

IFTM UNIVERSITY, MORADABAD
Syllabus (EFFECTIVE FROM SESSION 2012-13)
B.Sc. (BIOTECHNOLOGY/MICROBIOLOGY/FOOD TECHNOLOGY)

First Year First Semester

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
			L	T	P	Mid Sem Exam	AS +AT	Total	End Sem Exam		
THEORY											
1.	BCH-104	Organic Chemistry	3	0	0	20	10	30	70	100	3
2.	BPH-104	Fundamentals of Physics	3	0	0	20	10	30	70	100	3
3.	BSB-103	Professional Communication	3	0	0	20	10	30	70	100	3
4.	BSB-104	Fundamentals of Computers	3	0	0	20	10	30	70	100	3
5.	BSB-105	Introduction to Biotechnology	3	0	0	20	10	30	70	100	3
PRACTICALS / PROJECT											
6.	BSB-151	Chemistry Lab	0	0	2	30	20	50	50	100	3
7.	BSB-152	Computer Lab	0	0	2	30	20	50	50	100	3
8.	BGP-101	General Proficiency	0	0	0	0	0	-	-	100	

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First Year Second Semester

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
			L	T	P	Mid Sem Exam	AS +AT	Total	End Sem Exam		
THEORY											
1.	BCH-204	Physical Chemistry	3	0	0	20	10	30	70	100	3
2.	BSB-207	Environmental Studies	3	0	0	20	10	30	70	100	3
3.	BSB-208	Animal Science	3	0	0	20	10	30	70	100	3
4.	BSB-209	Plant Science	3	0	0	20	10	30	70	100	3
5.	BSB-210	Introduction to Microbiology	3	0	0	20	10	30	70	100	3
PRACTICALS / PROJECT											
6.	BSB-261	Animal Science Lab	0	0	2	30	20	50	50	100	3
7.	BSB-262	Plant Science Lab	0	0	2	30	20	50	50	100	3
8.	BGP-201	General Proficiency	0	0	0	30	20	-	50	100	

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BCH-104 Organic Chemistry

Unit 1: Structure and Bonding: Hybridizations, Bond lengths and bond angles, bond energy: Localized and delocalized chemical bond, van-der Waals interactions, inclusion compounds, clathrates, charge transfer complex, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding

Unit 2: Types of Reagents and Reactions: Electrophiles and nucleophiles. Types of organic reactions. Energy consideration. Reactive intermediates- carbocations, carbanions, free radicals and carbenes. Methods of determination of reaction mechanism

Unit 3: Stereochemistry: Conformations w.r.t. ethane, butane and cyclohexane; Interconversion of Wedge Formula; Newman, Sawhorse and Fischer representations; Concept of chirality; Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism; D and L; cis - trans nomenclature; CIP Rules

Unit 4: Alkanes and Cycloalkanes: IUPAC nomenclature, classification, isomerism in alkanes, sources, and methods of preparation (with special reference to Wurtz, Kolbe, Corey-House, reactions and decarboxylation of carboxylic acids). Physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation of alkanes. **Cycloalkanes** : Nomenclature, methods of preparations, chemical reactions. Bayer's strain theory and its limitations. ring strain in cyclopropane and cyclobutanes. Theory of strainless rings

Unit 5: Alcohols, Phenols and Ethers: Alcohols: Preparation: Preparation of 1 alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters, Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO₄, acidic dichromate, conc. HNO₃). Oppenauer oxidation; Diols: oxidation of diols. Pinacol-Pinacolone rearrangement.

Recommended Text/Reference Books

1. R. T. Morrison & R. N. Boyd: Organic Chemistry, Prentice Hall.
2. Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand
3. Textbook of Practical Organic Chemistry, A.I. Vogel, Prentice Hall, 5th edition.

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BPH-104 Fundamentals of Physics

Unit 1: Introduction; Concepts of Applications; Measurements: Physical quantities, standards and units; Length: radius of proton to size to astronomical distances; Mass: atomic mass unit to mass of earth; Time: time for fast elementary particle to pass through nucleus to age of earth; Electric current; Thermodynamic temperature; Amount of substance; Luminous intensity; International systems and units

Unit 2: Elasticity: Stress and strain in solids; Hook's law; Stress-strain curves; Limit of elasticity; Relevance of elasticity to life sciences; Surface tension: Surface tension and surface energy: Definition, concept and derivation; Capillary action; Angle of contact; Wettability; Temperature dependence of surface tension.

