

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY



CIRCULAR NO.SU/B.Sc.Biotech./Honors/26/2022

It is hereby inform to all concerned that, the syllabus prepared by the Ad-hoc Board and recommended by the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor has accepted the **Syllabus of Degree Course of B.Sc. Biotechnology (Honors) under the scheme of Choice Based Credit & Grading System** in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith run at Model College, Ghansawangi Dist.-Jalna.

This is effective from the Academic Year 2022-23 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.SU/2022/10530-38
Date:- 19.09.2022.

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[Signature]
**Deputy Registrar,
Academic Section**

Copy forwarded with compliments to :-

- 1] **The Principal of Model College, Ghansawangi, Dist. Jalna**
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

- 1] **The Director, Board of Examinations & Evaluation, Dr.BAMU,A'bad.**
- 2] The Section Officer,[B.Sc.Unit] Examination Branch,Dr.BAMU,A'bad.
- 3] The Programmer [Computer Unit-1] Examinations, Dr.BAMU,A'bad.
- 4] The Programmer [Computer Unit-2] Examinations, Dr.BAMU,A'bad.
- 5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.BAMU,A'bad.
- 6] The Public Relation Officer, Dr.BAMU,A'bad.
- 7] The Record Keeper, Dr.BAMU,A'bad.

Dr. Babasaheb Ambedkar Marathwada University
Aurangabad - 431004 (MS) India.



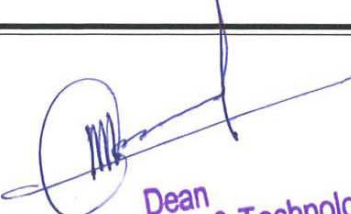
Undergraduate Bachelor Degree Program
in

B.Sc. Biotechnology
(Honours)

Course Structure and Curriculum
(Outcome based Curriculum)

Choice Based Credit System
(Effective from Academic Year 2022-23)

Run at Model Degree College, Ghansawangi. Dist: Jalna
Dr. Babasaheb Ambedkar Marathwada University
Aurangabad – 431004 (MS) India


Dean
Faculty of Science & Technology
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad

1. Preamble

Biotechnology, being one of the latest branch of Life Science, has expanded and established as advanced interdisciplinary applied science. The socio-economic potential of Biotechnology is well established which has almost become synonymous with modern development. Biotechnology has its applications in almost every field touching practically every human activity e.g. Vaccine developed against Covid-19 endemic. The applied aspect of Biotechnology is now getting established with its applications in Industry, Agriculture, Health and Environment, Biotechnology is the lead science expanding exponentially.

B.Sc. Biotechnology (Hon) syllabus provides students with an in-depth understanding of Biology, Tissue culture, biological chemistry, microbiology, molecular biology, genetics, analytical techniques, bioinformatics, computer programming and other topics are included in the B.Sc. syllabus. This syllabus entails a thorough examination of the cellular and bio molecular processes involved in creating a wide range of innovation and products that help people to live better lives with better health. This course's sole purpose is to provide students with advanced biological processes knowledge for industrial and other purposes.

B.Sc. (Hons) Biotechnology is a three year course comprising of systematic and multidisciplinary curriculum involving theoretical and practical aspects. The various subjects in Biotechnology syllabus emphasizing distribution, morphology and physiology of microorganisms in addition to skills in aseptic procedures, isolation and identification. The course also includes sophomore level material covering immunology, cell biology, Molecular Biology, biochemistry, plant science, industrial biotechnology, environmental biotechnology and medical biotechnology. The course aims at producing professionals, who can be furnished into true biotechnologist and can be capable enough to serve the nation.

2. Course Structure

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Choice Based Credit System (CBCS) Curriculum

For

Faculty of Science and Technology

Course Structure and Scheme of Examination

B.Sc. Biotechnology (Honors) Three Year Undergraduate Degree Program

Run at Model Degree College Ghansawangi.

