



**JAI HIND COLLEGE
BASANTSING INSTITUTE OF SCIENCE**

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**J. T. LALVANI COLLEGE OF COMMERCE
(AUTONOMOUS)**

'A' ROAD, CHURCHGATE, MUMBAI - 400020, INDIA

**Affiliated to
University of Mumbai**

Program: B.Sc. Botany

Course: Algae, Fungi and Lichens

Semester I

**Credit Based Semester and Grading System (CBSGS) with effect
from the academic year 2021 - 22**

F.Y. B.Sc. Botany Syllabus

Semester I			
Course Code	Course Title	Credits	Lectures /Week
SBOT101	Algae, Fungi and Lichens	2	3



Semester I – Theory

Course Code: SBOT101	PAPER I Algae, Fungi and Lichens (Credits: 2 Lectures/Week: 3)	
	<p>Learning Objectives:</p> <ul style="list-style-type: none"> ● Learn the morphology, structure and importance of the organisms and differentiate between various groups of Algae, Fungi and Lichens. ● Learn the life cycles of individuals belonging to Chlorophyta, Cyanophyta and Phycomycetes. ● Learn the economic importance of each group. ● Study and understand the structure of algae and fungi in an association ● Classify lichens on the basis of their habitat, internal structure, fungal partner and thallus morphology. ● Study the details about origin, association and relations between the phyco and mycobiont ● Learn economic importance and ecological significance of lichens ● Study the diseases and parasites on lichens <p>Learning Outcomes: Students will be able to:</p> <ul style="list-style-type: none"> ● Differentiate and compare between different classes of algae from their syllabus. ● Discuss life cycles and systematic position of algae prescribed in the syllabus ● Differentiate between different Modes of nutrition in fungi. ● Discuss life cycles and systematic position of fungi prescribed in the syllabus ● Differentiate between types of lichen thallus on the basis of their internal and external structure. ● Assess and understand the economic importance of lichens especially in food and medicine ● Grasp the basic understanding of the ecological significance of the presence of lichens and appreciate their role in the environment. 	
Unit I	<p>ALGAE:</p> <ul style="list-style-type: none"> ● Outline of Classification according to G.M. Smith, General characters, thallus structure, reproduction of Chlorophyta and Cyanophyta. ● Life cycle and systematic position of: <ul style="list-style-type: none"> ▪ <i>Nostoc</i> ▪ <i>Oscillatoria/Arthrospira</i> ▪ <i>Chlamydomonas/Chlorella</i> ▪ <i>Spirogyra</i> ▪ Economic importance of Algae with respect to Chlorophyta and Cyanophyta 	15L

Unit II	FUNGI AND PLANT PATHOLOGY <ul style="list-style-type: none"> ● Outline of Classification according to G.M. Smith, General characters, thallus structure, reproduction, economic importance of Phycomycetes, ● Structure, life cycle and systematic position of: <ul style="list-style-type: none"> ▪ <i>Rhizopus</i> ▪ <i>Saprolegnia</i> ▪ <i>Phytophthora</i> ▪ <i>Albugo</i>. ● Modes of nutrition in Fungi (Saprophytism, predation, mutualism and Parasitism) 	15L
Unit III	LICHENS <ul style="list-style-type: none"> ● History of Lichenology, Origin of Lichen, Present trends in classification, Kinds of Lichens, Development of Lichen Thallus. ● Relation between components of Lichen thallus and Nature of lichen thallus (external and internal structure – Foliose, Crustose, Fruticose, Squamulose) ● Pseudo-Lichens, fossil lichens, specialized structure in lichen thallus, Reproduction in lichen ● Distribution of Lichen, Habit and Habitat ● Economic importance, Ecology of lichens, Diseases of lichens ● Microscopy – Principle and working of Simple and Compound Light microscope 	15L
References: <ul style="list-style-type: none"> ● Gangulee, Das & Datta, College Botany, Volume II, New Central Book Agency, 2006 ● Vashishta B. R. & Sinha, A. K., Botany for degree students - Algae, S. Chand, 1st Edition, 2010 ● Vashishta B. R. & Sinha, A. K., Botany for degree students - Fungi, S. Chand, 1st Edition, 2010 ● Smith G.M., Cryptogamic Botany – Algae and Fungi, Vol. I, McGraw Hill Publications, 1955 		



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Program: B. Sc. Botany

Course: Genetics, Ecology and Industrial Botany

Semester I

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F.Y. B.Sc. Botany Syllabus

Semester I			
Course Code	Course Title	Credits	Lectures /Week
SBOT102	Genetics, Ecology and Industrial Botany	2	3



