DEPARTMENT OF BOTANY (NORTH CAMPUS)

UNIVERSITY OF KASHMIR

SEMESTER-II

Five-Year Integrated Masters Programme (FYIMP) in Botany

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UNIVERSITY OF KASHMIR

SEMESTER-2				
Course Type	**Course Code**	**Course Title**	**Credit**	
			Theory	**Practical**
MAJOR-1	IBOTMJMP0224	Mycology and Plant Pathology	3	1
MINOR	IXXXMNFC0224	Fundamentals of Chemistry	3	1
Multidisciplinary	IXXXMDBC0023	Introduction to Biochemistry	3	0
Ability Enhancement	IXXXAECS0023	Communication Skills	3	0
Value Added	IXXXVADT0023	Digital and Technological Solutions	2	0
Value Added	IXXXVAUI0023	Understanding India	2	0
Skill Enhancement	IXXXSEFP0224	Techniques of Fruit Processing & Preservation	0	2
Total			**20**	

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Semester	:	**II**
Course Type	:	**Major-1**
Course Title	:	**Mycology and Plant Pathology**
Course Code	:	**IBOTMJMP0224**
Credits	:	**04 (Theory: 03; Practical: 01)**

COURSE OBJECTIVES: *To aware students about mycology, plant pathology, importance of plant diseases and their management.*

LEARNING OUTCOMES: *The students will be able to understand mycology and principles of plant pathology and pathogenesis and disease management.*

Theory (03 Credits)

UNIT I:

Fungi: Introduction, general characteristics, thallus organization; cell wall composition; nutrition, reproduction; classification (Alexopolous *et al.*, 1996)
Slime moulds: General characteristics, reproduction and life cycle of slime moulds.
Lichen: Occurrence, General characteristics, types of lichens, economic importance.
Mycorhiza: General account, ectomycorrhiza, endomycorrhiza, reproduction, significance of mycorrhizae

UNIT II:

Oomycota: General characteristic; morphology, reproduction and life cycle of *Phytophthora.*
Chytridiomycota and Zygomycota: General characteristic; morphology, reproduction and life cycle of *Synchytrium and Rhizopus.*
Ascomycota: General characteristic; morphology, reproduction and life cycle of Aspergillus, *Marchella.*
Basidiomycota: General characteristic; morphology, reproduction and life cycle of *Puccinia*, and *Agaricus.*
Deuteromycota: General characteristics, morphology, reproduction and life cycle of *Alternaria,*

UNIT III:

Plant Pathology: Plant Pathogens (General characteristics): Fungi, Bacteria, Nematodes, Virus; Plant disease: Concept and classification of plant disease, Symptoms of plant disease (Fungi and Bacteria), Parasitism, pathogenicity and pathogenesis
Plant Disease management: Regularity methods; Quarantine and inspections. Physical methods, Chemical methods: and Biological control for disease management
Specific plant diseases: Symptoms, causal organism, disease cycle and control of: Late blight of Potato, Apple Scab, Paddy blast.

Practical Exercise (01 Credit)

- Study the morphological and microscopic features of *Rhizopus and Alternaria*
- *Morchella*: Specimen study section cutting and collection from the field and preservation.
- Study of growth forms of lichens (crustose, foliose and fruticose): Specimens and field collection and preservation.
- Preparation of culture media: PDA and Richard's medium.
- Culturing of some Fungi such as *Rhizopus*, *Alternaria*,
- Symptoms and studies of some local diseased plant materials through temporary/permanent mounts: Late blight of potato, Apple scab.