Semester I									
	Name of Course	Course Code	Course Title	(Teaching periods/week)	Credits	Scheme of Examination			
						Max Marks	CIA	UA	Min Marks
Ability Enhancement compulsory courses (AECC-I)	Language Curriculum	BTE-101	English-I	4Hours/week	4	100	40	60	40
		BTSL-102	Marathi/Hindi	4Hours/week	4	100	40	60	40
Core Courses	Core A	BTCA-103	Inheritance Biology	3Hours /week	3	50	20	30	20
	Core B	BTCB-104	Genomes and Inheritance	3Hours /week	3	50	20	30	20
	Supportive	BTS-105	Biomolecules I	2Hours /week	2	50	20	30	20
	Applied	BTA-106	Essentials of Microbiology	2Hours/week	2	50	20	30	20
	Practical based on Core A	BTCA-103P	Lab Course I	2Hours/week	2	50	0	50	20
	Practical based on Core B	BTCB-104P	Lab Course II	2Hours/week	2	50	0	50	20
	Practical based on Supportive	BTS-105P	Lab Course III	2Hours/week	2	50	0	50	20
	Practical based on Applied	BTA-106P	Lab Course IV	2Hours/week	2	50	0	50	20
Life Skill Curriculum	Job Oriented Soft Skills	BT-JOC-107	JOC(Job Oriented Course)	2Hours/week	2	50	20	30	20
	Value Oriented Courses	BT-VOC-108	VOC (Value Oriented course)	2Hours/week	2	50	20	30	20
				30	30	700	200	500	280
Total Credits for Semester I : 30 (Theory : 22 ; Laboratory : 8)									


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Semester II									
	Name of Course	Course Code	Course Title	(Teaching periods/week)	Credits	Scheme of Examination			
						Max Marks	CIA	UA	Min Marks
Ability Enhancement compulsory courses (AECC-I)	Language Curriculum	BTE-201	English-I	4Hours/week	4	100	40	60	40
		BTSL-202	Marathi/Hindi	4Hours/week	4	100	40	60	40
Core Courses	Core A	BTCA-203	Cell Biology	3Hours /week	3	50	20	30	20
	Core B	BTCB-204	Fundamentals of Genetics	3Hours /week	3	50	20	30	20
	Supportive	BTS-205	Microbial Physiology	2Hours /week	2	50	20	30	20
	Applied	BTA-206	Biomolecules-II	2Hours/week	2	50	20	30	20
	Practical based on Core A	BTCA-203P	Lab Course V	2Hours/week	2	50	0	50	20
	Practical based on Core B	BTCB-204P	Lab Course VI	2Hours/week	2	50	0	50	20
	Practical based on Supportive	BTS-205P	Lab Course VII	2Hours/week	2	50	0	50	20
	Practical based on Applied	BTA-206P	Lab Course VIII	2Hours/week	2	50	0	50	20
Life Skill Curriculum	Job Oriented Soft Skills	BT-JOC-207	JOC(Job Oriented Course)	2Hours/week	2	50	20	30	20
	Value Oriented Courses	BT-VOC-208	VOC (Value Oriented course)	2Hours/week	2	50	20	30	20
Non Credit Course			Constitution of India	3Hours/Week	2*	50	10	40	20
				30	30	700	200	500	280
Total Credits for Semester II : 30 (Theory : 22 ; Laboratory : 8)									


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3.Vision: The biotechnology program vision is to provide quality teaching with a strong core science concepts and an application-oriented undergraduate education along with solid foundation in the rapidly expanding fields of biotechnology that enable them to produce high quality professionals. Our goal is to provide students with a sound knowledge and understanding of current theories, concepts and laboratory practices in biotechnology.

4.Mission: To generate high quality students by offering UG (B.Sc. Honours) programmes in Biotechnology and to develop a premier biotechnology teaching and research department to cater the needs and challenges of the region and the country.

5. Program Education Objectives

PEO1	To Understand the structure and function of biological molecules, cellular energetics, cellular metabolism, and photosynthesis.
PEO2	Understand the structure and function of prokaryotic and eukaryotic cells, as whole entities and in terms of their subcellular processes..
PEO3	Understand the flow of genetic information in populations and the relationship between genetics and evolutionary theory. Understand the functioning of organisms, at the molecular, cellular, organ, and organismal levels
PEO4	To impart knowledge through updated curriculum as per need to prepare students for higher studies and national/international competitive examinations

6.PROGRAM OUTCOMES

PO1	Knowledge: Students will be able to demonstrate their knowledge of biotechnology concepts. Graduates will gain and apply knowledge of Biotechnology, Science and Engineering concepts to solve problems related to field of Biotechnology.
PO2	Problem analysis:. Identify, formulate, review research literature, and analyze complex problems reaching substantiated conclusions using first principles of Biotechnology and natural sciences
PO3	Design/development of solutions: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal,

	and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern computational tools including prediction and modeling to complex computational problems with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of change in environment solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the ethical practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex activities with the community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions..
PO11	Project management and finance: Demonstrate knowledge and understanding of the management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO1	The student will be able to apply the knowledge of biotechnology and allied disciplines in industry, research and higher studies.
PSO2	The student will be able to apply technological solutions in the area of modern biotechnological applications.
PSO3	The student will be able to apply the knowledge of biotechnology and allied disciplines to become an entrepreneur.
PSO4	Ability to design the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to biotechnological product.