Unit 3: Fluid Statics & Fluid Dynamics (Viscosity): Fluids: Definition, Pressure and Density. The variation of pressure in a fluid at rest, Pascal's Principle; Streamline and turbulent flow (definition and explanation); Flow of liquids through capillaries; Poiseulles equation: Derivations and physical significance

Unit 4: Heat: Quantity of heat and specific heat; Molar heat capacity of solid; Concept of temperature; Thermal equilibrium – Zeroth law of thermodynamics; Measuring temperature. International practical temperature scale; Mechanical equivalent of heat; Heat and work

Unit 5: Thermodynamics: First law of thermodynamics- Mathematical form, limitations & applications, Indicator diagram and concept of cyclic process; Second law of thermodynamics- Concept of entropy with examples; Carnot cycle and its efficiency; Van der Waals equation of state; Critical constants and their derivation; Liquefaction of gases and their application in refrigeration phenomenon

Recommended Text/Reference Books

1. Physics - David Hallday and Robert Resnick(Vol. I and II) (Willey Eastern Ltd.)
- 2 Fundamentals of mechanics - S.K. Saxena (Himalaya Publication)
- 3 Perspectives of modern physics - Arthur Beiser (Mc Graw Hill)
- 4 Heat and thermodynamics - Zemansky (Mc Graw Hill)
- 5 Fundamentals of optics - Jenkins, White (Mc Graw Hill)
- 6 Optics -Ajoy Ghatak (Tata Mc Graw Hill)
- 7 Solar Energy - Suhas Sukhatme (Tata Mc Graw Hill)
- 8 Digital principles and applications - Malvino and Leach (Tata Mc Graw Hill)

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BSB-103 Professional Communication

Unit 1: Use of Vocabulary and Programme of Writing: Meaning of words; Precise usages of synonyms, technical terms; nomenclature, context and superfluous words; Writing- Thinking & planning; information; ideas; topic outline; order of paragraph writing; revising

Unit 2: Use of Good English: Noun; pronoun; verb; adverb; adjective; conjunction; article; tense; spelling etc

Unit 3: Reading & Communication skills: How to read; making Notes as you read; Writing a book review; Letters & memoranda, communication as a part of science:

Unit 4: Helping the reader: Easy reading (how to begin, control, explain, sentence length, rhythm, style); Capture & hold readers interest – Effective communication

Unit 5: The art of illustrations, figures; The art of thesis & report writing; Editing & correcting

RECOMMENDED TEXT/REFERENCE BOOKS:

- 1 Written communication in English - Sarah Freeman
- 2 English for students of science - A. Roy & P.L. Sharma
- 3 McMillan Grammar: A hand book of “Augustine & Joseph” - Orient Longman
- 4 A new guide to précis writing - R.W. Jepson (O.L.)

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BCS-104 Fundamental of Computer Science and C Programming

Unit-1: Introduction to Computer:-Definition, Characteristics. Generation of Computers, Capabilities and Limitations. Introduction to Operating System. Concept of Bios, Booting Files. Basic Components of a Computer System-Control Unit, ALU, Input/output functions and characteristics. Memory Introduction, Classifications-Volatile Memory and Non- Volatile , Flash Memory, ROM, RAM, EPROM, PROM, EEPROM other types of memory.

Unit-2: Input, Output and storage Units:-Computer Keyboard, Pointing Devices: Mouse, Trackball, Touch Panel, and Joystick, Light Pen, Scanners, Various types of Monitors, Touch-sensitive screens, Optical Recognition System, Pen based systems, Digitizers, MICR, OCR, OMR, Bar-code Reader, digital camera. Hard Copy Devices:- Impact and Non- Impact Printers- Daisy Wheel, Dot Matrix, Line Printer, Chain Printer, Comb Printers, Non Impact Printers- DeskJet, Laser Printer, Thermal Transfer Printer, Barcode Printers, Electro static printers and plotters. High Level Language and Low Level Language, Firmware, Compiler, Interpreter and Assembler.

Unit-3: Introduction and Features of “C” language, Structure of “C” program , Identifiers and Keywords, Constants, Variables, Scope of variables, Typedef, Type Conversion, Arithmetic Operators, Library Functions, Input/output Statements, getchar(), Puchar(), scanf, printf, Compound statements and block. Relational Operators, Logical Operators, Bitwise Operators, Unary Operators, If—Else Statement, Operators, Switch statement, goto statement and Label. Iteration statements: For Loop, While Loop, Do While Loop, Nested Loop, Continue and Break statements.

Unit-4: Array and Structures: Declaration, Concept of One Dimensional and Multi Dimensional arrays, Defining Structure, Declaration of Structure Variable, Accessing Structure members, nesting of structures, Array of structures.

Unit-5: Difference between Union and Structure. Functions: Need of “C” function, User Defined and Library Functions, Prototype of Function, Call by Value, Call by Reference, Nesting of Functions, Recursion, Array as Function Argument, Structure as Function Argument.