Course Code: SBOT102	PAPER II Mendelian Genetics, Ecology and Industrial Botany (Credits: 2 Lectures/Week: 3)
	<p>Learning Objectives:</p> <ul style="list-style-type: none"> ● Revise the basic principles of Mendelian Genetics and further learn a variety of exceptions and extensions of Mendelian principles. These will include multiple alleles, modified dominance relationships, gene interactions leading to modified Mendelian ratios, essential genes and lethal alleles, penetrance and expressivity and dual influence of genes and the environment on phenotypic expression. ● To create an in-depth awareness about the different aspects of the environment such as different types, components and the flora and fauna involved. ● Study the different applications of commercially used plants for different products of use to mankind. <p>Learning Outcomes: Students will be able to:</p> <ul style="list-style-type: none"> ● Understand the concept of gene interaction and that genes do not always function independently in determining the phenotypic characteristics. With appropriate examples they will understand the influence of non-allelic genes on the phenotype of the organism. ● Understand the concept of penetrance and expressivity as studied for any gene. With appropriate examples covered here, they will realise that penetrance and expressivity for any gene under study depends on the dual effect of genotype of the organism as well its internal and external environmental factors and it may remain constant or be variable. Further, they will be able to understand the multiple internal and external environmental factors influencing the expressivity of many genes. ● Gain theoretical knowledge and learn to apply it for the betterment of the environment. ● Provide solutions to plant suitable adaptive plants in their respective area. ● Differentiate between primary and secondary metabolites. ● Comment upon commercial uses of Primary and Secondary metabolites covered in their syllabus.

Unit I	MENDELIAN GENETICS: <ul style="list-style-type: none"> ● Monohybrid ratio and their modifications- Complete dominance, Incomplete dominance, codominance and concept of essential and lethal genes. Test cross, back cross ratios, ● Di-hybrid ratios and their modifications ● Gene interactions ● Epistasis: Recessive, Dominant and Duplicate Recessive and Duplicate Dominant ● Gene expression and environment: penetrance and expressivity, effects of environment (Age, Sex, Temperature and chemicals). ● Concept of multiple alleles. 	15L
Unit II	ECOLOGY: <ul style="list-style-type: none"> ● Energy pyramids, energy flow in an ecosystem. ● Types of ecosystems: aquatic and terrestrial ● Ecological adaptations in plants (Morphological and Anatomical) <ul style="list-style-type: none"> ▪ Hydrophytes – submerged, floating, rooted ▪ Mesophytes ▪ Halophytes – accumulators and excretors ▪ Xerophytes – drought resisting; drought enduring; drought escaping and drought evading ● Biogeochemical cycles: Carbon, Nitrogen and Water. 	15L
Unit III	INDUSTRIAL BOTANY: <ul style="list-style-type: none"> ● Corn starch: Extraction, Identification and various products from corn starch. ● Soya Proteins: Separation of Proteins from Soya & its applications and recent health hazards and allergy associated with soy products. ● Castor oil: Extraction (Solvent extraction), various products from Castor oil. ● Commercial importance, geographical distribution, production and economic policy of <ul style="list-style-type: none"> ▪ Essential oils: <i>Eucalyptus</i>, <i>Rosemary</i>, <i>Zingiber</i>, <i>Mentha</i> ▪ Tannins: Catechu, Myrobalan (<i>Terminalliachebula</i>) ▪ Resins: Turmeric and Asafoetida, Colophony, Benzoin ▪ Alkaloids: <i>Adhatoda</i> and <i>Atropa belladonna</i> 	15L
Additional References: <ul style="list-style-type: none"> ● Russell P. J., iGenetics – A Molecular approach, Pearson Education, Inc., second edition, 2006 ● Winchester A. M. Genetics – A survey of Principles of heredity, A. M., Houghton Mifflin Company, 1972 ● Santra S. C., Fundamentals of ecology and environmental biology, New Central Book Agency, 2010 ● Odum E. P. & Barrett G. W. Fundamentals of Ecology, E. P., Peter Marshall, Fifth edition, 2005 ● Kochhar S. L., Economic Botany in the tropics, MacMillan India Limited, 1981 ● Hill A., Economic Botany, McGraw Hill Publication, 1937 		



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Program: B.Sc. Botany

Course: Practical I

Semester I

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F.Y. B.Sc. Botany Syllabus

Semester I			
Course Code	Course Title	Credits	Lectures /Week
SBOT1PR	Practical I	2	6



Course Code: SBOT 1PR	Course Title: Practical I	Credits 2
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Learning Objectives:

- To use bright field microscopy for observing Algae, Fungi and Lichens
- To study variation in members of Chlorophyta and Cyanophyta
- To study the morphology and anatomy of primitive fungi Phycomycetes
- To understand economic importance of all the lower forms of life
- To understand Mendel's Laws and modified Mendelian ratios by solving problems.
- Tissue typing using blood as a medium
- To study multiple alleles with the help of laboratory exercises
- To study the plants adapted to different environments as per morphological and anatomical adaptations
- To detect presence of primary and secondary metabolites
- To study statistics with reference to biological problems.

