



### List of New Course(s) Introduced

Department : **Biotechnology**

Program Name : **B.Sc.**

Academic Year : **2018-2019**

### List of New Course(s) Introduced

| Sr. No. | Course Code                                  | Name of the Course   |
|---------|--|--|
| 1.      | LS/BT/C-102L                                 | Biochemistry and Metabolism(core-2)  |
| 2.      | LS/BT/C-102P                                 | Laboratory-2 based on core-2   |
| 3.      | LS/BT/GE-101/B&B-L                           | Bioethics and Biosafety(GE-1)  |
| 4.      | LS/BT/GE-101/B&B-P                           | Laboratory-GE1 based on GE-1   |
| 5.      | ECA  | ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others |
| 6.      | LS/BT/GE-202/B &HW-L                         | Biotechnology and Human Welfare(GE-2)  |
| 7.      | LS/BT/GE-202/B&HW-P                          | Laboratory-GE2 based on GE-2   |
| 8.      | ECA  | ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others |
| 9.      | Swayam / Swachhta / NSS / Industrial/ others | Summer Internship: 15 days   |

Signature & Seal of HoD

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

**गुरु घासीदास विश्वविद्यालय**  
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)  
**कोनी, बिलासपुर - 495009 (छ.ग.)**



**Guru Ghasidas Vishwavidyalaya**  
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)  
**Koni, Bilaspur - 495009 (C.G.)**



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

**Academic Year : 2018-2019**

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

**Department : Biotechnology**

**Date and Time : 13-04-2018 - 12:00 Noon**

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

### MINUTES OF THE MEETING OF BOARD OF STUDIES IN BIOTECHNOLOGY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR, HELD ON 13/04/2018

A Meeting of the Board of Studies in Biotechnology under School of Life Science was held on 13/04/2018 at 12:00 Noon under the chairmanship of Dr. Renu Bhatt, Head of Department of Biotechnology for approval of the CBCS, B.Sc.(Hons.) courses in Biotechnology.

Any other matter by permission of the Chair.

To discuss and approve the course structure and scheme of examination of **B.Sc.(Hons.) Biotechnology**, following members were present:

|   |           |
|---|-----------|
| (i) Dr. Renu Bhatt, Head                | Chairman  |
| (ii) Prof. B.N. Tiwary                  | Professor |
| (iii) Prof. Ragini Gothwal              | Expert    |
| (iv) Ms. Alka Ekka, Assistant Professor | Member    |

At the very outset the HOD and Chairman of BOS welcomed all the esteemed members and placed the draft prepared for the course structure and scheme of examination of 3 year B.Sc. (Hons.) degree course in biotechnology as per guidelines of the UGC for CBCS was discussed at length. The external subjects expert suggested that the semester wise title of pappers may be slightly inter-changed for step wise academic development of undergraduate students. Accordingly, the semester-wise papers and course content was restructured. The members after a thorough deliberations approved the course structure and scheme of examinations of B.Sc.(Hons.) to be implemented from the Academic session 2018-2019.

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

| Sr. No. | Course Code         | Name of the Course                                     |
|---------|---------------------|--|
| 1.      | LS/BT/C-306L        | Bio-analytical Tools(core-6)                           |
| 2.      | LS/BT/C-307L        | Chemistry-1(core-7)                                    |
| 3.      | LS/BT/C-307P        | Laboratory-7 based on core-7                           |
| 4.      | LS/BT/GE-303/IPRE-L | Intellectual Property Right and Entrepreneurship(GE-3) |