Suggested Readings

- Introductory Mycology by Alexopoulos, C.J. and Mims, C.W. 2002. 5th edition. John Wiley and Sons, New York.
- Plant Pathology by E. J. Butler and S.G. Jones: Mac Millan& Co Ltd.
- Plant Pathology by G.N. Agrios: Elsevier.
- Plant pathology by R.S. Singh. Oxford & IBH Publishing Co. Pvt Ltd New Delhi.
- Plant Diseases by R.S. Singh. Oxford & IBH Publishing Co. Pvt Ltd New Delhi.
- Plant pathology by B.P. Pandey (S. Chand

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Minor Courses for Five-Year Integrated Masters Programme (FYIMP) in Botany

Semester	:	**II**
Course Type	:	**Minor-2**
Course Title	:	**Fundamentals of Chemistry**
Course Code	:	**IXXXMNFC0024**
Credits	:	**04 (Theory: 03; Practical: 01)**

COURSE OBJECTIVES & LEARNING OUTCOMES: *This course is designed to give a learner the fundamental understanding of chemistry.*

Theory (03 Credits)

Unit 1:

Data Analysis in Chemistry: Importance of Chemistry in biological systems; Basic concepts of Mole, Avogadro's number; precision and accuracy; Insignificant and significant figures; rules for counting significant figures.

Atom in Chemistry: De Broglie's wave-particle equation, Brief introduction of quantum model of atom; Significance of psi (Ψ) and Ψ^2 (only qualitative description); Non-polar interactions (cation-pi and pi-pi); Stability of half and fully filled orbitals (Symmetry affect);

Chemical bonding: Types of Chemical Bonds (Ionic, Covalent and Hydrogen bonding) and their significance; Polar and Non Polar Molecular Interactions.

Unit 2:

Solutions: Introduction of Solutions, Solute and Solvent; Types of solutions; Water as universal solvent; Concentration (Brief concept); Different ways to express concentrations in solutions (Molarity, molality, normality and mass percentage and calculations); Solubility and solubility product.

Acids and bases: Introduction, Arrhenius, Bronsted and Lewis concepts; Strong and weak acids and bases; concept of Ionization.

pH and Buffer: general concept of pH and buffer; pH, pOH, pH scale and significance of pH; Henderson-Hasselbalch equation; Buffer action and its Role in biochemical processes (blood buffer systems, enzyme activity).

Unit 3:

Water and its treatment: Structure of water molecule, pure and impure water; Permanent and temporary hardness of water; Measurement of hardness using EDTA; Factors affecting the water hardness; Water treatment methods (Soda lime and zeolite methods).

Atmospheric Chemistry: Vertical profile of atmosphere, Greenhouse Effect; Chemistry of Ozone layer depletion. Acid rain and mechanistic reactions involved in acid rain.

Soil Chemistry: Organic and inorganic composition of soil; Chemistry of soil (with special reference to its pH)

Surface Chemistry: Surface tension, emulsions, Colloids, soaps and detergents, mechanism of action of surfactants.

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Laboratory Exercise (01 Credit):

1. Preparation of standard solutions of different concentrations (Molar and Normal)
2. Dilution of Solutions (Molar and Normal).
3. Preparation of buffer solutions of the following compositions:
   a) Sodium acetate-acetic acid
   b) Ammonium chloride and ammonium hydroxide
   Measurement of the pH of the above buffer solutions and comparison of the values with theoretical values.
4. Qualitative determination of hardness of water using EDTA and Eriochrome black T.

Suggested Readings:

1. Principles of Inorganic Chemistry; B.R. Puri, L.R. Sharma and K.C. Kalia; 33rd Edition, Milestone Publishers & Distributors/ Vishal Publishing Co., 2017
2. Concise inorganic chemistry; J.D Lee; 5th Edn., OUP/Wiley India pvt. Limited, 2008.
3. Principles of Physical Chemistry; B.R. Puri, L.R. Sharma and L.S. Pathania; 47th Edition, Vishal Publishing & Co, 2017.
4. Vogel's Qualitative inorganic analysis; G.Svehla; 7th Ed., Pearson Education, 2013.
5. Vogel's; text book of Quantitative Inorganic Analysis (revised); Bassett, J.; Denney, R.C.; Jeffery, G. H and Mendham, J.; 6th Edition, ELBS; 2007
6. Advanced practical physical chemistry; J.B Yadav; Krishna Prakashan Media (P) Limited, 2015.
7. Environmental chemistry; Nigel.J.Bunce; Wurez Publishers; 1991
8. Environmental chemistry; 2nd edition; Colin Baird; Freeman Co. Nigel.J.Bunce; 1991
9. Environmental chemistry; A.K.De; Wiley Eastern; 1995
10. Environmental chemistry; S.E.Manahan (6th/7th/8th/9th Edns); Lewis Publishers

