



(Bachelor Of Science) (Botany)  
(B.Sc.) (Botany-Major) Semester (II)

Course Code	US02MABOT01	Title of the Course	Biodiversity (Microbes, Algae, Fungi and Archegoniate)
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	1. The candidate will obtain knowledge and understanding about the structure, function, reproduction and economic importance of viruses, bacteria, algae, fungi, lichens, Bryophytes, Pteridophytes, and Gymnosperms.
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Course Content		
Unit	Description	Weightage* (%)
1.	<b>Microbes :</b> Viruses – Discovery, general structure, replication (general account), DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance; Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance.	25
2.	<b>Algae</b> Cyanobacteria: History, Characteristics, Types, Classification, Structure, Specialized structure, Reproduction, Economic importance and harmful effects of Cyanobacteria. Role of Cyanobacteria as a Food Supplements, Reduction of Methane Emissions, as Source of Bio-energy, as Plant Growth Promoters, in Bioremediation and as Bio-fertilizers. Occurrence, thallus structure and reproduction of Gloeocapsa, Oscillatoria, Spirulina, Nostoc and Gloeotrichia. Culturing Of algae. General characteristics; Classification, Range of thallus organization and reproduction and Classification and Economic importance of algae. Life-cycle of the Spirogyra, Ectocarpus and Batrachospermum Contribution of Professor M O P Iyengar.	25





3	<p><b>Fungi –</b>  Introduction- General characteristics, ecology and significance, range of thallus organization, cell wall composition , nutrition, reproduction and classification; True Fungi- General characteristics, ecology and significance, life cycle of Rhizopus (Zygomycota) Penicillium, Alternaria (Ascomycota), Puccinia, Agaricus (Basidiomycota); Symbiotic Associations-Lichens: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance  Contribution of Prof. Karam chand Mehta</p>	25
4.	<p><b>Introduction to Archegoniate :</b> General characters, Economic importance, Classification , alternation of generation and outline lifecycles of following -  A. Bryophyta – <i>Riccia, Anthoceros</i>  B. Pteridophyta – <i>Nephrolepis, Funaria</i>  C. Gymnosperms – <i>Cycas</i>  Contribution of Prof. Shiv Ram Kashyap and Prof. Birbal Sahni.</p>	25

Teaching-Learning Methodology	<p>Classroom interactions  Multimedia presentation  Chart/model presentation  Live /preserved specimen observation  Student seminar and unit test, quiz etc  Question bank circulation  Students assignments  Student counselling for any problem of subject understanding  Student-Teacher interaction on social media platform for any query (MS team, Google classroom, email, etc)</p>
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%





3.	University Examination	70%
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Course Outcomes: Having completed this course, the learner will be able to

1.	This course helps the students to gain knowledge theoretically and practically on microorganisms like viruses, bacteria, algae, fungi and archegoniates like bryophytes, Pteridophytes and gymnosperms---their forms, structures, life cycles and their roles in maintaining biodiversity
2.	Know general characters and classification of all living forms of life.

Suggested References:

Sr. No.	References
1.	1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
2.	Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers
3.	Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.
4.	Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
5.	Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.
6.	Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
7.	Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.
8.	Text book of Botany-Diversity of Microbes and Cryptogams-Singh, Pande and Jain

On-line resources to be used if available as reference material





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<https://onlinelibrary.wiley.com/doi/book/10.1002/9781444313383>

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(Bachelor of Sciences) (Botany)  
(B.Sc.) (Botany-Major) Semester (II)

Course Code	US02MABOT02	Title of the Course	Practical
Total Credits of the Course	04	Hours per Week	08(PartA-4and PartB-4)

Course Objectives:	1. To get hands on training to use various biology laboratory equipment. 2. To do experiment as per the given syllabus through fresh/preserved specimen/slides/models/charts etc
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No	Practical (Part-A)
1.	Electron Micrographs/Models of viruses –Bacteriophage, TMV/ Lytic and Lysogenic Cycle
2.	Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation; Structure of root nodule.
3.	Gram staining/Permanent slides
4.	Study of vegetative/ reproductive structure of <i>blue green algae</i> through temporary preparation / permanent slides(Gloeocapsa, Oscillatoria, Spirulina)
5.	Study of vegetative/ reproductive structure of <i>blue green algae</i> through temporary preparation / permanent slides(Nostoc and Gloeotrichia)
6.	Study of vegetative/ reproductive structure of <i>Spirogyra</i> through temporary preparation / permanent slides
7.	Study of vegetative/ reproductive structure of <i>Ectocarpus</i> through temporary preparation / permanent slides
8.	Study of vegetative/ reproductive structure of <i>Batrachospermum</i> through temporary preparation / permanent slides
9.	Contribution of various Phycologists
10.	Culturing of algae(Protocol)
11.	Fieldtrip/project/submission





