



**DEPARTMENT OF BOTANY (NORTH CAMPUS)**  
**UNIVERSITY OF KASHMIR**

**SEMESTER-I**

**Five-Year Integrated Masters Programme (FYIMP) in Botany**



**DEPARTMENT OF BOTANY (NORTH CAMPUS)**  
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<b>SEMESTER-1</b>				
Course Type	Course Code	Course Title	Credit	
			Theory	Practical
MAJOR-1	IBOTMJMA0124	Microbes and Algae	3	1
MINOR	IXXXMNAD0124	Introduction to Systematics and Animal Diversity	3	1
Multidisciplinary	IXXXMDBT0023	Introduction to Biotechnology	3	0
Ability Enhancement	IXXXAEEL0023	English Language	3	0
Value Added	IXXXVAES0023	Environmental Science Education	2	0
Value Added	IXXXVAHW0023	Health and Wellness	2	0
Skill Enhancement	IXXXSEPM0124	Propagation of Medicinal and Aromatic Plants	0	2
<b>Total</b>				<b>20</b>



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Semester	:	I
Course Type	:	Major-1
Course Title	:	Microbes and Algae
Course Code	:	IBOTMJMA0124
Credits	:	04 (Theory: 03; Practical: 01)

**COURSE OBJECTIVES:** To impart understanding about diversity and economic importance of viruses, bacteria and algae, and to acquaint students about the classification, structure, morphology and reproduction of viruses, bacteria and algae.

**LEARNING OUTCOME:** Student is expected to learn the basic concept, diversity, general characteristics and economic importance of viruses, bacteria and algae. The students will be able to identify the various species of these groups for scientific exploration, conservation and sustainable utilization.

**Theory (03 Credits)**

**UNIT-I:**

**Viruses:** Evolution and general characteristics; structure, replication and life cycle of DNA and RNA viruses (T-phage, TMV); Isolation and purification of viruses (TMV); Bacteriophage; Overview of viral transmission.

**UNIT-II:**

**Bacteria:** Evolution and diversity; Characteristics and cell structure; Growth and reproduction (conjugation, transformation and transduction); Bacterial nutrition; Economic importance.

**UNIT-III:**

**Algae:** General characteristics, classification of algae (Fritsch 1935, 1945; Round 1965), criteria for classification of algae (cell wall, flagella, eye spot, reserve food, photosynthetic pigments); range of thallus organization; range of reproductive diversity; morphology, reproduction and life cycle of *Nostoc*, *Chlamydomonas*, *Oedogonium*, *Vaucheria*, *Ectocarpus*, *Batrachospermum*. Economic importance of algae

**Practical Exercise (01 Credit)**

- Models/photographs of T-Phage and TMV viruses.
- Types of bacteria from temporary/permanent slides/photographs; Gram staining.
- Study of vegetative and reproductive structures of *Nostoc*, *Chlamydomonas*, *Oedogonium*, *Ectocarpus* and, *Batrachospermum* through temporary preparations and permanent slides.

**Suggested Readings**

- Tortora, G.J., Funke, B.R., Case, C. L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
- Fritsch, F.E. 1979. The structure & reproduction of algae. Vol. I & II. Cambridge University Press.
- Prescott, G.W. 1984. The Algae: A Review. Otto Koeltz Science Publishers, Germany.
- Bold and Wynne. 1985. Introduction to the Algae. Prentice Hall, USA. •
- Singh, V., Pande, C; Jain, D.K. 2010. Diversity of Microbes & Cryptogams. Rastogi Publications.
- Vashishta, B. R., Sinha, A.K. and Singh, V. P. 2008. Botany for Degree Students- Algae. S. Chand and Company Pvt. Ltd., New Delhi.
- Kumar, H. D. (1999). Introductory Phycology. Affiliated East-West Press Ltd. Delhi. 2<sup>nd</sup> edition.
- Raven, P. H., Johnson, G. B., Losos, J.B., Singer, S. R., (2005). Biology. Tata McGraw Hill, Delhi, India.

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**DEPARTMENT OF BOTANY (NORTH CAMPUS)**  
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Minor Courses for Five-Year Integrated Masters Programme (FYIMP) in Botany

**Semester** : I  
**Course Type** : Minor-1  
**Course Code** : IXXXMNAD0024  
**Course Title** : Introduction to Systematics and Animal Diversity  
**Credits** : 04 (Theory: 03; Practical: 01)

**COURSE OBJECTIVES:** This course is designed to give a learner the fundamental understanding of the basic terms and definitions relevant to animal taxonomy and the biodiversity so as to lay a strong foundation in understanding diversity of animal life.

**LEARNING OUTCOMES:** At the completion of this course, a student will be able to learn basic taxonomy skills and demonstrate classification and identification abilities of organisms. Students comprehend and explain evolutionary relationships among the various organismal groups and get sensitized with the relevance of animal diversity in understanding life from a broader perspective.