Learning Outcomes:

Student will be able to:

- Focus and mount specimens mentioned above on a light microscope.
- Identify the different specimens
- Differentiate between alga
- Give Control measures of harmful fungi
- Ecological and economic significance of all species
- Correlate biological examples with Mendelian and non-Mendelian ratios
- Differentiate between alleles and correlate their interrelationships
- Know the detection, significance and location of both primary and secondary metabolites in plants.
- Extract and identify essential oils, tannins, resins and alkaloids.
- Apply statistical methods to analyse their data.

PRACTICAL PAPER I

1	Microscopy – study of parts of microscope
2	Study of stages in the life cycle of <i>Nostoc</i> from fresh/ preserved material and permanent slide
3	Study of stages in the life cycle of <i>Oscillatoria/Arthrospira</i> from fresh/ preserved material and permanent slide
4	Study of stages in the life cycle of <i>Chlamydomonas/ Chlorella</i> from fresh/ preserved material and permanent slide
5	Study of stages in the life cycle of <i>Spirogyra</i> from fresh/ preserved material and permanent Slides
6	Economic importance of Algae with respect to Chlorophyta and Cyanophyta.
7	Study of stages in the life cycle of <i>Rhizopus</i> from fresh/ preserved material and permanent slides
8	Study of stages in the life cycle of <i>Saprolegnia</i> from fresh/ preserved material and permanent slides
9	Study of stages in the life cycle of <i>Phytophthora</i> from fresh/ preserved material and permanent slides
10	Study of stages in the life cycle of <i>Albugo</i> from material and permanent slides
11	Disease causing fungi & useful fungi of phycomycetes

12	Identification of Lichens (Permanent slides and specimens) – based on morphology/anatomy
13	Economic importance of Lichens
PRACTICAL PAPER II	
1	Genetics related Problems on: <ul style="list-style-type: none"> ● Monohybrid cross ● Dihybrid crosses ● Probability ● multiple alleles ● Chi- square
2	Blood typing: ABO groups and Rh factor.
3	Identification of plants adapted to different environmental conditions and internal structure adaptations: <ul style="list-style-type: none"> ● Hydrophytes - free floating (<i>Pistia/Eichhornia</i>); Rooted floating (<i>Nymphaea</i>); Submerged (<i>Hydrilla</i>) ● Mesophytes (any common plant) ● Xerophytes – Drought evading – <i>Bryophyllum</i>; Drought escaping - <i>Sorghum</i>; Drought enduring - <i>Opuntia</i> & Drought resisting – <i>Nerium</i> ● Halophytes – Salt excretors – <i>Avicennia</i>; Salt accumulators - <i>Sueda</i>
4	Qualitative tests for carbohydrates, proteins and fats
5	Qualitative tests for <ul style="list-style-type: none"> ● Essential oils: <i>Eucalyptus, Rosemary, Zingiber, Mentha</i> ● Tannins: <i>Acacia catechu, Terminalliachebula</i> ● Resins: <i>Turmeric, Asafoetida, Colophony, Benzoin</i> ● Alkaloids: <i>Adhatodavastica</i> and <i>Atropa belladonna</i>
6	Biostatistics <ul style="list-style-type: none"> ● Calculation of: <ul style="list-style-type: none"> ▪ Mean ▪ Median ▪ Mode ▪ Standard deviation ● Frequency distribution, graphical representation of data <ul style="list-style-type: none"> ▪ Frequency polygon ▪ Histogram ▪ Pie chart

Evaluation Scheme:

[A]Evaluation scheme for Theory Courses:

I. Continuous Assessment (C.A.) - 40 Marks

- (i) C.A.-I: Test/continuous evaluation in given time frame with Surprise test – 20 Marks
- (ii) C.A.-II: Assignment/project/presentation /surprise test/ continuous evaluation in given time frame – 20 Marks

II. Semester End Examination (SEE)- 60 Marks

[B] Evaluation scheme for Practical courses: (SEE – 60 Marks)

- **Internal Assessment -40 Marks: Journal/Viva/Experiment**

NOTE:

1. A minimum of ONE field excursion habitat studies are compulsory. Field work of not less than eight hours duration is equivalent to one period per week for a batch of fifteen students.
2. A candidate will be allowed to appear for the practical examinations only if he/she submits a certified journal of FYBSc Botany and the Field Report or a certificate from the Head of the Department/Institute to the effect that the candidate has completed the practical course of FYBSc Botany as per the minimum requirements. In case of loss of journal, a candidate must produce a certificate from the Head of the Department/ Institute that the practical for the academic year were completed by the student. However, such a candidate will be allowed to appear for the practical examination but the marks allotted for the journal will not be granted.