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R. P. Gogate College of Arts & Science and R. V. Jogalekar College of Commerce (Autonomous), Ratnagiri

Department of Botany

UG Programme 2024-25

Syllabus for S. Y. B. Sc. (Botany-Minor)

Semester III and IV

Under Choice Based Credit System (CBCS)

R. P. Gogate College of Arts and Science and R. V. Jogalekar College of Commerce (Autonomous), Ratnagiri

Board of Studies in Botany

Proposed Syllabus for S. Y. B. Sc. Botany Minor effective from the year 2024-25

Name of Programme	**B. Sc.**
Level	UG
No of Semesters	06
Year of Implementation	2024-25
Programme Specific Outcomes (PSO)	1. Students will be able to recall details and information about the evolution, anatomy, morphology, systematics, genetics, physiology, ecology, and conservation of plants and all other forms of life such as Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms. 2. Students will be able to recall details of the unique ecological and evolutionary features of the local and Indian flora. 3. Students will be able to communicate effectively using oral and written communication skills. 4. Students will be able to generate and test hypotheses, make observations, collect data, analyze and interpret results, derive conclusions, and evaluate their significance within a broad scientific context.
Relevance of PSOs to the local, regional, national, and global developmental needs (200 words)	The students, after completion of the course will be able to understand the diversity of plants from local, regional and national level with respect to various groups like Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.The knowledge of floral diversity gained by the students will be helpful for the sustainable livelihood which is useful from local to global level. The students will also gain knowledge regarding the ecological and economic importance of vegetation throughout the world. The knowledge acquired by the students, regarding cultivation and processing of different varieties of agricultural crops, fruits, vegetables and other plants of commercial importance will be helpful in setting up of small scale industries and seeking jobs which will lead to improve the local , regional and national economy. Study of phytochemical analysis, extraction of essential oils from plant resources and study of microbial technology will make the students able to use the techniques effectively in the industry. The students will be able to analyze the local and regional environmental issues like pollution, waste disposal by studying ecology. The students will be able to establish the relationship between the modern and traditional and indigenous knowledge system of plants of the nation.

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The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40% marks in the first part and by conducting the Semester End Examinations with 60% marks in the second part. **The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below-**

A) Internal Assessment: 40 % (40 Marks)

Sr. No.	Particulars	Marks
1.	**One Periodical Class Test / Online Examination**	**20**
2.	**Assignments**	**20**
	Question Paper Pattern for Periodical Class Test/ Online Examination: Maximum Marks: 20 Duration: 50 Minutes Long answer questions/ Multiple Choice Questions	

B) Semester End Examination: 60% (60 Marks)

Duration: The examination shall be of 2 hours duration. Question Paper Pattern
1. There shall be four questions.
2. All questions shall be compulsory with internal options.
3. Questions may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

Standard of Passing

The learner to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learner shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 out of 60) separately, to pass the course and minimum of Letter Grade "P" in the project component, wherever applicable to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment & Semester End Examination together.

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Performance grading

Letter grades and grading points:

Semester GPA / Program CGPA Semester/Program	% of Marks	Alpha-Sign/Letter Grade Result
9.00-10.00	90.0-100	O (Outstanding)
8.00 ≤ 9.00	80.0 ≤ 90.0	A+ (Excellent)
7.00 ≤ 8.00	70.0 ≤ 80.0	A (Very Good)
6.00 ≤ 7.00	60.0 ≤ 70.0	B+ (Good)
5.50 ≤ 6.00	55.0 ≤ 60.0	B (Above Average)
5.00 ≤ 5.50	50.0 ≤ 55.0	C (Average)
4.00 ≤ 5.00	40.0 ≤ 50.0	P (Pass)
Below 4.00	Below 40	F (Fail)
Ab (Absent)	-	Absent

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Nomenclature of the Course	**Fundamentals of Botany**
Class	S. Y. B. Sc.
Semester	3
Course Code	USBOTMn301
No. of Credits	02
Nature	Theory
Type	Minor

Course Outcomes:

CO1: Learn the salient features of algae, fungi and their life cycle patterns with a suitable example.

CO2: Understand the economic importance of algae, fungi and bryophytes.

CO3: Learn the principles and applications of plant preservation methods, microscopy, chromatography and electrophoresis.

CO4: Describe the morphological and reproductive structures of prescribed families

CO5: Classify the prescribed families according to Bentham and Hooker's system.

ILO

Students will be able to

ILO1: Explain the salient features and classification upto orders (with examples of each) of Phaeophyta

ILO 2: Elaborate Structure and life cycle of *Sargassum*

ILO3: Justify systematic position of *Sargassum.*

ILO4: Elaborate Structure and life cycle of *Ectocarpus.*

ILO5: Justify systematic position of *Ectocarpus.*

ILO6: Enlist and explain the economic importance of division Phaeophyta.