7. Eligibility

Candidates who have passed 10+2 with Science from recognized board and as per the eligibility criteria lay down by Dr. Balasaheb Ambedkar Marathwada University, Aurangabad will be eligible for admission to B.Sc. Biotechnology (Honours) course.

8. Duration:

The course will be of three years duration and shall be completed in six semesters.

9. Medium of Instructions: English

10. Choice Based Credit System (CBCS) and Credit-to-contact hour mapping: One Credit would mean equivalent of 15 periods of 60 minutes each for theory lecture. For lab course/ workshops/internship/field work/project, the credit weightage for equivalent hours shall be 50% that for lectures.

11. Attendance: A candidate is required to put in a minimum of 75% of attendance in both theory papers practical separately in each subject before admission to the examination. This relaxation in attendance includes for medical & any other reasons approved by the head of the Institution. A candidate lacking in the prescribed attendance and progress in any one of the subjects in theory and practical in the first appearance shall not be permitted for admission to the entire examination.

12. Evaluation Methods/ Scheme of Examination, Earning Credits, Grading System:

Theory

- Each theory paper examination shall be of 2 hours duration and of maximum marks 30.
- There will be three question papers (03 sets each) for each year and shall be in

accordance with the different subjects/area covered during each of the B. Sc. Biotechnology three years course.

- c. The Paper setter shall set the questions within the prescribed course of study of the concerned paper. There will be a set pattern of question papers duly approved by Academic Council, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
- d. Internal Assessment – Internal assessment shall be of 20 marks for each theory paper.
- e. Passing criteria - A candidate will have to obtain at least 40% marks in each Theory paper to pass.

Practical

- Practical examination will be conducted in presence of internal & external examiner as per university guidelines.
- Practical exam will conducted annually.
- Students shall be required to obtain a minimum of 40% marks in the each paper of practical examination.

The Grading:

At the end of each semester, the teacher will assign grades to each student and will submit it to the department. The department will submit these grades to the university to give official results to students.

The grade will be as follows:

- **O (Outstanding)** will have 9.00-10 points
- **A++ (Excellent)** will have 8.00-8.99 points
- **A+ (Exceptional)** will have 7.00-7.99 points
- **A (Very good)** will have 6.00-6.99 points
- **B+ (Good)** will have 5.50-5.99 point
- **B (Fair)** will have 5.00-5.49 point
- **C+ (Average)** will have 4.50-4.99 point
- **C (Below average)** will have 4.01-4.49 point
- **D (Pass)** will have 4.00 point.
- **F (Fail)** will have 0 point.

13. Curriculum: Semester – I

B.Sc. Biotechnology Honours (Semester I)

BTCA103 : Inheritance Biology

Paper: Core A

Contact Hours: 45 (Clock Hours)

Total Credit: 03

Marks: 30

Unit I : Historical and Evolutionary perspective

Contribution of various scientists in Evolutionary Genetics: Lamark, Russel Wallace, Darwin, Weisman, Hugo de veries. Definition of gene. Discovery of genetic material –Experimental evidences, Watson and Crick DNA structure.

Unit II : Gene Concept and Inheritance

Concept of gene: Allele, Alleles, Pseudoallele, Complementation test. Mendelian Principles: segregation; Mendels experiment, terminology, testing phenotypes, examples of gene differences and segregation. Mendelian Principle II: Independent assortment; genotypes of dihybrid corsses, testing dihybrid genotypes.

Unit III : Extension of Mendel Principles

Codominance, Incomplete dominance, Pleiotrophy, Genomic Imprinting, Penetrance and Expressivity, Phenocopy, Linkage and Crossing over, Sex determination, Sex Linkage, Sex limited and Sex influenced characters.