Theory (03 Credits)

**Unit I:**

**Introduction to Systematics:** terms & definitions; Utility and strategy of systematic research with emphasis on alpha, beta & gamma taxonomy; Taxonomic character and its kinds

**Unit II:**

Overview of animal kingdom; General organization and economic importance of Protozoa, Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca and Echinodermata

**Unit III:**

General organization and economic importance of Protochordates, Pisces, Amphibians, Reptiles, Aves & Mammals

Laboratory Exercise (01 Credit):

- Slide & museum study of non-chordates
- Museum study of chordates
- Dissection of Earthworm to expose nervous system
- Preparation of temporary mount of insect mouth parts
- Preparation of temporary mount of sting apparatus of honey bee

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Suggested Readings:

- Modern Textbook of Zoology: Invertebrates by R.L Kotpal. Rastogi Publishers
- Modern Textbook of Zoology: Vertebrates by R.L Kotpal. Rastogi Publishers
- Invertebrate Zoology by Robert D. Barnes
- Principles of Systematic Zoology, by Ernst Mayr and Peter D. Ashlock, 1991
- Principles and Practices of Animal Taxonomy by V. C. Kapoor

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DEPARTMENT OF BOTANY (NORTH CAMPUS)  
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Multidisciplinary Courses for Five-Year Integrated Masters Programme (FYIMP) in Botany

Semester	:	I
Course Type	:	Multidisciplinary Course (MDC)
Course Code	:	IXXXMDBT0023
Course Title	:	Bio-Technology (Introduction to Bio-Technology)
Credits	:	03 (Theory: 03)

**COURSE OBJECTIVE:** This course is aimed to introduce students to basic concepts of Biotechnology and its relevance in contemporary times.

**LEARNING OUTCOMES:** Students will be imparted with a basic understanding of Biotechnology as a discipline. The students will also understand the flow of information in a cell and basics of recombinant DNA technology besides understanding the applications of Biotechnology.

Theory (03 Credits)

**UNIT I:**

Definition, Scope and Milestones in Biotechnology  
Overview of Structure and Functions of Biomolecules - Carbohydrates, Proteins, Lipids and Nucleic acids.

**UNIT II:**

Central Dogma (Flow of information in a Cell) - Replication, Transcription and Translation  
Introduction to Recombinant DNA Technology.  
Human Genome Project - Goals and Applications.

**UNIT III:**

Applications of Biotechnology in Agriculture (Golden rice and Bt Cotton); Human Health (Antibiotics, Vaccines, Insulin and DNA finger printing); Environment (Bioremediation and Biofuels)

Suggested Readings:

- *Lehninger Principles of Biochemistry*, Nelson and Cox, WH Freeman.
- *Introduction to Biotechnology*, William Thieman and Michael Palladino Benjamin Cummings Publishing Company.
- *Biotechnology*, Satyanarayana, Books & Allied Ltd.
- *Molecular Biotechnology: Principles and Applications of Recombinant DNA*, Bernard R. Glick, Cheryl L. Patten, ASM Press.
- *Biotechnology Fundamentals and Applications*, S.S. Purohit, Agrobios.

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

Semester : I  
Course Type : AEC  
Course Title : English Language  
Course Code : IXXXAEEL0023  
Credits : 03

**Unit I: Poetry**

1. Robert Frost: "The Road Not Taken"
2. Nissim Ezekiel: "Night of the Scorpion"

**Unit II: Short Story**

1. Mulk Raj Anand: "The Lost Child"
2. Henry Lawson: "The Loaded Dog"

**Unit III: Language in Use**

1. Reading Comprehension
2. Paragraph Writing/Essay Writing
3. Homonyms, Homophones/ Commonly misspelt words
4. Idioms and phrases/ phrasal verbs
5. Spellings and Sound Patterns in English/ One-Word substitution

**Textbook recommended:** Step Ahead with English (Published by Orient Black Swan)  
**(Note: Exercises at the end of the literary pieces to be done in the class.)**



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

**Semester** : I  
**Course Type** : VAC-1  
**Course Title** : Environmental Science Education  
**Course Code** : IXXXVAES0123  
**Credits** : 02

**COURSE OBJECTIVE:** This course attempts to create pro-environment attitude and a behavioural pattern in student community and society that attaches importance and priority to create sustainable life style and awareness on various environmental issues.

**LEARNING OUTCOMES:** This course is expected to inculcate a critical thinking on various dimensions of environment through knowledge, skill, critical thinking and problem-solving.