	Practical (Part-B)
1	Asexual stage from temporary mounts and sexual structures through permanent slides.(Rhizopus)
2	Asexual stage from temporary mounts and sexual structures through permanent slides.(Penicillium)
3	Alternaria: Specimens/photographs and tease mounts
4	Puccinia: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores on Wheat and permanent slides of both the hosts
5	Agaricus: Specimens of button stage and full grown mushroom; Sectioning of gills of Agaricus.
6	Lichens: Study of growth forms of lichens (crustose, foliose and fruticose)
7	Mycorrhiza: ecto mycorrhiza and endo mycorrhiza (Photographs)
8	Study of <i>Riccia</i> – Morphology of thallus, capsule/ sporophyte /Permanent Slides)
9	Study of <i>Anthoceros</i> – Morphology of thallus, capsule/ sporophyte /Permanent Slides)
10	Study of <i>Nephrolepis</i> – plant morphology, mounting of sporangia
11	Funaria- Morphology, whole mount of leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, longitudinal section of capsule and protonema.
13	Cycas- morphology, t.s. coralloid root, t.s. leaflet, v.s. microsporophyll, w.m. spores (temporary slides)
14	Field trip/project/submission

Teaching-Learning Methodology	Observation of specimen Handling of specimen Using student's microscope Using certain required chemical for test Dissection of specimen
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	Preparing journal though drawing various figures with description Learn through charts/model Field visits for live experience. Preparing field visit note.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
3.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Gain hands-on experience of using various optical instruments and making temporary mountings.
2.	Identifying various plant and animal specimen through mountings of fresh specimens/charts/models.
3.	Understand characteristics of biological specimens.
4.	Carried out field visits to explore ecological understanding and learn range of biodiversity.

Suggested References:	
Sr. No.	References
1.	A text book of Practical Botany(vol I&II) by Bendre and Kumar
2.	Modern Practical Botany(vol I&II)byPandey B.P.

On-line resources to be used if available as reference material
On-line Resources
The virtual library of Botany
<a href="https://www.wiziq.com/tutorials/practical">https://www.wiziq.com/tutorials/practical</a>

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(Bachelor Of Science) (Botany-Minor)  
(B.Sc.) (Botany-Minor) Semester (II)

Course Code	US02MIBOT01	Title of the Course	Introduction to Archegoniate
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	1. Knowledge about structure, function, reproduction and economic importance of archegoniate.
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Course Content		
Unit	Description	Weightage* (%)
1.	<p><b>Introduction to Archegoniate:</b> Unifying features of archegoniate, Transition to land habit, Alternation of generations.</p> <p><b>Bryophytes:</b> General characteristics, adaptations to land habit, Classification, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of Riccia, Anthoceros, Sphagnum and Funaria (Developmental details not to be included). Ecology and economic importance of bryophytes with special mention of Sphagnum.</p> <p>Contribution of Prof. Shiv Ram Kashyap</p>	50
2.	<p><b>Pteridophytes</b> General characteristics, Classification (up to family), morphology, anatomy and reproduction of Lycopodium, Selaginella and Equisetum (Developmental details not to be included). Heterospory and seed habit, stelar evolution. Ecological and economical importance of Pteridophytes. Contribution of Prof. Birbal Sahni.</p> <p><b>Gymnosperms</b> General characteristics, Distribution, Classification (up to family), morphology, anatomy and reproduction of Cycas and Gnetum (Developmental details not to be included). Ecological and economical importance</p>	50







Teaching-Learning Methodology	Classroom interactions Multimedia presentation Chart/model presentation Live /preserved specimen observation Student seminar and unit test, quiz etc Question bank circulation Students assignments Student counselling for any problem of subject understanding Student-Teacher interaction on social media platform for any query (MS team, Google classroom, email, etc)
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	This course helps the students to gain knowledge theoretically and practically archegoniate like bryophytes, Pteridophytes and gymnosperms---their forms, structures, life cycles and their roles in maintaining biodiversity
2.	Know general characters and classification of all living forms of life.