Unit IV: Post mendelian Genetics

Gene Intaraction and phynotype effect, Epistasic gene, hypoststic gene, types of Epistasis: Dominant, Recessive, duplicate dominant, duplicate recessive.

References:

1. Principles of Genetics, 7th edition R. H. Tamarin, Tata McGraw Hill Edition, Reprint 2004.
2. Molecular Genetics: an introductory narrative (2nd edition) Gunther S. Stent, and Riochard Calenar, CBS publishers and Distributiors, Reprint 2004
3. Genetics 5th edition, Strickberger, Pearsons Publisher, LPE.
4. Modern Microbial Genetics Editors Uldis N Streips and Ronald E. Yassbin, Wiley Liss Pubication 1991.
5. Genetics: Conceptual approach by Benjamin Pierce
6. i-Genetics: A molecular approach 3rd edition, -Peter J. Russel.

BTCB104: Genomes and Inheritance

Paper: Core B
Contact Hours: 45 (Clock Hours)

Total Credit: 03
Marks: 30

Unit I : Organization of genomes, prokaryotes, eukaryotes. *Escherichia coli* genome, examples of eukaryotic genomes; *Saccharomyces cereviceae*, *C. elegans*, *Arabidopsis thaliana*, human genome.

Unit II : C-value paradox, Repetitive DNA-satellite DNAs and interspersed repeated DNAs, Transposable elements, LINES, SINES, Alu family and their application in genome mapping. Subcellular and extrachromosomal inheritance, Plasmid genomes, viral genomes, Plastid genomes, Mitochondrial genomes.

Unit III : Non-Nuclear Inheritance : Maternal inheritance, maternal effect, cytoplasmic inheritance, Plastid inheritance, Endosymbiont mediated inheritance and Uniparental Inheritance

Unit IV:Genome Mapping

Linkage map, Tetrad analysis, Mapping with Molecular Markers, Mapping with Somatic cell Hybrids.

References:

1. Principles of Genetics, 7th edition R. H. Tamarin, Tata McGraw Hill Edition, Reprint 2004.
2. Molecular Genetics: an introductory narrative (2nd edition) Gunther S. Stent, and Riochard Calenar, CBS publishers and Distributors, Reprint 2004
3. Genetics 5th edition, Strickberger, Pearsons Publisher, LPE.
4. Modern Microbial Genetics Editors Uldis N Streips and Ronald E. Yassbin, Wiley Liss Pubication 1991.
5. Genetics: Conceptual approach by Benjamin Pierce
6. i-Genetics: A molecular approach 3rd edition, -Peter J. Russel.
7. Genomes: T. A. Brown 3rd edition
8. Principles of Genomes and Genomics 7th edition, Primrose and Twyman.

BTS105: Biomolecules I

Paper: Supportive
Contact Hours: 30 (Clock Hours)

Total Credit: 02
Marks: 30

Unit-1: Basic Concepts:

Concept and definition of acid, base, Water and pH, Normality, Molarity, Buffers and biological systems, Henderson-Hasselbalch equation. Types of bond in biomolecules- Covalent (Glycosidic, peptide, Phosphodiester) Ionic hydrogen, Van der Waals, Hydrophobic, Coordinate, Their formation and interaction.

Unit-II: Thermodynamics and bioenergetics

Basic concepts of Thermodynamics, Enthalpy, entropy. Law of Thermodynamics, Thermodynamics and biological system, Application of Thermodynamics. Concepts of free energy, relation between Equilibrium constant and Standard Free energy change Biological oxidation reduction reaction. High Energy phosphate compound – Introduction, phosphate group transfer, Hydrolysis of ATP and Sugar phosphate Along with reasons for ΔG

Unit-III: Nucleic Acids

Physico-chemical properties of Nucleic acids, nitrogenous bases (Purines and Pyrimidines), structure of nucleosides and nucleotides. Structure of DNA- Watson and Crick Model, DNA forms and conformations Denaturation of DNA. RNA- types, structure and role.