References

1. Computer Fundamentals B.Ram
2. Computer fundamentals P.K Sinha (BPB Publications)
3. Programming in Ansi C E.balagurusamy (3rd edition Mc Graw Hill)

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BSB-105 Introduction to Biotechnology

Unit 1: Fundamentals of Biochemistry, Biochemical Engineering, Biotechnology and Society; Principles and Processes; Application in health, food, medicine and Agriculture; Significance of Genetically modified (GM) Organisms (Animals and Plants)

Unit 2: Cell as a basic unit of life; introductory account of Microbiology, Types of microbes, Classification of microbes; Application of animal, plants and microbes in biotechnological processes

Unit 3: Proteomics: Introductory account and applications in the development of Biotechnology

Unit 4: Genomics: Introductory account and applications in the development of Biotechnology

Unit 5: Bioinformatics: Introductory account and applications in the development of Biotechnology

Recommended Text/Reference Books

1. An Introduction to Plant Tissue Culture, M.K. Razdan, Oxford and IBH Publishing
2. Experiments in Plant Tissue Culture, J.H. Dodds and L.K. Roberts, Cambridge University Press
3. Plant Biotechnology and Transgenic Plants, K.M.O. Caldenty, W.H. Barz and H.L. Wills, Marcel Dekker
4. Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences
5. Plant Tissue Culture :KalyankumarDey

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BCH-204 Physical Chemistry

UNIT 1: General characteristic of gases, gas law, Boyle's law, Charle's law, Gay-Lussac's law, the gas equation, Avogadro's hypothesis, mole concept, Dalton law of partial pressure, Graham's law of diffusion, kinetic molecular theory of gases, ideal and real gases.

UNIT 2: Solution, concentration of solution, normality, equivalent weight, molarity, formality, molality, solutions of gases in gases, mole fraction, Grams per ml, colligative properties, abnormal behavior of solutions, Vant Hoff factor.

UNIT 3: Introduction, reversible and irreversible reactions, chemical equilibrium, law of chemical equilibrium, Chaleties's principle. Ionization, strong and weak electrolytes, concept of acid and bases, dissociation of acid and base in water, strength of acids and bases, dissociation of water, the pH scale, the $p\Delta H$.

UNIT 4: Thermodynamics, law of thermodynamics (first, second, third and zeroth law of thermodynamics), entropy, enthalpy, Gibb's free energy. Rate of reaction, order of reaction, first, second and zero order reactions, catalysts.

UNIT 5: True solution, colloidal solution and suspension, types of colloidal systems, classification of colloids, properties of colloidal system, co-agulation of colloidal solution, protective colloids, Electrolysis, electrochemical cells, electrode potential, electrochemical series, electrode potentials and electrolyte concentration.

Recommended Text/Reference Books

1. Rakshit, P. C. "Physical Chemistry"
2. Atkin, P. W. "Physical Chemistry"
3. Laidler, K. J. "Kinetics and Mechanism"
4. Frost & Pearson, "Chemical Kinetics"

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BSB-207 Environmental Studies

Unit –1: Environmental Sciences: Introduction, definition, Scope, Importance, Need for Public Awareness
Natural Resources: Renewable and non Renewable resources, Biogeochemical Cycles Ecological Succession,
Ecological pyramids

Unit –2: Concept of an Ecosystem: Structure and function of an ecosystem ,□Producers, consumers and decomposers, Energy flow in the ecosystem ,Ecological succession, Food chains, food webs and ecological , pyramids , Introduction, types, characteristic features, structure and function of the following ecosystem
Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean)

Unit –3: Environmental pollution and pollutants, Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution, Solid waste management: Causes, effects and control measures of urban and industrial wastes.

Unit –4: Introduction – Definition: genetic, species and ecosystem diversity. Biogeographical classification of India, Value of biodiversity: consumptive use, productive uses, social, ethical aesthetic and option values ,Biodiversity at global, national and local levels ,India as a mega-diversity nation ,Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts ,Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity, Biodiversity and its conservation: introduction value of biodiversity, biodiversity at global, national and local level, hotspots of biodiversity, and its conservation

Unit –5: Global warming, acid rains, depletion of ozone layer population growth the population explosion, family welfare |Program, human rights, Biofertilizers, Biopesticides vermicomposting

Recommended Text/Reference Books

1. Environmental studies By Dr. S.K. Dhameja
2. Environmental & Ecology P.K. Agrawal
3. Environmental & Ecology Deswal & Deswal
4. Basic concepts and applications in environment Indusekher Thakur

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BSB-208 Animal Science

UNIT 1: General principle of taxonomy and animal classification. Salient features and outline classification upto order in non chordates.

Unit 2: General characters of protozoa and human disease, type study of Paramecium caudatum. General idea of origin of Metazoan metamerism and symmetry, general characters of Platyhelminthes type study of Taenia, Parasitic adaptation. General character of Annelids, type study of Leech.