|     |   |   |
|-----|---|---|
| 5.  | LS/BT/GE-303/IPRE-P                       | Laboratory-GE3 based on GE-3                          |
| 6.  | LS/BT/SEC-301/MT-L                        | Molecular techniques in disease diagnosis(SEC-1)      |
| 7.  | LS/BT/SEC-301/MT-P                        | Laboratory-SEC1 based on SEC-1                        |
| 8.  | LS/BT/C-408L                              | Mammalian Physiology(core-8)                          |
| 9.  | LS/BT/C-408P                              | Laboratory-8 based on core-8                          |
| 10. | LS/BT/C-410L                              | Chemistry-2   |
| 11. | LS/BT/C-410P                              | Laboratory-10 based on core-10                        |
| 12. | LS/BT/GE-404/BME-L                        | Bio-management of Environment (GE-4)                  |
| 13. | LS/BT/GE-404/BME-P                        | Laboratory-GE4 based on GE-4                          |
| 14. | LS/BT/SEC-402/ACC -L                      | Animal Cell Culture (SEC-2)                           |
| 15. | LS/BT/SEC-402/ACC -P                      | Laboratory-SEC2 based on SEC-2                        |
| 16. | SwayamSwachhta / NSS / Industrial/ others | Summer Internship: 15 days                            |
| 17. | LS/BT/C-511L                              | Plant Physiology and Anatomy(core-11)                 |
| 18. | LS/BT/C-511P                              | Laboratory-11 based on core-11                        |
| 19. | LS/BT/DSE-502L                            | Industrial Fermentations(DSE-2)                       |
| 20. | LS/BT/DSE-502P                            | Laboratory-DSE2 based on DSE-2                        |
| 21. | LS/BT/C-613L                              | Bioprocess Technology(core-13)                        |
| 22. | LS/BT/C-613P                              | Laboratory-13 based on core-13                        |
| 23. | LS/BT/C-614L                              | Genomics and Proteomics(core-14)                      |
| 24. | LS/BT/C-614P                              | Laboratory-14 based on core-14                        |
| 25. | LS/BT/DSE-603L                            | Microbial Technology (DSE-3)                          |
| 26. | LS/BT/DSE-603P                            | Laboratory-DSE3 based on DSE-3 (Microbial Technology) |
| 27. | LS/BT/DSE-603L                            | Biodiversity and Bioprospecting(DSE-3)                |

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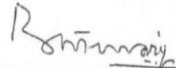
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|     |                |  |
|-----|----------------|--|
| 28. | LS/BT/DSE-603P | Laboratory-DSE3 based on DSE-3 (Biodiversity and Bioprospecting) |
|-----|----------------|--|

The meeting ended with a vote of thanks by the Chair.

  
13/11/18

Dr. Renu Bhatt  
Chairman



Prof. B.N. Tiwary  
Professor



Prof. Ragini Gothalwal  
Expert



Ms. Alka Ekka  
Member



Signature & Seal of HoD

विभागाध्यक्ष, जैव प्रौद्योगिकी विभाग  
Head, Department of Biotechnology  
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## **Scheme and Syllabus**





**School of Sciences : (Life Science) B.Sc. Biotechnology Hon's**

| Semester | Course Opted                                 | Course Code        | Name of the course   | Credit | Hour / week |
|----------|--|--------------------|--|--------|-------------|
| I        | Core-1                                       | LS/BT/C-101L       | Cell Biology   | 4      | 4           |
|          | Core -1 Practical                            | LS/BT/C-101P       | Laboratory-1 based on core-1   | 2      | 4           |
|          | Core -2                                      | LS/BT/C-102L       | Biochemistry and Metabolism  | 4      | 4           |
|          | Core -2 Practical                            | LS/BT/C-102P       | Laboratory-2 based on core-2   | 2      | 4           |
|          | Generic Elective - 1 (GE- 1)                 | LS/BT/GE-101/B&B-L | Bioethics and Biosafety  | 4      | 4           |
|          | Generic Elective - Practical                 | LS/BT/GE-101/B&B-P | Laboratory-GE1 based on GE-1   | 2      | 4           |
|          | Ability Enhancement Compulsory Course (AECC) | LS/BT/AE-101/EC    | English Communication / MIL (Hindi Communication)  | 4*     | 4           |
|          | ECA  |                    | ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others | 2      | (2)         |
| TOTAL    |  |                    |  | 24     | 28          |

|    |  |                     |  |    |     |
|----|--|---------------------|--|----|-----|
| II | Core-3                                       | LS/BT/C-203L        | General Microbiology   | 4  | 4   |
|    | Core -3 Practical                            | LS/BT/C-203P        | Laboratory-3 based on core-3   | 2  | 4   |
|    | Core -4                                      | LS/BT/C-204L        | Genetics   | 4  | 4   |
|    | Core -4 Practical                            | LS/BT/C-204P        | Laboratory-4 based on core-4   | 2  | 4   |
|    | Generic Elective -2 (GE-2)                   | LS/BT/GE-202/B&HW-L | Biotechnology and Human Welfare  | 4  | 4   |
|    | Generic Elective - Practical                 | LS/BT/GE-202/B&HW-P | Laboratory-4 based on core-4   | 2  | 4   |
|    | Ability Enhancement Compulsory Course (AECC) | LS/BT/AE-201/EVS    | Environmental Science  | 4* | 4   |
|    | ECA  |                     | ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others | 2  | (2) |