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Multidisciplinary Courses for Five-Year Integrated Masters Programme (FYIMP) in Botany

Semester	:	**II**
Course Type	:	**Multidisciplinary Course (MDC)**
Course Code	:	**XXXMDBC0023**
Course Title	:	**Bio-Chemistry (Introduction to Bio-Chemistry)**
Credits	:	**03 (Theory: 03)**

COURSE OBJECTIVE: *The objective of the course is to introduce the subject of Biochemistry including biomolecules and water as a universal solvent, to students.*

LEARNING OUTCOMES: *At the end of the course students will have:*

1. *Gained the knowledge regarding structure and function of carbohydrates, protein, RNA, DNA and lipids.*
2. *Known how structure of a biomolecule determines its biochemical properties*
3. *Understood biochemical foundations of life.*
4. *Known biological significance of each biomolecule*

Theory (03 Credits)

Unit I:

Definition, scope &significance of Biochemistry. Cellular basis of life (eukaryotic and prokaryotic) Carbohydrates: Definition, classification and functions; Monosaccharides, Disaccharides, Polysaccharides, Homo- and Hetero-polysaccharides. Hyper-and hypoglycemia

Unit II:

Amino Acids and Proteins: Definition, structure and function of amino Acids. Classification of Amino Acids- Aliphatic, Aromatic, Acidic, Basic, Essential and Non-Essential Amino Acids; Primary, secondary, tertiary and quaternary structure of Proteins, Protein energy malnutrition

Unit III:

Lipids: Definition and classification- Fatty acids, Triglycerols and Phospholipids. Significance of lipids as energy stores of body. Cholesterol and its function. Nucleic acids: Ribose and De-oxyribose sugars, Nucleosides, Nucleotides, Nucleic acids (DNA and RNA) as genetic material

Suggested Readings:

- Biochemistry by Dr U Satyanarayan
- Lehninger, Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York).

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Ability Enhancement Courses for Five-Year Integrated Masters Programme (FYIMP) in Botany

Semester	:	**II**
Course Type	:	**AEC**
Course Title	:	**Communication Skills**
Course Code	:	**IXXXAECS0023**
Credits	:	**03**

Unit I

- Communication: An Introduction
- Definition and scope
- Process of communication
- Barriers to communication (semantic/linguistic, physical, psychological, socio-cultural)/ Overcoming barriers
- Verbal/non-verbal communication

Unit II: Soft Skills

- Introduction to soft skills
- Personality development /emotional intelligence
- Time management/leadership skills
- Interpersonal relations/public speaking
- Facing interviews/Group discussion/presentation skills

Unit II: Writing Skills

- Letter writing – formal and informal
- CV, Email, Message
- Minutes, Report writing
- Notice, memoranda
- Short speech

Note: Adequate practice to be given in the class to improve speaking and writing competence)
Textbook recommended: Step Ahead with English (Published Orient Blacks Swann.)

