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VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

યુનિવર્સિટી કેમ્પસ, ઉદ્ધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન બોટની વિષયની તમામ અનુસ્નાતક કોલેજોનાં આચાર્યશ્રીઓ તથા ડિપાર્ટમેન્ટનાં વડાશ્રીને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૨-૨૩ થી અમલમાં આવનાર M.Sc. Botany વિષયનો સેમે. -૧ નો અભ્યાસક્રમ વનસ્પતિશાસ્ત્ર વિષયની અભ્યાસ સમિતિ અને વિષયનાં નિષ્ણાંતો ધ્વારા NEP-2020 મુજબ તૈયાર કરેલ M.Sc. Botany Sem-1 અભ્યાસક્રમ બોર્ડ વતી ચેરમેનશ્રીએ અને વિજ્ઞાન વિદ્યાશાખાનાં ડીનશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલ તા. ૧૭/૦૬/૨૦૨૨ ની સભાનાં ઠરાવ ક્રમાંક: ૪૮ થી સ્વીકારી મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા. ૧૭/૦૬/૨૦૨૨ની ઠરાવ ક્રમાંક: ૪૮

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૨-૨૩ થી અમલમાં આવનાર M.Sc. Botany વિષયનો સેમે.-૧ નો અભ્યાસક્રમ વનસ્પતિશાસ્ત્ર વિષયની અભ્યાસ સમિતિ અને વિષયનાં નિષ્ણાંતો ધ્વારા NEP-2020 મુજબ તૈયાર કરેલ M.Sc. Botany Sem-1 અભ્યાસક્રમ બોર્ડ વતી ચેરમેનશ્રીએ અને વિજ્ઞાન વિદ્યાશાખાનાં ડીનશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ સ્વીકારી મંજૂર કરવામાં આવે છે.

(બિડાણ: ઉપર મુજબ)

ક્રમાંક : એસ./બોટની/સિલેબસ/પરિપત્ર/૧૩૦૨૫/૨૦૨૨

તા. ૨૨-૦૬-૨૦૨૨


ઈ.ચા. કુલસચિવ

પ્રતિ,

૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન બોટની વિષયની તમામ અનુસ્નાતક કોલેજોનાં આચાર્યશ્રીઓ. તથા ડિપાર્ટમેન્ટનાં વડાશ્રી.

.....આપશ્રીની કોલેજ/વિભાગના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારું.

૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.

૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારું.



વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
Veer Narmad South Gujarat University
સત્યમ્ જ્ઞાનમ્ અનન્તમ્

NATIONAL EDUCATION POLICY – 2020

Report on
Proposed Model Syllabus for
Post Graduate Programme (M.Sc.)
in
Veer Narmad South Gujarat University, Surat
Under
NEP – 2020
In
BOTANY

M.Sc. BOTANY REVISED SYLLABUS (Academic Flexibility) (Credit System) (NEP – 2020)

Syllabus for the Semester System Examination (Academic Flexibility, Credit System, NEP - 2020) w.e.f. June 2022 for M.Sc. Part - I (Semester I & II) and for M.Sc. II (Semester III & IV) from June 2023.

- 1) The entire course of M. Sc. (Botany) will be of four semesters spread over two years.
- 2) There shall be four theory (three core and one elective) papers and three practical papers (each based on core theory paper) in every semester. Each semester course shall comprise of four units per theory paper per week.
- 3) Each unit in theory paper shall comprise of 15 lectures of 1-hour duration and there shall be four lectures per theory paper per week. There shall be three practicals (each with not less than three hour duration) per week. Library (Reference) work/ Excursion/ Field Work/Seminar –Group Discussion/Project Work shall also be conducted in every week.
- 4) Among the four Theory papers there shall be one elective paper per semester.
- 5) The candidates should study the typical vegetation in natural condition. There shall be at least one short tour per year for all students. There shall be one long tour (within two years) out of the state to Botanical Regions, floristic rich area, Research Institutes / Centers. All excursion tours, short and long, are obligatory to each student and submission of study report is compulsory.
- 6) For the elective theory paper, there may be more than one paper offered in a given semester, in which case students can choose any one theory paper based on their interest.
- 7) Similarly, for the skill based theory paper, there may be more than one paper offered in a given semester, in which case students can choose any one theory paper based on their interest.