|  |  |       |    |    |
|--|--|-------|----|----|
|  |  | Total | 24 | 28 |
|--|--|-------|----|----|

|                            |  |   |   |     |
|----------------------------|--|---|---|-----|
| SUMMER Internship: 15 days |  | SwayamSwachhta / NSS / Industrial/ others | 2 | 100 |
|----------------------------|--|---|---|-----|



|                                      |                |                                |    |    |
|--------------------------------------|----------------|--------------------------------|----|----|
|                                      |                | Anatomy                        |    |    |
| Core -11 Practical                   | LS/BT/C-511P   | Laboratory-11 based on core-11 | 2  | 4  |
| Core -12                             | LS/BT/C-512L   | Recombinant DNA Technology     | 4  | 4  |
| Core -12 Practical                   | LS/BT/C-512P   | Laboratory-12 based on core-12 | 2  | 4  |
| Discipline Specific Elective (DSE-1) | LS/BT/DSE-501L | Bioinformatics / Biostatistics | 4  | 4  |
| DSE-1 - Practical                    | LS/BT/DSE-501P | Laboratory-DSE1 based on DSE-1 | 2  | 4  |
| Discipline Specific Elective (DSE-2) | LS/BT/DSE-502L | Industrial Fermentations       | 4  | 4  |
| DSE-2 - Practical                    | LS/BT/DSE-502P | Laboratory-DSE2 based on DSE-2 | 2  | 4  |
|                                      |                | TOTAL                          | 24 | 32 |

|    |   |                  |  |    |    |
|----|---|------------------|--|----|----|
| VI | Core-13   | LS/BT/C-613L     | Bioprocess Technology                                  | 4  | 4  |
|    | Core -13 Practical                                | LS/BT/C-613P     | Laboratory-13 based on core-13                         | 2  | 4  |
|    | Core -14  | LS/BT/C-614L     | Genomics and Proteomics                                | 4  | 4  |
|    | Core -14 Practical                                | LS/BT/C-614P     | Laboratory-14 based on core-14                         | 2  | 4  |
|    | Discipline Specific Elective (DSE-3)              | LS/BT/DSE-603L   | Microbial Technology / Biodiversity and Bioprospecting | 4  | 4  |
|    | DSE-3 – Practical                                 | LS/BT/DSE-603P   | Laboratory-DSE3 based on DSE-3                         | 2  | 4  |
|    | Discipline Specific Elective (DSE-4) Dissertation | LS/BT/DSE-604/PD | Dissertation   | 6  | 8  |
|    |   |                  | TOTAL  | 24 | 32 |
|    |   | TOTAL CREDITS    | 152 + 4 (SI)   |    |    |

As per UGC CBCS guidelines, University / departments have liberty to offer GE and SEC courses offered by any department to students of other departments. The No. of GE course is four. One GE course is compulsory in first 4 semesters each. In present scheme it is proposed to have minimum two GE courses (from one subject) in first two semester after which student shall change two GE for another subject in III<sup>rd</sup> and IV<sup>th</sup> semester, so that the entire student can have exposure of one additional subject. (Subject to approval by the competent authority)

NOTE:

- ECA (I and II Semester): The 2 credit allotted for these courses will be addition credit.
- Continuous Internal assessment should be evaluated by two component test and assignment.
- Marks distribution as proposed End semester: continuous internal assessment (70:30) according to final ordinance.





B.Sc. (Hons.) Biotechnology, Semester-I., Core-2  
Course: Biochemistry and Metabolism  
Course Code: C-2  
Course Credit: (4-0-0) 4

#### UNIT I

Introduction to Biochemistry: Amino acids & Proteins: Structure and properties of Amino acids, Synthesis of aromatic and aliphatic amino acids, amino acid oxidation and production of urea. Types of protein and their classification structure and shape. Different levels of structural organization of proteins (primary, secondary, tertiary and quaternary).

