# Annexure 2

**Detailed Syllabus for B.Sc. (Hons.)Botany**

## Semester-1

### BOM 111 T: Basic Plant Science

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|---|---|---|
| **Semester: I** | **Course Title: Basic Plant Science** | **Credits: 4** |
| **Course No.: BOM 111T** | **Major- (T)** | **Hours: 4/week** |

**COs**

| COs | COURSE OUTCOMES |
|---|---|
| **CO 1** | Remember taxonomic positions of lower group of plants (Cryptogams).<br>Distinguish different plant forms to its respective group based on characteristic features and give examples.<br>Remember & Understand basic concept and current trends of ecology, environment, climate change & its sustainable management.<br>Cite the importance and economic significance of algae & fungi |
| **CO 2** | Understand the fundamentals of cytology & molecular biology.<br>Gain insight into the most significant molecular and cell based methods used today to expand understanding of biology.<br>Understand diverse habits, habitats & reproductive modes within algae & fungi |
| **CO 3** | Apply the understanding in various experiments.<br>Identify, interpret & apply basic measures to recognize the physical, chemical & biological components of the earth's system.<br>Apply the knowledge of Biotechnological principles to understand the role of Biotechnology and Plant Tissue Culture |
| **CO 4** | Investigate the complexities of the natural environment and our relationship with it.<br>Understand the fundamentals of Plant Tissue Culture & apply these for Industrial production, conservation of endangered plant species, medicine, product development etc<br>Analyze current scenario & apply them for sustainable management. |

**CO-PO Mapping:**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 |
|---|---|---|---|---|---|
| **CO 2** | 1 | 2 | 1 | | |
| **CO 2** | 1 | 1 | 1 | | |
| **CO 3** | 1 | 2 | 1 | | |
| **CO 4** | | 1 | 2 | | |

| Unit | Detailed Syllabus | No. of Hours of Teaching |
|---|---|---|
| I | **Environmental biology**<br>-Introduction, Scope and Branches of Ecology<br>-Ecosystems, Kinds of Ecosystems: Natural, Artificial<br>-Components of Ecosystem, Components of Freshwater Ecosystem (Pond), Components of Terrestrial Ecosystem (Grassland)<br>-Food chain, food web, Ecological Pyramids, Productivity of an Ecosystem, Energy flow in an Ecosystem<br>-Biogeochemical Cycles- Nitrogen, Sulphur<br>-Biotic Factors : Symbiosis: Mutualism, Proto-cooperation, Commensalism<br>Antagonism: Predation, Parasitism, Antibiosis, Competition, Saprophytism<br>-Edaphic factor: Importance of soil, Effect of soil on plants<br>-Composition of soil, origin and development of soil, soil profile<br>-Soil composition, Soil texture<br>-Soil water, water holding capacity<br>-Soil-air, soil organisms<br>-Electrical conductivity of soils<br>-Soil erosion<br>-Soil conservation | 15 |
| II | **Diversity of Lower Plants**<br>-General account: Habit and habitat of Algae, Fungi. General characters, Pigments, Food reserves, flagella, thallus organization & -Modes of reproduction in Algae.<br>-Life history of the following genera including morphology and reproduction excluding development: (Classification as per G. M. Smith) *1. Spirogyra 2. Nostoc 3. Volvox*<br>-Importance of Algae in Industry & Agriculture<br>-Life history of the following genera including morphology and reproduction, excluding development ( Classification according to<br>Ainsworth*) 1. Mucor 2. Agaricus*<br>-Mushroom Cultivation – Importance<br>-Economic importance of fungi.<br>-Study of Lichens and their types | 15 |
| III | **Cytology and Molecular biology**<br>-Ultra structure of Plant Cell<br>-Structure & Function of Mitochondria and Chloroplast<br>-Structure of Nucleic Acids<br>-Watson and Crick's Model of DNA<br>-Forms of DNA- Z-DNA, Satellite DNA<br>-DNA Replication<br>-Structure and Types of RNA | 15 |

| | | |
|---|---|---|
| | -Genetic Code & its Properties<br>-Protein Synthesis<br>-Regulation of gene expression in prokaryotes – LAC Operon concept | |
| IV | **Introduction to Plant Biotechnology**<br>-Introduction, Brief History, Scope& Types of Plant Biotechnology<br>-Plant Tissue Culture- Laboratory organization<br>-Principles & working of instruments used in Plant tissue Culture- Autoclave, Laminar air flow, Balance, Hot air oven, Water distillation unit, pH meter<br>-Technique of Plant Tissue Culture<br>-Protoplast Culture<br>-Somatic Hybridization<br>-Applications of Plant Tissue Culture in Industries & Forestry<br>-Introduction to Synthetic Seeds<br>-Edible Vaccines | 15 |