ILO7: Explain the salient features and classification upto orders (with examples of each) of Ascomycetae.

ILO8: Elaborate Structure and life cycle of *Erysiphe.*

ILO9: Justify systematic position of *Erysiphe.*

ILO10: Enlist and explain the economic importance of division Ascomycetae.

ILO11: Explain the symptoms, causative organism, disease cycle and control measures of Powdery mildew.

ILO12: Understand and explain the structure of chromosome.

ILO13: Understand, differentiate and explain the chromosomal aberrations.

ILO14: Understand and describe the principle, working and applications of plant preservation Methods.

ILO15: Understand and describe the principle, working and applications of microscopy.

ILO16: Explain the principle, working and applications of electrophoresis.

ILO17: Understand and describe the principle, working and applications of chromatography.

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Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
1	**Thallophyta**	Algae: Structure, life cycle and systematic position of *Sargassum* and *Ectocarpus.* Fungi: Structure, life cycle and systematic position of *Erysiphe* Plant pathology - Symptoms, causative organism, disease cycle and control measures of Powdery mildew.
2	**Cytogenetics**	Structure of chromosome Variation in Chromosome structure Sex determination, sex linked, sex influenced and sex limited traits
3	**Modern techniques to study plant diversity**	**Preservation methods:** Dry and Wet method **Microscopy** - Principle and working of Light, and Electron microscope. **Chromatography** - Principles and techniques in Thin Layer and Column chromatography.

Prescribed Text/s (If any):

- College Botany Volume I and II Gangulee - Das and Dutta. Central Education enterprises, 2001
- Botany for Degree Students- Algae, Vashishta B.R. S. Chand Publication 2010.
- Botany for Degree Students- Fungi, Vashishta B.R. S. Chand Publication 2010.
- Diversity of Cryptogams, O.P. Sharma, McGraw-Hill, 2010
- Cryptogamic Botany Volume I and II - G M Smith McGrawHill 1955
- iGenetics- A Molecular Approach, Russell, Benjamin Cummings, U.S.A.,2009
- Genetics, C. B. Powar, Himalaya Publication, 2011.
- Principles and techniques of biochemistry and molecular biology- K. Wilson and J. Walker 2010

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Teaching Plan:			
Unit No.	**Unit Title**	**Teaching Methods**	**No. of Lectures**
1	**Thallophyta**	**AV method, Chalk and board, Charts**	**10**
2	**Cytogenetics**	**AV method, Chalk and board**	**10**
3	**Modern techniques to study plant diversity**	**AV method, Demonstration, Seminar**	**10**

Evaluation Pattern

A) Continuous Internal Evaluation: Maximum Marks:20

Method	Marks
Class test	**10**
Home assignment	**10**

B) Semester End Examination: Maximum Marks: 30

Question No. and Sub questions	Unit and sub unit (with number and title)	Type of Question	Marks
1 A	**I**	**Long answer questions (Any 1 out of 2)**	**06**
1 B	**I**	**Answer in brief (Any 1 out of 2)**	**04**
2 A	**II**	**Long answer questions (Any 1 out of 2)**	**06**
2 B	**II**	**Answer in brief (Any 1 out of 2)**	**04**
3 A	**III**	**Long answer questions (Any 1 out of 2)**	**06**
3 B	**III**	**Answer in brief (Any 1 out of 2)**	**04**

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Nomenclature of the Course	**Botany Practical**
Class	S. Y. B. Sc.
Semester	3
Course Code	USBOTMnP3
No. of Credits	02
Nature	Practical
Type	Minor

Course Outcomes:

Students will be able to

CO1: Identify, draw and label the sketches of stages in the life cycle of *Sargassum.*

CO2: Identify, draw and label the sketches of stages in the life cycle of *Ectocarpus.*

CO3: Identify, draw and label the sketches of stages in the life cycle of *Erysiphe.*

CO4: Identify the inheritance pattern with reference to plastid inheritance.

CO5: Differentiate various stages of Mitosis and Meiosis practically.

CO6: Perform various techniques like dry and wet preservation, thin layer chromatography.

Syllabus:

Practical Paper I - Plant diversity II

Unit No.	Unit Title	Subtitles (Learning Points)
1	**Thallophyta**	Study of stages in the life cycle of *Sargassum* from fresh/ preserved material and permanent slides.
1	**Thallophyta**	Study of stages in the life cycle of *Ectocarpus* from fresh/ preserved material and permanent slides.
1	**Thallophyta**	Study of stages in the life cycle of *Erysiphe* from fresh/preserved material and permanent slides.
2	**Cytogenetics**	Study of inheritance pattern with reference to Plastid Inheritance.
2	**Cytogenetics**	Study of mitosis and meiosis from suitable plant material.
3	**Modern techniques to study plant diversity**	Study of dry and wet preservation techniques.
3	**Modern techniques to study plant diversity**	Separation of carotenoids by thin layer chromatography

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Evaluation Pattern

A) Continuous Internal Evaluation: Maximum Marks: 20 marks

Method	Marks
Active participation	**05**
Journal	**05**
Class test	**10**

B) Semester End Examination: Maximum Marks: 30

S.Y. B.Sc. BOTANY PRACTICAL EXAMINATION

Semester III Paper I

Time: 2 hrs **Total Marks: 30**

Note- Show all the slides/observations/results to the examiner.
Mobile phones are not allowed in examination hall.