Unit IV: Vitamins

Vitamins Structure and active forms of water soluble and fat soluble vitamins, deficiency diseases and symptoms, hypervitaminosis

References:

1. Cohn & Stump – Outline of Biochemistry Wiley Eastern Ltd.
2. L. Lehninger, D. L. Nelson & M M Cox – Principles of Biochemistry.
3. Lubert Stryer – Biochemistry
4. J. Jayaraman- Practical Biochemistry
5. Plummer. –Practical Biochemistry
6. A.C.Deb Fundamentals of biochemistry
7. Zubay - Biochemistry 4th edition
8. Boyer- Concepts in Biochemistry
9. Cooper -The tools of Biochemistry
10. Biochemistry- U Satyanarayan

BTA106: Essentials of Microbiology

Paper: Applied
Contact Hours: 30 (Clock Hours)

Total Credit: 02
Marks: 30

Unit I : Determination of micro-organisms

Various shapes of bacteria, determination of microbes by Stains and Staining procedure, Classification, Negative staining, Monochrome staining, Gram staining, Acid Fast staining

Unit II: Microbial Nutrition

Types of growth media: Natural, Synthetic, Enriched, Enrichment and selection, Differential medium.

Unit III : Isolation and purification

Isolation & Purification: Pure culture techniques; streak plate, pour plate and spread plate technique. Techniques used for isolation purification of aerobic and anaerobic microbes.

Unit IV: Microbial Control

Physical: Sterilization: Heat: Dry heat, Moist heat, Tyndalization & Pasteurization. Radiations. Chemical control :properties of disinfectant, types of disinfectants, Antimicrobial compounds

References:

1. R. Y. Stanier 6th Edition, General Microbiology, Mc Millan Press. Inc.
2. Pelczar Microbiology, TMH publication
3. Anantnarayan text book of Microbiology 9th edition, Orient Longman Delhi
4. Cappucinno Microbiology; a laboratory manual 4th edition
5. Toratora Microbiology: An introduction
6. Salle A. J. Fundamental Principles of Bacteriology
7. Prescott Microbiology

Practicals (Semester I)

BTCA103P : Lab Course-I: Practical Based on Inheritance Biology

Paper: Practical based on Core A
Contact Hours: 30 (Clock Hours)

Total Credit: 02
Marks: 50

1. Problems based on monohybrid and back cross
2. Problems based on di-hybrid
3. Problems based on tri-hybrid
4. Problems based on pedigree analysis
5. Problems based on epistasis.
6. Problems based on Linkage

BTCB104P : Lab Course-II: Practical Based on Genomes & Inheritance

Paper: Practical based on Core B
Contact Hours: 30 (Clock Hours)

Total Credit: 02
Marks: 50

1. Isolation & Demonstration of chloroplast from plant source
2. Isolation and Demonstration of Mitochondria
3. Comparison of Microbial and Eukaryotic genomes (structure & Function level)
4. Comparison of virus and corresponding host genomes (Structure and Function)
5. Problems based on Linkage Map

BTS105P : Lab Course-III: Practical Based on Biomolecules I

Paper: Practical based on Supportive
Contact Hours: 30 (Clock Hours)

Total Credit: 02
Marks: 50

1. Preparation of reagents, Molar and normal solution
2. Preparation of various buffers and determination of p^H
3. Quantitative estimation of DNA by diphenylamine method
4. Quantitative estimation of RNA by Orcinol method.

BTA106P : Lab Course-III: Practical Based on Essentials of Microbiology

Paper: Practical based on Applied
Contact Hours: 30 (Clock Hours)

Total Credit: 02
Marks: 50

1. Simple staining/Monochrome staining
2. Negative staining
3. Differential staining –Grams staining and Acid Fast staining
4. Media preparation & Test of sterility
5. Isolation of bacteria from soil, water by streak plate, pour plate and spread plate method
6. Preparation of Slant
7. Biochemical characterization (IMViC Test)
8. Assay of Antibiotics

14. Curriculum Semester II

B. Sc. Biotechnology (Honours) II Semester

BTCA203: Cell Biology

Paper: Core A
Contact Hours: 45 (Clock Hours)

Total Credit: 03
Marks: 30

Unit1. Cell Structure and organelles

Cell theory Organization : Origin of eukaryotic cells-endosymbiotic theory,. Overview of cell specializations: Plants-epidermis,vascular tissue and cortex, Animals-epithelia,connective tissue, nervous tissue, muscle, blood, germ cells and sensory cells. Structure and Functions of Organelles

Unit II. Membrane Structure

Membrane models -Overton's lipid nature of membrane, Langmuir's lipid monolayer, Davson and Danielli's lipid bilayer plus protein sheet, Robertson's Unit membrane, Singer and Nicolson's fluid mosaic. Membrane structure-2D Lipid bilayer, composition of lipid bilayer, asymmetric nature, fluidity, membrane proteins and their function.

