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-10l/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.)

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 Sciences was held on 13/04/2018 at 12:00 Noon under the chairmanship of Dr. Renu Bhatt, Head 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	Member
(iii) Prof. Ragini Gothalwal,	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 papers 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 meeting ended with a vote of thanks by the Chair

Dr. Renu Bhatt 13/4/18
Chairman

Prof. B. N. Tiwary
Member

Prof. Ragini Gothalwal
Expert

Ms. Alka Ekka
Member

In the meeting of BOS-Biotechnology held on 13-40-2018, the following courses were revised in Syllabus of B. Sc.:

LS/BT/C-305L	Molecular Biology
LS/BT/C-305P	Laboratory-5 based on core-5
LS/BT/C-306L	Bio-analytical Tools(core-6)
LS/BT/C-306P	Laboratory-6 based on core-6
LS/BT/C-307L	Chemistry-1(core-7)
LS/BT/C-307P	Laboratory-7 based on core-7
LS/BT/GE-303/IPRE-L	Intellectual Property Right and Entrepreneurship(GE-3)
LS/BT/GE-303/IPRE-P	Laboratory-GE3 based on GE-3
LS/BT/SEC-301/MT-L	Molecular techniques in disease diagnosis(SEC-1)
LS/BT/SEC-301/MT-P	Laboratory-SEC1 based on SEC-1
LS/BT/C-408L	Mammalian Physiology(core-8)
LS/BT/C-408P	Laboratory-8 based on core-8
LS/BT/C-409L	Immunology(core-9)
LS/BT/C-409P	Laboratory-9 based on core-9
LS/BT/C-410L	Chemistry-2
LS/BT/C-410P	Laboratory-10 based on core-10
LS/BT/GE-404/BME-L	Bio-management of Environment (GE-4)
LS/BT/GE-404/BME-P	Laboratory-GE4 based on GE-4
LS/BT/SEC-402/ACC -L	Animal Cell Culture (SEC-2)
LS/BT/SEC-402/ACC -P	Laboratory-SEC2 based on SEC-2
SwayamSwachhta / NSS / Industrial/ others	Summer Internship: 15 days

LS/BT/C-511L	Plant Physiology and Anatomy(core-11)
LS/BT/C-511P	Laboratory-11 based on core-11
LS/BT/C-512L	Recombinant DNA Technology(core-12)
LS/BT/C-512P	Laboratory-12 based on core-12
LS/BT/DSE-501L	Bioinformatics(DSE-1)
LS/BT/DSE-501P	Laboratory-DSE1 based on DSE-1 (Bioinformatics)
LS/BT/DSE-501L	Biostatistics(DSE-1)
LS/BT/DSE-501P	Laboratory-DSE1 based on DSE-1 (Biostatistics)
LS/BT/DSE-502L	Industrial Fermentations(DSE-2)
LS/BT/DSE-502P	Laboratory-DSE2 based on DSE-2
LS/BT/C-613L	Bioprocess Technology(core-13)
LS/BT/C-613P	Laboratory-13 based on core-13
LS/BT/C-614L	Genomics and Proteomics(core-14)
LS/BT/C-614P	Laboratory-14 based on core-14
LS/BT/DSE-603L	Microbial Technology (DSE-3)
LS/BT/DSE-603P	Laboratory-DSE3 based on DSE-3 (Microbial Technology)
LS/BT/DSE-603L	Biodiversity and Bioprospecting(DSE-3)
LS/BT/DSE-603P	Laboratory-DSE3 based on DSE-3 (Biodiversity and Bioprospecting)
LS/BT/DSE-604/PD	Dissertation
101	Research Methodology and scientific communication (core)
102	Analytical and Separation techniques (core)
103A	Advances in Animal Cell Culture Technology (Elective)
103B	Advances in Cancer Biology (Elective)
103C	Advances in immunology (Elective)
103D	Microbial resources and Products (Elective)
103E	Enzyme and fermentation technology (Elective)

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

Signature & Seal of HoD

विभागाध्यक्ष, जैव प्रौद्योगिकी विभाग
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Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Scheme and Syllabus