Q.1 Identify, Classify and describe specimens **'A'** and **'B'**. Sketch neat and labeled diagram. (12)

Q.2 Make a squash/smear preparation of specimen **'C'** to show the stages of mitosis/meiosis, draw a diagram and comment on your observations. (06)

Q.3 Perform the chromatography experiment **'D'** for separation of carotenoids (06)

Q. 4 Identify and describe the specimen **'E', 'F'** (06)

Key:

A: *Sargassum/ Ectocarpus*

B: *Erysiphe*

C: Mitosis/Meiosis

D: TLC of carotenoids

E: Plastid inheritance

F: Herbarium/ Wet preservation

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Nomenclature of the Course	**Form and function II**
Class	S. Y. B. Sc.
Semester	4
Course Code	USBOTMn401
No. of Credits	2
Nature	Theory
Type	Minor

Course Outcomes:

Students will be able to:

CO1: Learn the ultrastructure and functions of prescribed cell organelles and nucleic acids.

CO2: Understand and differentiate between cell organelles such as Mitochondrion, Peroxisomes, Glyoxysomes and Ribosomes.

CO3: Learn Cell cycle and cell division and differentiate between Mitosis and Meiosis.

CO4: Learn and understand the chromosome structure and genetics.

CO5: Learn and understand the DNA replication in prokaryotes as well as eukaryotes and Protein synthesis.

Learn and understand biogeochemical cycles.

CO5: Understand and explain the concept of ecological factors and edaphic factor.

CO6: Learn community ecology and characters of community.

CO6: Study the tools in Information technology and apply them for data retrieval.

ILO

Students will be able to

ILO1: Apply the Objectives and Goals of Plant systematics

ILO 2: Apply Plant Nomenclature

ILO 3: Justify Taxonomy in relation to Cytology,

ILO 4: Analyse Use of characters of chemical constituents in taxonomy.

ILO 5: Analyse**,** Classify and describe the Morphological Peculiarities of Family Leguminosae, Asteraceae and Palmae .

ILO 6: Justify Economic Importance of Family Leguminosae, Asteraceae and Palmae.

ILO7: Differentiate Biogeochemical Cycles - Carbon and Water.

ILO8: Analyse Ecological factors: Concept of environmental factors.

ILO9: Differentiate Soil as an edaphic factor,Soil composition,

ILO10: Analyse types of soil,

ILO11: Elaborate the process of soil formation,

ILO12: Justify soil profile

ILO 13: Apply Bioinformatics tools of IT, Internet and its uses;

ILO 14: Analyze Databases used in bioinformatics

ILO 15: Apply tools for web search, Data retrieval tools - Entrez; BLAST.

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Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
1	**Angiosperms**	Objectives and Goals of Plant systematics Plant Nomenclature Taxonomy in relation to Cytology, Use of characters of chemical constituents in taxonomy. Classification, Morphological Peculiarities and Economic Importance of Family Leguminosae, Asteraceae and Palmae.
2	**Ecology**	Biogeochemical Cycles - Carbon and Water. Ecological factors: Concept of environmental factors. Soil as an edaphic factor, Soil composition, types of soil, soil formation, soil profile.
3	**Bioinformatics**	Introduction to Bioinformatics: Information technology: History and tools of IT, Internet and its uses; Databases used in bioinformatics Introduction to Bioinformatics - goal, need, scope and limitation; Aims of Bioinformatics, tools for web search, Data retrieval tools - Entrez; BLAST.

Prescribed Text/s (If any):

- Plant Systematics - Gurcharan Singh, Oxford and IBH Publ. 2004
- Fundamentals of Ecology - E P Odum and G W Barrett. Thompson Asia Pvt Ltd. Singapore, 2001.
- Ecology and environment - P. D. Sharma, Rastogi publications, 2007.
- Bioinformatics Methods and Applications Genomics, Proteomics and Drug Discovery, S.C. Rastogi, Namita Mendiratta and Parag Rastogi; PHI Learning Pvt. Ltd., 2013.