Unit III. Cell Division and Cell Cycle

Mitosis, Meiosis, and Cytokinesis, role of protein kinases and Cyclin-Cdk-complex in controlling cell cycle, control of cell proliferation in multicellular organisms, programmed cell death

Unit IV: Cell Communication and Cell Signalling

Cellular Communication and Cell signaling: general principles of cell communication, , cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, Neurotransmissions and its regulation, Hormones and their receptors, cell surface receptor, G-protein coupled receptors, signal transduction pathways, second messengers, regulation of signaling pathways, bacterial and plant two-component signaling systems, bacterial chemotaxis and quorum sensing.

References:

1. Cell Biology by -Sadava
2. Molecular Cell Biology, Lodish et al., Freeman and Company, New York, 1999
3. Essential Cell Biology -An introduction to the molecular Biology of the cell- Alberts, Bray, Johnson, Lewis, Raff, Roberts, Walter, Garland Publishing.
4. Molecular Biology of the cell- Bruce Alberts, Garland Publishing Inc.
5. Cell Biology- A short course, Second edition, Stephen R. Bolsover, Wiley Publication
6. Genes XI- Benjamin Lewin, Prentice Hall Publication
7. An introduction to Practical Biochemistry- David T Plummer, Tata McGraw-Hill Edition
8. Developmental Biology, Ninth edition, S.F. Gilbert, Sinauer Associates Inc.

BTCB204: Fundamentals of Genetics

Paper: Core B
Contact Hours: 45 (Clock Hours)

Total Credit: 03
Marks: 30

Unit I :Chromosomal Abberations

Mutation: spontaneous, replica plating, fluctuation test, induced mutation: physical, chemical and biological. UV and gamma ray induced mutation, base substitution analogue, hydroxyl amine, nitrous acid, acridine dyes mediated mutations. Mutations by transposition.

Unit II :Safe Guarding principles

Choice of restriction and modification within cell, type I, type II and type III restriction enzymes. UV repair, Photoreactivation, post replication repair and SOS repair system. Homologous: general and site specific examples, non homologous recombination.

Unit III :Genetic Code

Codon, degeneracy of codon, amino acids and their codon , wobble hypothesis, unusual amino acids, codon usage, tRNA sturcutre and classes of tRNA synthetases, charging of tRNA,

Unit IV:Microbial Genetics

Gene transfer methods, Transformation, Conjugation, and Transduction.

References:

1. Principles of genetics : Tamarin, McGrahall
2. Principles of genetics 8th edition, E. J. Gardner, MJ. Simmons and D. P. Snustad.
3. Genetics : 5th edition Strickberger Pearson Publisher, Low Price Edition,
4. General Microbiology: RY Stanier, 6th edition
5. Genes XI, Benjamin Lewin
6. Molecular genetics : An introductory narrative 2nd edition, Gunther S. Stent and R. Calendar, CBS publisher and Distributors, reprint 2004

BTS205: Microbial Physiology

Paper: Supportive
Contact Hours: 30 (Clock Hours)

Total Credit: 02
Marks: 30

Unit I : Microbial Growth

Growth curve, quantification of growth –direct/indirect, Arithmetic, continuous and synchronous growth

Unit II: Transport of Nutrients

Uptake of Nutrient, Passive diffusion, facilitated diffusion, active transport (ABC transporters), simple transport (Uniport, symport, and antiport.) group translocation and protein export system.

Unit II :Microbial Differentiation

Bacterial sporulation, stages and biochemical changes during sporulation and germination of spore, Typical Structure of spore.

Unit III :Microbial toxins and stress response

types of toxin, Shiga toxin, toxins from *E. coli*, cholera toxin, Staphylococcal toxin, septic shock, botulism. Heat shock and cold shock, stress during prolonged stationary phase and other environmental conditions.