Unit 3: General characters of Mollusk type study of Pilla globosa. General character of Echinodermata, external features of star fish, General introduction of minor phyla and their examples. General characters and outline classification of phylum Chordata. General characters and classification of class Mammalia.

Unit 4: Basic concept of animal physiology: Digestive System: Metabolism and energy production from carbohydrates, proteins and lipids, Nervous System, Endocrinology: glands and hormone regulation,

Unit 5: Respiratory system; Circulation: activity of the heart. Blood its Function and composition of blood, formation of blood cells, blood clotting mechanism, type of blood cells & blood groups. Human reproductive system

Recommended Text/Reference Books

1. Modern textbook of Zoology-Invertebrate by R.L.Kotpal
2. Modern textbook of Zoology-Vertebrate by R.L.Kotpal
3. Invertebrate Zoology by Dhami & Dhami
4. Chordate Zoology by Dhami & Dhami
5. Invertebrate Zoology by Jordan & Verma
6. Chordate Zoology by Jordan & Verma
7. Animal Physiology by R.A. Agarwal

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BSB-209 Plant Science

Unit 1: Algae: General features, classification, distribution, range of thallus organization, reproduction, economic importance with special reference to *Chlamydomonas*.

Unit 2: Fungi: General features, classification, distribution, range of thallus organization, reproduction, parasexual cycle and economic importance with special reference to *slime mold*.

Unit 3: Bryophyta: General features, classification, distribution, range of thallus organization, reproduction, economic importance with special reference to *Riccia, Marchantia and Anthoceros*.

Unit 4: Cyanobacteria & Lichens: General features, taxonomic position, distribution, cell structure heterocyst, water bloom, reproduction and economic importance with special reference to *Nostoc*.

Unit 5: Pteridophyta, Gymnosperms & Angiosperms: General features, outline classification, structure, reproduction, Alternation of generation, stellar evolution, and heterospory and seed habit.

Recommended Text/Reference Books

1. College Botany Vol. I and II, Ganguli and Kar
2. A Text Book of Botany, V. Singh, P.C. Pande & D.K. Jain
3. Modern Plant Taxonomy, N.S. Subrahmanyam, Vikas Publishing House.
4. A Text Book of Botany, V. Singh, P.C. Pande & D.K. Jain, Rastogi Publication.
5. The Algae, V. J. Chapman and D. J. Chapman.
6. Introductory Phycology, H. D. Kumar.

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BSB-210 Introduction to Microbiology

UNIT 1: Introduction to Microbiology: History, scope and development of Microbiology; Applications of Microbiology in human welfare. Development of Microbiology in India & Abroad: Antony van Leeuwenhoek, Alexander Fleming, Edward Jenner, Louis Pasteur, Robert Koch, Selman Waksman, Joseph Lister, A M Chakrobbarti etc.

UNIT 2: Pure culture techniques, Physical and chemical methods of sterilization. Diversity of Microbial World A: Classification, general characteristics and structure of Bacteria-(eubacteria & archaeobacteria), Cyanobacteria, Actinomycetes, Mycoplasma, Rickettsia & Chlamydia with emphasis on function of each part & components.

UNIT 3: Diversity of Microbial World B: Classification, general characteristics, structure with emphasis on Mucor, Rhizopus, Puccinia, Cercospora, Aspergillus, Penicillium Alternaria and Curvularia, function of each part & components of cell. Reproduction & economic importance of Fungi.

UNIT 4: Diversity of Microbial World C: Classification, general characteristics and structure of Viruses (Prions, Virions, Virusoids & Viroids) Virus host, General features of virus reproduction. DNA & RNA Viruses with the example of T4, TMV & Pox Virus.

UNIT 5: Growth and growth measurement: Definition of growth, mathematical expression of growth. Growth curve, Growth yield, Effect of nutrient concentration on growth. Factors affecting growth: nutrients, temperature, oxygen, pH, osmotic pressure. Measurement of growth; general introduction of synchronous culture, continuous culture and batch culture.

Recommended Text/Reference Books

1. Sharma, P.D. (2005) 2nd Ed. Microbiology, Rastogi Publications.
2. Pelczar M. J., E. C. S. Chan and N. R. Krieg (2003) Microbiology, 5th Ed.; Tata McGraw Hill Publishing.
3. Dubey R. C. and D. K. Maheshwari (2004). A Text book of microbiology, 1st Ed.; S. Chand and Company Ltd.
4. H.C. Dube (2005) A Textbook of Fungi, Vikas Publishing House.
5. A Textbook of Fungi- Vashistha (2003) S. Chand and Company Ltd.
6. Davis and Harper, General Microbiology