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

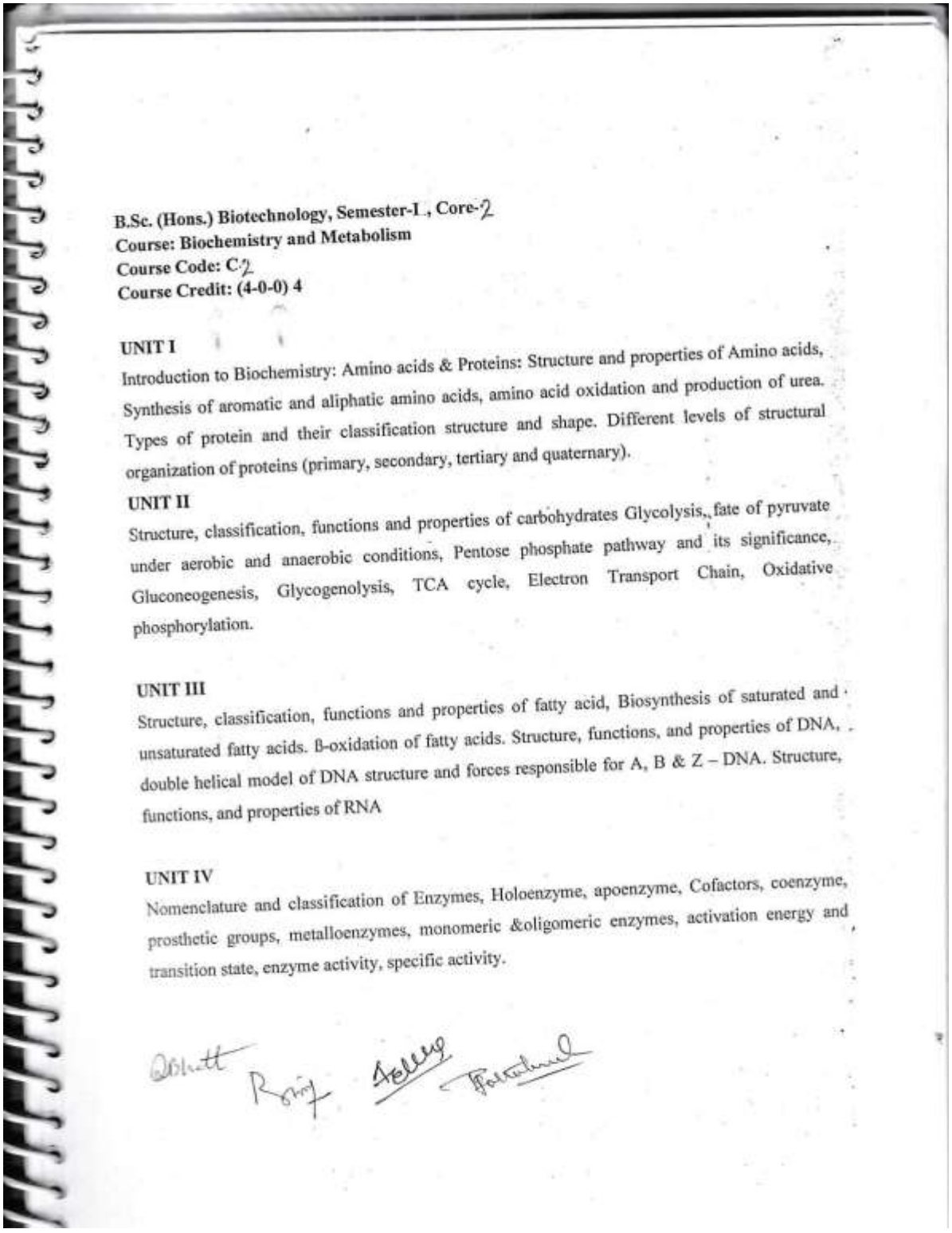
Semester	Course Opted	Course Code	Name of the course	Credit	Hour / weak
I	Core-1	LS/BT/C-101L	Cell Biology	4	4
	Core -1 Practical	LS/BT/C-101P	Laboratory-1 based on core-1	2	4
	Core -2	LS/BT/C-102L	Biochemistry and Metabolism	4	4
	Core -2 Practical	LS/BT/C-102P	Laboratory-2 based on core-2	2	4
	Generic 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 / Biostatics	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 IIIrd and IVth 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. ß-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.

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. ß-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.

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 preparethe 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.

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), OECED 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 recourses management, genetically modified foods: steps for genetically modified food technology regulations, ethical issues and present scenario in consumption of Genetically Modified Organisms

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.

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_2 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.

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