Suggested References:	
Sr. No.	References
1.	Text book of Botany-Diversity of Microbes and Cryptogams-Singh,Pande and Jain
2.	Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot,Allahabad.





3.	Introductory Botany –Bendre and Pande
4.	Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
5.	Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.
6.	Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.

On-line resources to be used if available as reference material

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(Bachelor of Sciences) (Botany)  
(B.Sc.) (Botany-Minor) Semester (II)

Course Code	US02MIBOT02	Title of the Course	Practical
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	1. To get hands on training to use various biology laboratory equipment. 2. To do experiment as per the given syllabus through fresh/preserved specimen/slides/models/charts etc
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No	Practical
1.	Riccia – Morphology of thallus, Sex organs and sporophyte
2.	Anthoceros- Morphology of thallus, dissection of sporophyte (to show stomata, spores, pseudoeaters, columella) (temporary slide), vertical section of thallus (permanent slide).
3.	Sphagnum- Morphology of plant, whole mount of leaf (permanent slide only).
4.	Funaria- Morphology, whole mount of leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, longitudinal section of capsule and protonema.
5.	Study of Lycopodium
6.	Selaginella- Morphology, whole mount of leaf with ligule, transverse section of stem, whole mount of strobilus, whole mount of microsporophyll and megasporophyll (temporary slides), longitudinal section of strobilus (permanent slide).
7.	Equisetum- Morphology, transverse section of internode, longitudinal section of strobilus, transverse section of strobilus, whole mount of sporangiophore, whole mount of spores (wet and dry) (temporary slide), transverse section of rhizome (permanent slide)
8.	Cycas- Morphology (coralloid roots, bulbil, leaf), whole mount of microsporophyll, transverse section of coralloid root, transverse section of rachis, vertical section of leaflet, vertical section of microsporophyll, whole mount of spores (temporary slides), longitudinal section of ovule, transverse section of root (permanent slide).
9.	Contribution of various scientists in the field of archegoniate
10.	Submission/project/Fieldtrip





Teaching-Learning Methodology	Observation of specimen Handling of specimen Using student's microscope Using certain required chemical for test Dissection of specimen Preparing journal though drawing various figures with description Learn through charts/model Field visits for live experience. Preparing field visit note.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Gain hands-on experience of using various optical instruments and making temporary mountings.
2.	Identifying various plant and animal specimen through mountings of fresh specimens/charts/models.
3.	Understand characteristics of biological specimens.
4.	Carried out field visits to explore ecological understanding and learn range of biodiversity.

Suggested References:	
Sr. No.	References
1.	A text book of Practical Botany(vol I&II) by Bendre and Kumar
2.	Modern Practical Botany(vol I&II)byPandey B.P.
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On-line resources to be used if available as reference material
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(Bachelor Of Science) (Botany)  
(B.Sc.) (Botany-IDP) Semester (II)

Course Code	US02IDBOT01	Title of the Course	Plants and Human Welfare -II
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	To know very basics of plants used as fruits, sugar, oil crops and spices.
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Course Content		
Unit	Description	Weight age* (%)
1.	Fruits and Sugar Producing Plants: Common name, Botanical name ,family ,Variety, geographical distribution, important constituents and uses of :Mango,Date Palm,Banana,Apple,Grapes,Guava,Pomegranate,Papaya,Peach,Cherry,Jujube,Mulberry,Jamun,Watermelon,Muskmelon. Sugar Producing Plants: Sugarcane, Sugar Beet.	50
2.	Oil Crops: Common name, Botanical name ,family ,Variety, geographical distribution, important constituents and uses of : Groundnut,Castor,Linseed,Sesame,Mustard,Palm,Coconut,Khas. Spices and Condiments: Ginger,Turmeric,Cinnamon,Cloves,Saffron,Black Pepper,Cardamom,Red Pepper,Fennel,Corinder,Carway,Cumin,Celery,Indian Dill,Anise.	50

Teaching-Learning Methodology	Classroom interactions Multimedia presentation Chart/model presentation Live /preserved specimen observation Student seminar and unit test, quiz etc Question bank circulation Students assignments Student counselling for any problem of subject understanding
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	Student-Teacher interaction on social media platform for any query (MS team, Google classroom, email, etc)
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand outlines of plants used for human welfare such as fruits, sugars, oil crops and spices.
2.	Understand about basic food ingredients and their uses.