**Unit I:**

**Environment:** concept, importance and components

**Ecosystem:** Concept, structure and function (food chain, food web, ecological pyramids and energy flow)

**Ecosystem services:** (Provisioning, regulating and cultural)

**Biodiversity:** levels, values and threats and conservation

Concept and objectives of environmental education, environmental ethics

**Unit II:**

**Natural resources:** Renewable and non-renewable (Global status, distribution and production)

**Management of natural resources:** Individual, community and government managed

**Air, water and soil pollution:** Causes, consequences and control

**Solid waste management:** Collection, segregation, transportation and disposal; 3R's

Climate change: Causes and consequences

**Suggested Readings:**

- Asthana, D.K. Text Book of Environmental Studies. S. Chand Publishing.
- Basu, M., Xavier, S. Fundamentals of Environmental Studies, Cambridge University Press, India.
- Basu, R. N., (Ed.) Environment. University of Calcutta, Kolkata.
- Bharucha, E. Text book of Environmental Studies for Undergraduate Courses. Universities Press.
- Miller T.O. Jr., Environmental Science, Wadsworth Publishing Co.
- Wagner K.D. Environmental Management. W. B. Saunders Co. Philadelphia, USA 499p.
- Mckinnon, M.L. & Schoch. R.M. Environmental Science systems & Solutions. Web enhanced edition. 639p.

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

**Semester** : I  
**Course Type** : VAC-2  
**Course Title** : Health and Wellness  
**Course Code** : IXXXVAHW0123  
**Credits** : 02

**COURSE OBJECTIVE:** This course helps the learners to understand the importance of a healthy lifestyle and will create awareness of various life style related diseases.

**LEARNING OUTCOMES:** This course is expected to inculcate critical thinking among the students on various dimensions of physical and mental health apart from understanding of health and wellness and stress management through knowledge, skill and problem-solving.

**Unit I:**

Define and differentiate health and wellness; Importance of health and wellness Education; Local, demographic, societal issues and factors affecting health and wellness. Diet and nutrition for health & wellness; Essential components of balanced diet for healthy living with specific reference to the role of carbohydrates, proteins, fats, vitamins & minerals; Malnutrition, under nutrition and over nutrition; Processed foods and unhealthy eating habits; Body systems and common diseases; Sedentary lifestyle and its risk of disease; Stress, anxiety, and depression; Factors affecting mental health; Identification of suicidal tendencies; Substance abuse (Drugs, Cigarette, Alcohol), de-addiction, counseling and rehabilitation

**Unit II:**

Healthy foods for prevention and progression of Cancer, Hypertension, Cardiovascular, and metabolic diseases (Obesity, Diabetes, Polycystic Ovarian Syndrome) Types of Physical Fitness and its Health benefits; Modern lifestyle and hypo-kinetic diseases; prevention and management through exercise; Postural deformities and corrective measures; Spirituality and mental health; Role of Yoga, asanas and meditation in maintaining health and wellness; Role of sleep in maintenance of physical and mental health

**Suggested Readings:**

- Physical Activity and Health by Claude Bouchard, Steven N. Blair, William L. Haskell.
- Mental Health Workbook by Emily Attached & Marzia Fernandez, 2021.
- Mental Health Workbook for Women: Exercises to Transform Negative Thoughts and Improve Well-Being by Nashay Lorick, 2022
- Lifestyle Diseases: Lifestyle Disease Management: C. Nyambichu & Jeff Lumiri, 2018.
- Physical Activity and Mental Health by Angela Clow & Sarah Edmunds, 2013.

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DEPARTMENT OF BOTANY (NORTH CAMPUS)  
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Skill Enhancement Courses for Five-Year Integrated Masters Programme (FYIMP) in Botany

SEMESTER-1				
Course Type	Course Code	Course Title	Credit: 02	
			Theory	Practical
Skill Enhancement Course	IXXXSEPM0124	Propagation of Medicinal and Aromatic Plants	0	2

**COURSE OBJECTIVES:** *The objective of this course is to acquaint the students with the basic methods of propagation used in medicinal plant cultivation.*

**LEARNING OUTCOME:** *The course will impart the students with practical, field-based knowledge in medicinal plant propagation and will help them in entrepreneurship in large scale cultivation of medicinal plants.*

**COURSE CONTENTS:**

- Practical/field demonstrations of plant production; vegetative, sexual & asexual methods of reproduction
- Nursery techniques, preparation and layout of nursery and field beds
- Methods of seed/seedling sowing (Broadcasting, drilling, dibbling, transplanting etc.)
- Plant propagation by cutting/layering/grafting.
- Transplantation of seedlings and rooted cuttings.
- Methods of Irrigation,
- Weed control methods: manual weeding and weed control chemicals.
- Methods of seed collection, processing and storage techniques.
- Collection of medicinal plants from the field.

**Suggested Readings:**

- Axe, J. 2021. Ancient Remedies: Secrets to Healing with Herbs, Essential Oils, CBD, and the Most Powerful Natural Medicine in History. Little, Brown Spark
- Gupta, V.K. 2021. Medicinal Plants: Phytochemistry, Pharmacology and Therapeutics Vol. 2. Daya Pub. House.
- Kenneth, T. 1998. Spices, condiments and seasonings, Springer Science & Business Media.
- Bhojwani SS & Bhatnagar SP. 1999. *The embryology of Angiosperm*. Vikas publications.
- Plant breeding principles and methods by B. D. Singh