#### UNIT II

Structure, classification, functions and properties of carbohydrates Glycolysis, fate of pyruvate under aerobic and anaerobic conditions, Pentose phosphate pathway and its significance, Gluconeogenesis, Glycogenolysis, TCA cycle, Electron Transport Chain, Oxidative phosphorylation.

#### UNIT III

Structure, classification, functions and properties of fatty acid, Biosynthesis of saturated and unsaturated fatty acids.  $\beta$ -oxidation of fatty acids. Structure, functions, and properties of DNA, double helical model of DNA structure and forces responsible for A, B & Z - DNA. Structure, functions, and properties of RNA

#### UNIT IV

Nomenclature and classification of Enzymes, Holoenzyme, apoenzyme, Cofactors, coenzyme, prosthetic groups, metalloenzymes, monomeric & oligomeric enzymes, activation energy and transition state, enzyme activity, specific activity.

Abhatt  
Raj  
Ajeet  
Rohit

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B.Sc. (Hons.) Biotechnology, Semester-I., Core-2  
Course: Biochemistry and Metabolism  
Course Code: C-2  
Course Credit: (4-0-0) 4

#### UNIT I

Introduction to Biochemistry: Amino acids & Proteins: Structure and properties of Amino acids, Synthesis of aromatic and aliphatic amino acids, amino acid oxidation and production of urea. Types of protein and their classification structure and shape. Different levels of structural organization of proteins (primary, secondary, tertiary and quaternary).

#### UNIT II

Structure, classification, functions and properties of carbohydrates Glycolysis, fate of pyruvate under aerobic and anaerobic conditions, Pentose phosphate pathway and its significance, Gluconeogenesis, Glycogenolysis, TCA cycle, Electron Transport Chain, Oxidative phosphorylation.

#### UNIT III

Structure, classification, functions and properties of fatty acid, Biosynthesis of saturated and unsaturated fatty acids.  $\beta$ -oxidation of fatty acids. Structure, functions, and properties of DNA, double helical model of DNA structure and forces responsible for A, B & Z - DNA. Structure, functions, and properties of RNA

#### UNIT IV

Nomenclature and classification of Enzymes, Holoenzyme, apoenzyme, Cofactors, coenzyme, prosthetic groups, metalloenzymes, monomeric & oligomeric enzymes, activation energy and transition state, enzyme activity, specific activity.

*Abhatt* *Romy* *Seleg* *Patel*



B.Sc. (Hons.) Biotechnology, Semester-I, Lab-2  
Course: Laboratory-2 based on Core-2  
Course Code: Lab-2  
Course Credit: (0-0-4) 2

1. To calculate the molarity, molality, normality and their relationship of given sample.
2. To prepare the buffers (acetate and phosphate buffers).
3. To maintain the pH of different types of buffer using pH meter.
4. To study the Qualitative tests for carbohydrates (for reducing and nonreducing sugars), lipids (Zak's test for cholesterol) and proteins (ninhydrin test, biuret test).
5. To estimate the content of protein by using Lowery method/Bradford method.

#### SUGGESTED READING

1. Berg, J. M., Tymoczko, J. L. and Stryer, L. Biochemistry. W.H Freeman and Co.
2. Buchanan, B., Gruissem, W. and Jones, R. Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists.
3. Nelson, D.L., Cox, M.M. Lehninger Principles of Biochemistry, WH Freeman and Company, New York, USA.
4. Hopkins, W.G. and Huner, P.A. Introduction to Plant Physiology. John Wiley and Sons.
5. Salisbury, F.B. and Ross, C.W. Plant Physiology, Wadsworth Publishing Co. Ltd.

*Abhatt* *Romy* *Tejap* *Parvinder*





**GENERIC ELECTIVE SUBJECTS**

**B.Sc. (Hons.) Biotechnology, Semester-I, GE-1**

**Course: Bioethics and Biosafety**

**Course Code: GE1**

**Course Credit: (4-0-0) 4**

**UNIT I**

Bioethics: Necessity of Bioethics, different paradigms of Bioethics: National & International, Universal Declaration on Bioethics and Human Rights, Ethical issues against the molecular technologies.