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Value Added Courses for Five-Year Integrated Masters Programme (FYIMP) in Botany

Semester	:	**II**
Course Type	:	**VAC-3**
Course Title	:	**Digital and Technological Solutions**
Course Code	:	**IXXXVADT0223**
Credits	:	**02**

COURSE OBJECTIVES: *To gain familiarity with digital paradigms and sensitize about role & significance of digital technology, communications & networks. This is also expected to bring awareness about the e-governance and Digital India initiatives.*

LEARNING OUTCOMES: *The learners of this course are expected to gain Knowledge about digital paradigm. Learners will realize the importance and use of digital technology, digital financial tools, e-commerce, communications & networks. Understand the basic knowledge and applications of machine learning and other emerging technologies-Cloud, Big Data, AI, 3D printing etc.*

UNIT I:

Digital Systems: Introduction, Evolution, role and significance of Digital Technology. **Information & Communication Technology**: Tools, Computer System & its working, Software and its types.
Operating Systems: Types and Functions. Problem Solving: Algorithms and Flowcharts.
Communication Systems: Principles, Model & Transmission Media.
Computer Networks & Internet: Concepts & Applications, WWW, Web Browsers, Search Engines, Messaging, Email, Social Networking.
Computer Based Information System: Significance & Types.
E-commerce & Digital Marketing: Basic Concepts, Benefits & Challenges.

UNIT II:

Digital India & e-Governance: Initiatives, Infrastructure, Services and Empowerment.
Digital Financial Tools: Unified Payment Interface, Aadhar Enabled Payment System, USSD, Credit/Debit Cards, e-Wallets, Internet Banking, NEFT/RTGS and IMPS, Online Bill Payments and PoS.
Cyber Security: Threats, Significance, Challenges, Precautions, Safety Measures, & Tools, legal and ethical perspectives.
Emerging Technologies & their applications: Overview of Cloud Computing, Big Data, Internet of Things, Virtual Reality, Blockchain & Cryptocurrency, Robotics, Machine Learning & Artificial Intelligence, 3-D Printing. Digital Signatures.

Suggested Readings:

- F.S. Masoodi, Z Masoodi and K B Dar, Digital and Technological Solutions, BPB Publications.
- V.Rajaraman,Introductionto InformationTechnology,3rdEdition,PHI;
- EBalagurusamy,Fundamentalsof Computers,TataMcGrawHill;
- Behrouz A. Forouzan, Data Communications and Networking, McGrawHill;
- P. Kumar, A.Tomar, R. Sharmila. Emerging Technologies in Computing Theory, Practice, and Advances, Edition 2021, Chapman and Hall/CRC Imprint.
- Buvya,Broberg,andGosciniski,CloudComputing-PrincipalsandParadigms,Wiley
- Russel and Norving, Artificial Intelligence-A Modern Approach, Pearson Education;
- Samuel Greengard, Internet of Things, MITPress;
- C.S.V.Murthy, E-commerce Concepts, Models, Strategies;
- Hurwith, Nugent Halper, Kaufman, Big Data for dummies, Wiley & Sons-Wiley.

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Value Added Courses for Five-Year Integrated Masters Programme (FYIMP) in Botany

Semester	:	**II**
Course Type	:	**VAC-4**
Course Title	:	**Understanding India**
Course Code	:	**IXXXVAUI0223**
Credits	:	**02**

COURSE OBJECTIVES: *To make student appreciate the value of pluralism and unity in diversity and to highlight the contribution of India to different branches of Knowledge.*

LEARNING OUTCOMES: *The course aims to make students understand and appreciate the contribution made by different sections of the society towards freedom struggle. It also aims to inculcate in students the values promoted by the Indian National Movement.*

UNIT I:

Bharatavarsha: Concept, Origin and its Evolution;
The Idea of India: Unity in diversity and Composite culture
Indian Education Systems: Vedic, Buddhist, Muslim; Modern Education
India's Contribution to the World: Medicine- Charaka, Sushruta, Mathematics and Astronomy- Aryabhatta, **Varahmihira, Ramanuja; India's Contribution to Philosphy;** Sad Darshan.
Major Socio-Religious Reform Movements: Brahmo Samaj, Arya Samaj, Aligarh Movement

UNIT II:

India's struggle for Freedom: Revolt of 1857; Foundation and Role of Indian National Congress
Makers of Modern India: Raja Ram Mohan Roy, Rabindernath Tagore, Sir Syed Ahmad Khan, Dada Bhai Naoroji, M.K. Gandhi, J.L. Nehru, V.B. Patel, Abul Kalam Azad, B.R. Ambadekar
Contribution of Peasants, Tribal's, Working Classes and Women to Freedom Movement
Legacy of Indian National Movement: Secularism, Socialism, Democracy.
Making of Indian Constitution and its Salient Features

Suggested Readings:

- Basu, D. (2012) 'Introduction to the Constitution of India'. New Delhi. Lexis Nexis.
- Bhikku, Parekh (1989). Colonialism. Tradition and Reforms: An Analysis of Gandhi's Political Discourses. Neu Delhi. Sage Publications.
- Bipan Chandra (1987). India's Struggle for Independence. Penguin. Delhi.
- Dhar. P. K. (2000): Growing Dimensions of Indian Economy. Kalyani Publishers. New Delhi.
- Dhingra. I. C. (2020): Indian Economy. Sultan Chand & Sons. New Delhi.
- Dutt, R. and Sundharam (2018): Indian Economy. S. Chand & Co. Ltd. New Delhi
- Gautam A (2009): Advanced Geography of India. Sharda Pustak Bhawan. Allahabad.
- Godschalk. D.R. (et.al.) (1999): Natural Hazard Mitigation Recasting Disaster Policy and Planning. Island Press. Washington. D.C.
- Gore. M. S. (2002) Unity in Diversity: The Indian Experience in Nation-Building. Rauat Publication. Jaipur.
- Government of India, Economic Survey (Annual). Economic Division. Ministry of Finance, New Delhi.
- K. Roy, C. Saunders and J. Kincaid (2006) (eds.) 'A Global Dialogue on Federalism'. Volume 3Montreal, Queen's University Press.
- Kabir. Humayun (1946). Our Heritage. National Information and Publications Ltd., Mumbai.
- L. Rudolph and S. Rudolph. (2008) 'Explaining Indian Institutions: A Fifty-Year Perspective, 1956-2006'. Volume 2. Neu Delhi. Oxford University Press.
- M. Singh, and R. Saxena (2011) (eds.), 'Indian Politics: Constitutional Foundations and Institutional Functioning'. Delhi: PHI Learning Private Ltd.
- Malik. S. C. (1975). Understanding Indian Civilization: A Framework of Enquiry. Indian Institute of Advanced Study. Shimla.
- Ministry of Human Resource Development.
- Ministry of Skill Development and Entrepreneurship.
- Misra, S.K and Puri (2020), V.K.: Indian Economy. Himalaya Publishing House, Mumbai.

Skill Enhancement Courses for Five-Year Integrated Masters Programme (FYIMP) in Botany

SEMESTER-2				
Course Type	Course Code	Course Title	Credit: 02	
			Theory	Practical
Skill Enhancement Course	IXXXSEFP0224	Techniques of Fruit Processing and Preservation	0	2

COURSE OBJECTIVES: To acquaint the students with the basic methods of processing, preservation and handling of fruits

LEARNING OUTCOME: *The course will impart the students with practical, field-based knowledge in fruit processing and will help them in entrepreneurship endeavours.*

COURSE CONTENT:

- **Background information of fruits:** Definition and classification of fruits; various methods of fruit harvesting; Principles and methods of fruit preservation.
- Quality evaulation of fruit products (FSSAI specifications);
- Certificed and banned food colors; Identification of various fruit types/ varieties;
- Requirements for a small sclae fruit based processing plant.
- Determination of maturity indices of fruits: Days from full bloom (DFFB), Starch-iodine ratio, Brics-acid ratio.
- Determination of moisture content, TSS, acidity and firmness of fruits
- Pack-house operations of apple
- Identification of spices and additives in fruits products
- Preservation techniques for different types of fruits (apple and quince)
- Preparation of Jams, Jellies, Fruit candy, Chutney, Sauces, Marmalades, Mixed vegetable pickle, Fruit juices, Tomato Puree and Ketchup.
- Cleaning and maintenance of fruit processing equipment.