11 based on core-11 (BTUELT1) **CREDITS: 2**

Course Objective

The course objective is to impart student's the skills related to microbial growth and bioprocess development.

Course learning outcomes

- Students will acquire skill to study the bacterial growth curve
- Students will acquire skill to calculate thermal death point of microorganisms
- Students will acquire skill to design, develop and analyse the production of industrially important metabolites and enzymes

Course content

1. To study the bacterial growth curve.
2. To calculate the thermal death point of a microbial sample.
3. Production and analysis of ethanol.
4. Isolation of industrially important (amylase producing) microorganism from natural resource.
5. Production and analysis of amylase.
6. Production and analysis of lactic acid.

Suggested Reading

1. Casida LE. (Industrial Microbiology. Wiley Eastern Limited.
2. Crueger W and Crueger A. Biotechnology: A textbook of Industrial Microbiology. Panima Publishing Co. New Delhi.
3. Patel AH. Industrial Microbiology. Macmillan India Limited.
4. Stanbury PF, Whitaker A and Hall SJ. Principles of Fermentation Technology. Elsevier Science Ltd.

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COURSE: Core -14 Practical

Laboratory-14 based on core-14 (BTUFLT2) CREDITS: 2

Course Objective

The objective of this course is to provide hands on training of experiments of bioinformatics

Course Learning Outcomes

After successful completion of the course student will be able

- To understand and use various web resources: EMBL, Genbank, Entrez, Unigene, Protein information resource (PIR)
- To understand and use PDB, Swissprot, TREMBL
- To retrieve the gene from Genbank in the output file format
- To retrieve the protein from PDB in the output file format
- To align nucleic acid sequence using BLASTN
- To align protein sequence using BLASTP
- To align multiple sequence using Clustal W

Course Contents

1. To understand and use various web resources: EMBL, Genbank, Entrez, Unigene, Protein information resource (PIR)
2. To understand and use PDB, Swissprot, TREMBL
3. To retrievethe gene from Genbank in the output File format
5. To retrievethe protein from PDB in the output File format
6. To align nucleic acid sequence using BLASTN
7. To align protein sequence using BLASTP
8. To align multiple sequence using Clustal W

SUGGESTED READING

1. Ghosh Z. and Bibekanand M. Bioinformatics: Principles and Applications. Oxford University Press.
2. Pevsner J. Bioinformatics and Functional Genomics. Wiley-Blackwell.
3. Campbell A. M., Heyer L. J. (Discovering Genomics, Proteomics and Bioinformatics. Benjamin Cummings.
4. Des Higgins and Willie Taylor, Bioinformatics: Sequence, Structure and Databanks. Oxford University Press.
5. Rashidi H. H. and Buehler. Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, London.
6. Gibas Cynthia and Jambeck P. Developing Bioinformatics Computer Skills: Shroff Publishersand Distributors Pvt. Ltd. (O'Reilly), Mumbai.

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