References:

1. R. Y. Stanier 6th Edition, General Microbiology, Mc Millan Press. Inc.
2. Pelczar Microbiology, TMH publication
3. Anantnarayan text book of Microbiology 9th edition, Orient Longman Delhi
4. Cappuccinno Microbiology; a laboratory manual 4th edition
5. Tortora Microbiology: An introduction
6. Salle A. J. Fundamental Principles of Bacteriology
7. Prescott Microbiology
8. Rose Chemical Microbiology
9. Cruickshank, Duguid Medical Microbiology

BTA:206: Biomolecules II

Paper: Applied
Contact Hours: 30 (Clock Hours)

Total Credit: 02
Marks: 30

Unit I :Carbohydrates

Structure of monosaccharides, stereoisomerism and optical isomerism of sugars. Structure, occurrence and biological importance of monosaccharides, oligosaccharides, and polysaccharides e. g. cellulose, chitin, agar, alginic acids, pectins, proteoglycans, sialic acids, blood group polysaccharides, glycogen and starch. Bacterial cell wall polysaccharides and glycoproteins

Unit II: Lipids

Definition and classification. Fatty acids: introduction, classification, nomenclature, structure and properties of saturated and unsaturated fatty acids. Essential fatty acids, prostaglandins. Triacylglycerols: nomenclature, physical properties, chemical properties and characterization of fats –hydrolysis, saponification value, rancidity of fats, ReichertMeissel number and reaction of glycerol. Biological significance of fats. Glycerophospholipids (lecithins, lysolecithins, cephalins, phosphatidyl serine, phosphatidyl inositol, plasmalogens), sphingomyelins, glycolipids –cerebrosides, gangliosides. Properties and functions of phospholipids, isoprenoids and sterols.

Unit III :Proteins

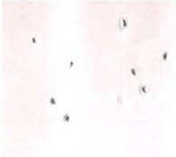
Amino acids: Classification and properties.

Peptides; structure of peptide bond, chemical synthesis of polypeptides –protection and deprotection of N-terminal, and C-terminal ends and functional groups in the side chains, formation of peptide bonds, condensing agents, strategy of chemical synthesis, Merrifield solid-phase peptide synthesis. Determination of the amino acid sequence of a polypeptide chain, specific chemical and enzymatic cleavage of a polypeptide chains and separation of peptides.

Protein structure: primary structure of proteins, secondary structure of proteins, -helix and pleated sheets, tertiary structure of proteins, forces stabilizing the tertiary structure and quaternary structure of proteins. Denaturation and renaturation of proteins.

Unit IV: Hormones :

Classification of hormones, Endocrine glands, basic mechanism of hormone action, neuroendocrine regulation [TSH,T3 ,T4,] Pituitary gland secreted hormone :Prolactin;Gonadotrophin releasing hormone:LH; role of hormones in reproduction (Estrogen, Testosterone, hCG, FSH,LH), control of fertility(Prolactin, Progesterone, FSH, LH), gametogenesis, human growth hormones,hormonal disorders Thyroiditis hypothyroidism,



References:

1. Cohn & Stump – Outline of Biochemistry Wiley Eastern Ltd.
2. L. Lehninger, D. L. Nelson & M M Cox – Principles of Biochemistry.
3. Lubert Stryer – Biochemistry
4. J. Jayaraman- Practical Biochemistry
5. Plummer. –Practical Biochemistry
6. A.C.Deb Fundamentals of biochemistry
7. Zuby - Biochemistry 4th edition
8. Boyer- Concepts in Biochemistry
9. Cooper -The tools of Biochemistry
10. Biochemistry- U Satyanaran

Practicals (semester II)

BTCA203P : Lab Course-V: Practical Based on Cell biology

Paper: Practical based on Core A
Contact Hours: 30 (Clock Hours)

Total Credit: 02
Marks: 50

1. Demonstration of golgi body, endoplasmic reticulum, peroxisomes (Permanent preparations)
2. Studies on various stages of Mitosis and
3. Studies on various stages of Meiosis
4. Studies on Plasmolysis and Plasmolysis
5. Transport across membrane
6. Effect of detergent on permeability of membrane

BTCB204P : Lab Course-VI: Practical Based on Fundamentals of Genetics

Paper: Practical based on CoreB
Contact Hours: 30 (Clock Hours)

Total Credit: 02
Marks: 50

1. Spontaneous mutant isolation (Streptomycin resistant)
2. UV induced mutations (Streptomycin resistant)
3. Mutations induced by chemical mutagen (Nitrous acid, hydroxyl amine, acridine dyes)
4. Fluctuation test analysis
5. Replica plate analysis
6. Transformation
7. Conjugation
8. transduction