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Teaching Plan:			
Unit No.	**Unit Title**	**Teaching Methods**	**No. of Lectures**
1	**Angiosperms**	**Chalk and talk, AV Studio**	**10**
2	**Ecology**	**Chalk and talk, AV Studio, Seminar**	**10**
3	**Bioinformatics**	**Chalk and talk, AV Studio, Group discussion**	**10**

Evaluation Pattern

A) Continuous Internal Evaluation: Maximum Marks: 20

Method	Marks
Class test	10
Home assignment	10

B) Semester End Examination: Maximum Marks: 30

Question No. and Sub questions	Unit and sub unit (with number and title)	Type of Question	Marks
1 A	I	Long answer questions (Any 1 out of 2)	06
1 B	I	Answer in brief (Any 1 out of 2)	04
2 A	II	Long answer questions (Any 1 out of 2)	06
2 B	II	Answer in brief (Any 1 out of 2)	04
3 A	III	Long answer questions (Any 1 out of 2)	06
3 B	III	Answer in brief (Any 1 out of 2)	04
1 A	I	Long answer questions (Any 1 out of 2)	06
1 B	I	Answer in brief (Any 1 out of 2)	04

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Nomenclature of the Course	**Botany Practical**
Class	S. Y. B. Sc.
Semester	4
Course Code	USBOTMnP4
No. of Credits	02
Nature	Practical
Type	Minor

Course Outcomes:

Students will be able to

CO1: Perform tests for detection of phenols and flavonoids from given material

CO2: Identify, classify and describe Study of morphological peculiarities and economic importance of families: Leguminosae, Asteraceae, Palmae

CO3: Identify and use the Soil thermometer, Soil testing kit, Soil pH meter, Wind anemometer.

CO4: Perform mechanical analysis of soil by sieve method, and estimate organic matter content from given soil sample.

CO5: Perform web search using Google and Entrez.

CO6: Retrieve and analyze the data using BLAST

Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
Practical Paper I - Form and Function II		
1	**Angiosperms**	Tests for Phenols and Flavonoids from suitable plant material.
1	**Angiosperms**	Study of morphological peculiarities and economic importance of following families: Leguminosae Asteraceae Palmae
2	**Ecology**	Study of the working of the following Ecological Instruments - Soil thermometer, Soil testing kit, Soil pH meter, Wind anemometer
2	**Ecology**	Mechanical analysis of soil by the sieve method and pH of soil.
2	**Ecology**	Quantitative estimation of organic matter of the soil by Walkley and Blacks Rapid titration method.
3	**Bioinformatics**	Web Search - Google, Entrez.Data retrieval and analysis using BLAST

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Evaluation Pattern

A) Continuous Internal Evaluation: Maximum Marks: 20 marks

Method	Marks
Active participation	05
Journal	05
Class test	10

B) Semester End Examination: Maximum Marks: 30

S.Y. B.Sc. BOTANY PRACTICAL EXAMINATION

Semester IV Paper I

Time: 2 hrs **Total Marks: 30**

Note- Show all the slides/observations/results to the examiner.
Mobile phones are not allowed in examination hall.

Q.1 Identify, classify and describe specimen **'A'**. Sketch neat and labeled diagram. (07)

Q.2 Perform the Ecological experiment **'B'** allotted to you. (08)

Q.3 Test for Phenols / Flavonoids from given material **'C'** (05)

Q. 4 Perform the experiment **'D'** related to Web search. (06)

Q. 5 Identify and describe specimens **'E'.** (04)

Key:

A: Leguminosae *(*Sub families), Asteraceae, Palmae

B: Mechanical analysis of Soil/Soil organic matter/pH of soil

C: Test for Phenols/Flavonoids

D: Google search/Entrez/ BLAST

E: Ecological instruments: Soil thermometer /Soil Testing kit/ pH meter /Wind anemometer

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Note:

- For Algae, Fungi, Bryophyta and Pteridophyta G. M. Smith's classification system should be followed.
- For Gymnosperms Chamberlain's classification system should be followed.
- For Angiosperms Bentham and Hooker's system of classification should be followed.

Scheme of Examinations

1. One external -Semester End Examination of 30 marks of duration: 1 hour.
2. One Practical at the end of semester consisting of practical: 30 marks, with a certified field report.
3. Two short field excursions for habitat studies are compulsory.
4. Field work of not less than eight hours' duration is equivalent to one period per week for a batch of 15 students.
5. A candidate will be allowed to appear for the practical examinations if he/she submits a certified journal of S.Y.B.Sc. Botany or a certificate from the Head of the department / Institute to the effect that the candidate has completed the practical course of S.Y.B.Sc. Botany as per the minimum requirements.
6. In case of loss of journal, a candidate must produce a certificate from the Head of the department /Institute that the practicals 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.
7. HOD's decision, in consultation with the Principal, shall remain final and abiding to all.

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7. HOD's decision, in consultation with the Principal, shall remain final and abiding to all.

Date: 16/04/24
Place: Ratnagiri

Signature
Chairperson and HoD