**Suggested Reference Books:**


1. Jackson, R.B. (2008). Biology, 8th edition. San Francisco, California: Pearson BenjaminCummings.
2. Kumar, H.D. (1999). Introductory Phycology, 2nd edition. New Delhi, Delhi: AffiliatedEast-WestPress.
3. Lee, R.E. (2008). Phycology, 4th edition. Cambridge, Cambridge: Cambridge UniversityPress,
4. Raven, F.H., Evert, R.F., Eichhorn, S.E. (1992). Biology of Plants. New York, NY: W.H.Freemanand Company
5. Alexopoulos,C.J.,Mims,C.W.,Blackwell,M.(1996).IntroductoryMycology,4th edition.Singapore, Singapore: John Wiley&Sons.
6. Sethi, I.K. andWalia,S.K.(2011).TextbookofFungiandTheir Allies.Noida,U.P.:MacmillanPublishersIndiaLtd.
7. Webster,J.,Weber,R.(2007).IntroductiontoFungi,3rdedition.Cambridge,U.K.:Cambridge UniversityPress.
8. Sharma, O.P. (1992). Text Book of Thallophytes. McGraw Hill Publishing Co. NewDelhi.
9. Vashishta,P.C.,Sinha,A.K.,Kumar,A.(2010).Bryophyta, S.Chand.Delhi, India.
10. Vashista,B.R.(1978). Bryophytes.SChand&Co.Ltd.,NewDelhi
11. Parihar,N.S.(1976).Biologyand MorphologyofPteridophytes.Central BookDepot.
12. Smith,G.M.1971.CryptogamicBotany.Vol.II. Bryophytes&Pteridophytes.TataMcGraw Hill Publishing, New Delhi.
13. Eames, A.J., (1974) Morphology of vascular plants - Lower groups. Tata Mc Grew-HillPublishingCo. New Delhi, Freeman &Co., NewYork
14. Vashishta,P.C.,Sinha,A.K.andKumar, A.(2010).Gymnosperms,S.ChandandCompanyLtd.,Ramnagar, New Delhi,India.
15. Pandey,B.P.(2010).CollegeBotanyVolII.S.ChandandCompanyLtd.,NewDelhi,India.
16. Sporne,K.R.(1965).TheMorphologyof Gymnosperms.Hutchinson&Co.,Ltd.,London.

17. Bhatnagar,S.P.andMoitra,A.(1996).Gymnosperms.NewAgeInternational(P) LtdPublishers,NewDelhi,India.
18. GanguleeH.C.,Kar,A.K.andSantraS.C.(2011). CollegeBotanyVolII. 4thEditionNewCentralBook Agency.
19. Singh,G.(2012).PlantSystematics:TheoryandPractice.Oxfordand IBHPvt. Ltd.,NewDelhi.3rdedition.

**E- Resources:**

https://nptel.ac.in/courses/102/107/102107075/
http://hhh.gavilan.edu/rmorales/documents/Gymnosperm18_withgneto.ppt

# BOM-112 P: Botany Major Practical

| Semester: I | Course Title: Botany Major Practical-112 | Credits: 4 |
|---|---|---|
| Course No.: BOM-112 P | Major- Practical | Hours: 8/week |

**COs**

| COs | COURSE OUTCOMES |
|---|---|
| CO 1 | Understand the structure and function of an ecosystem. Understand the principle and working of some ecological instruments; Understand the various interactions between organisms as biotic factors. Learn the basics of soil science. |
| CO2 | Understand the principles of microscopy & handle dissecting as well as compound microscopes. Recognize plant cell and its organelles and differentiate between plant cell and animal cell. Relearn the basics of Molecular biology. |
| CO3 | Classify the different plant forms to their respective groups based on their thallus structure and reproduction. Identify life cycle patterns of various groups. Describe the vegetative and reproductive structure of the forms studied. |
| CO4 | Understand the process of mushroom cultivation and analyze its entrepreneurial scope. Study lichens and their economic importance. |
| CO5 | Understand the principles and technique of Plant Tissue Culture.<br>Learn to handle various instruments of Plant Tissue Culture Laboratory like Autoclave, Laminar Airflow, etc. |
| CO 6 | Write a report of visit to a Plant Tissue Culture laboratory. |

**CO-PO Mapping**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 |
|---|---|---|---|---|---|
| CO 1 | 1 | 2 | 1 | | |
| CO 2 | 1 | 1 | 1 | | |
| CO 3 | 1 | 2 | 1 | | |
| CO 4 | | 1 | 2 | | |
| CO 5 | 1 | 1 | 2 | | |
| CO 6 | | 1 | 1 | | |

# List of Practicals

| Practical No. | Titleof thePractical |
|---|---|
| 1. | Study of Chart of Ecosystem classification |
| 2. | Study of artificial ecosystem by Terrarium chart/model |
| 3. | Study of Biotic factors |
| 4. | Study of Soil pH |
| 5. | Soil texture & soil types |
| 6. | Electrical conductivity of soil |
| 7. | Study of soil Water holding capacity |
| 8. | Study of *Spirogyra* |
| 9. | Study of *Nostoc* |
| 10. | Study of *Volvox* |
| 11. | Study of *Mucor* |
| 12. | Study of Mushroom |
| 13. | Study of Lichens and types by chart/specimen/slides |
| 14 | Study of Microscopy |
| 15 | Study of Plant cell |
| 16 | Study of structure of Nucleic acid(DNA,RNA) |
| 17 | Watson & Crick Model of DNA |
| 18 | DNA Replication |
| 19 | Structure of Chloroplast & Mitochondria |
| 20 | Classification of Algae and Fungi |
| 21 | Study of Layout of Plant Tissue Culture Lab |
| 22 | Study of PTC Instruments- Autoclave, Laminar air flow, Balance, Hot air oven, Water distillation unit, pH meter |
| 23 | Chart of PTC technique |
| 24 | Chart of somatic hybridization and Protoplast culture |
| 25 | Chart of edible vaccine |
| 26 | Study of Synthetic seeds |