**UNIT II**

Biosafety: Introduction, different levels, applications, protocol (UN Cartagena Biosafety Protocol) and health hazards related to Biotechnology, guidelines of Biosafety in India.

**UNIT III**

Introduction to the concept of containment level and Good Manufacturing Practices (GMP), OECD guidelines of Good Laboratory Practices (GLP), Quality assurance programme, apparatus material and reagents used for GLP.

**UNIT IV**

Ethical, Legal and Social Implication program of Human Genome project, Bioethics in Biodiversity and resources management, genetically modified foods: steps for genetically modified food technology regulations, ethical issues and present scenario in consumption of Genetically Modified Organisms

*Bhatt*

*Rony*

*Ashu*

*Panwar*





B.Sc. (Hons.) Biotechnology, Semester-I, Lab-GE1

Course: Laboratory-GE1 based on GE-1

Course Code: Lab-GE1

Course Credit: (0-0-4) 2

1. To study the guidelines for good laboratory Practice
2. To identify the different hazardous symbols for different chemicals/reagents used in laboratory
3. A case study on clinical trials of drugs in India with emphasis on ethical issues
4. Case study on women health ethics
5. Case study on handling and disposal of radioactive waste
6. Case study on medical errors and negligence

#### SUGGESTED READING

1. Sateesh MK Bioethics and Biosafety, I. K. International Pvt Ltd.
2. Sree Krishna V Bioethics and Biosafety in Biotechnology, New age international Publishers
3. Fleming, D.A., Hunt, D.L., Biotechnology and Safety Assessment, Academic press.
4. Thomas, J.A., Fuch, R.L. Biotechnology and safety assessment CRC press, Washington. patents by Sibley. Butterworth publication
5. Biotechnology - A comprehensive treatise. Legal economic and ethical dimensions VCH.

*Qbhatt*

*Romy*

*Arul*

*Pranav*



B.Sc. (Hons.) Biotechnology, Semester-II, GE-2

Course: Biotechnology and Human Welfare

Course Code: GE2

Course Credit: (4-0-0) 4

#### UNIT I

Industry: protein engineering; enzyme and polysaccharide synthesis, activity and secretion,  
Enzyme immobilization: methods and application.

#### UNIT II

Agriculture and Environments: Plant Tissue culture, N<sub>2</sub> fixation, transgenic plants: insect  
resistance, bacterial/ fungal stress tolerance, drought/salt tolerance, bioremediation,  
biofertilizers, biopesticides, biofuels and bioleaching.

#### UNIT III

Forensic science: solving violent crimes such as murder and rape; solving claims of paternity  
and theft etc. using various methods of DNA finger printing, Polymerase chain reaction,  
Restriction fragment length polymorphism.

#### UNIT IV

Health: development of non- toxic therapeutic agents, recombinant live and DNA vaccines,  
gene therapy, Molecular diagnosis: (monoclonal antibodies, DNA probes, Microarrays),  
transgenic animals.

*Q. Shetty*

*Romy*

*Ashu*

*Pravara*



B.Sc. (Hons.) Biotechnology, Semester-II, Lab-GE2

Course: Laboratory-GE2 based on GE-2

Course Code: Lab-GE2

Course Credit: (0-0-4) 2

*(Wherever wet lab experiments are not possible the principles and concepts can be demonstrated through any other material or medium including videos/virtual labs etc.)*

1. To perform ethanolic fermentation using Baker's yeast
2. To study the plant parts (leaves and stems) infected with a microbes.
3. To perform quantitative estimation of residual chlorine in water samples
4. To isolate and analyse the DNA from different biological samples
5. To demonstrate the PCR in biological samples

#### SUGGESTED READING

1. Sateesh MK Bioethics and Biosafety, I. K. International Pvt Ltd.
2. Sree Krishna V Bioethics and Biosafety in Biotechnology, New age international publishers
3. Gupta, Elements of Biotechnology
4. Dubey, T. B. of Biotechnology
5. Kumar H. Modern Concept of Biotechnology
6. Jogdand, Advances in Biotechnology
7. Chatwal, T. B. of Biotechnology
8. Primrose, Molecular Biotechnology

*Abhatt* *Romy* *Arun* *Pranav*