Suggested References:	
Sr. No.	References
1.	A text book of angiosperms by Singh, Pande and Jain.
2.	Economic botany by Dr.B.P.Pandey
3.	Economic botany by S.L.Kocher

On-line resources to be used if available as reference material
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**SARDAR PATEL UNIVERSITY**  
**Vallabh Vidyanagar, Gujarat**  
**(Reaccredited with 'A' Grade by NAAC (CGPA 3.11))**  
**Syllabus with effect from the Academic Year 2023-2024**

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**SARDAR PATEL UNIVERSITY**  
**Vallabh Vidyanagar, Gujarat**  
**(Reaccredited with 'A' Grade by NAAC (CGPA 3.11))**  
**Syllabus with effect from the Academic Year 2023-2024**

(Bachelor Of Sciences) (BOTANY)  
(B.Sc.) (BOTANY-) Semester (II)

Course Code	US02IDBOT02	Title of the Course	Practical
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	1. To get hands on training to use various plants. 2. To do experiment as per the given syllabus through fresh/preserved specimen/slides/models/charts etc
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Unit	Description
1.	Botanical name,Family,Morphology of : Mango, Date Palm,Banana,Apple,Grapes,Guava,
2	Botanical name,Family,Morphology of Pomegranate,Papaya,Peach,Cherry,Jujube
3.	Botanical name,Family,Morphology of Mulberry,Jamun,Watermelon,Muskmelon
4.	Botanical name,Family,Morphology of Groundnut,Castor,Linseed,Sesame
5.	Botanical name,Family,Morphology of Mustard,Palm,Coconut,Khas
6.	Botanical name,Family,Morphology of, Ginger,Turmeric,Cinnamon,Cloves,Saffron
7.	Botanical name,Family,Morphology of Black Pepper,Cardamom,Red Pepper, Fennel
8	Botanical name,Family,Morphology of Corinder,Carway,Cumin,Celery,Indian Dill,Anise
9	Field trip/Submission/ Project report
10.	

Teaching-Learning Methodology	Observation of specimen Handling of specimen Using student's microscope
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	Using certain required chemical for test Dissection of specimen Preparing journal though drawing various figures with description Learn through charts/model Field visits for live experience. Preparing field visit note.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand botanical name, family, important morphological characters and uses of fruits, oil yielding crops and spices.
Suggested References:	
Sr. No.	References
1.	A text book of Practical Botany(vol I&II) by Bendre and Kumar
2.	Modern Practical Botany(vol I&II)byPandey B.P.

On-line resources to be used if available as reference material
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(Bachelor of Sciences) (Botany)  
(B.Sc.) (Botany-SEC) Semester (II)

Course Code	US02SEBOT01	Title of the Course	Floriculture
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	<ul style="list-style-type: none"><li>• Describe career opportunities in the floriculture industry</li><li>• Growing, maintenance, and marketing of ornamental flowers.</li><li>• Explain the techniques in grading, bunching and shipping cut flowers in preparation for market</li><li>• List methods of classification of floral crops according to design, category, season availability and life span</li></ul>
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Course Content		
Unit	Description	Weightage* (%)
1.	Introduction: History of gardening; Importance and scope of floriculture and landscape gardening  Ornamental Plants: Flowering annuals; Herbaceous perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai.	50
2.	Commercial Floriculture: Factors affecting flower production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolus, Marigold, Rose, Liliun, Orchids).	50

Teaching-Learning Methodology	Classroom interactions Multimedia presentation Chart/model presentation Live /preserved specimen observation Student seminar and unit test, quiz etc Question bank circulation Students assignments Student counselling for any problem of subject understanding Student-Teacher interaction on social media platform for any query (MS team, Google classroom, email, etc)
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Identify and select different propagation methods, Handling of seed, bulbs, cut flowers, Nursery plants, pot plants.
2.	Identify Commercial Flowers and their packaging.
3.	Carry out Protected cultivation of flower.

Suggested References:	
Sr. No.	References
1.	Arora JS. 2006. Introductory Ornamental horticulture. Kalyani.
2.	Bhattacharjee SK. 2006. Advances in Ornamental Horticulture. Vols. I-VI. Pointer Publ.
3.	Chadha KL & Chaudhury B. 1992. Ornamental Horticulture in India. ICAR.
4.	Floriculture. Indian Society of Ornamental Horticulture, New Delhi.

On-line resources to be used if available as reference





On-line Resources

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