Further, students have to also obtain certificate of online course done at UGC/MoE (Ministry of Education) recognized web portals such as SWAYAM/ NPTEL/MOOCs etc.

- 8) In the fourth semester there shall be a dissertation work (Botany practical XII) to be done by each student independently under the supervision of allotted faculty and submit a dissertation/thesis in partial fulfillment for the award of M.Sc. degree in Botany.
- 9) Candidates shall require to produce, the following at the time of practical examination (at the end of each semester). :-
 - Every candidate shall complete laboratory course in accordance with the regulations issued from time to time by Academic Council on the recommendation of the Board of Studies.
 - Every candidate shall record observation directly in the laboratory journal. Every journal shall be signed periodically. At the end of the semester candidate shall produce certified journal during the practical examination.

- A set of micro preparations (semi / permanent) of plant materials illustrating the subject matter of the relevant paper.
- Uncertified Journal will not be considered for evaluation the candidate may not be allowed to appear in the examination at the discretion of subject chairman.
- At least 20-25 Herbarium specimens and preserved specimens (preferably of weeds) collected by the Candidate during the field work or excursion tour.

Frame work for M.Sc. Sem. I to III						
Theory Paper/Practical	Teaching schedule Hrs/week	Exam Schedule			Total Marks	Credit
		Duration (Hrs)	Internal Marks	External Marks		
Theory Papers:						
Core Paper I	4	3	30	70	100	4
Core Paper II	4	3	30	70	100	4
Core Paper III	4	3	30	70	100	4
Inter/Multi-Disciplinary Elective Paper	4	3	30	70	100	4
Practicals:						
Practical based on Core Paper I to III	12	10-15	50	100	150	6
Skill based elective paper/Swayam/other Mool Courses	2	2	20	30	50	2
		Total	190	410	600	24

- **Pedagogy :** Lectures, Practicals, Field and laboratory visit, Participatory Learning, Seminars, Assignments, Specimen submission etc.

Formative Assessment for theory	
Assessment Occasion/Type	Weightage in Marks
Attendance & Discipline	5
Assignment (per unit one)	10
Seminar	5
Test	10
Formative Assessment for Practical	
Regularity	5
Practical skill (Sectioning, Drawing, Labeling, Record Keeping etc.)	10
Submission (Herbarium, Specimen, Slides, Tour Report etc.)	10
Model Examination/Viva	25

Frame work for M.Sc. Sem. IV						
Theory Paper/Practical	Teaching schedule Hrs/week	Exam Schedule			Total Marks	Credit
Theory Papers:		Duration (Hrs)	Internal Marks	External Marks		
Core Paper I	4	3	30	70	100	4
Core Paper II	4	3	30	70	100	4
Core Paper III	4	3	30	70	100	4
Inter/Multi-Disciplinary Elective Paper	4	3	30	70	100	4
Practicals:						
Practical based on Core Paper I to III	6	10-15	50	50	100	3
Dissertation work		10-15	-	50	50	3
Skill based elective paper/Swayam/other MOOC Courses	2	2	20	30	50	2

Programme Outcome and Programme Specific Outcome

Subject Botany

POST-GRADUATION COURSES

In accordance with NEP 2020, the M.Sc. Botany program is designed with the following learning and subject specific outcomes to encourage and popularize the subject of Botany among the biology students in order to make it useful for their career building as well as to incorporate the essence of plant sciences and their importance in the ecology and environment.

Keeping in mind that these students can take up teaching at different levels, research work in research institutes and or industry, doctoral work, environment impact assessment, biodiversity studies entrepreneurship. scientific writing relevant topics have been included in the curriculum.

M. Sc. Botany Program and Course Outcome

On completion of program students will be able to

1. Appreciate the Botany subject as a discipline and its importance in the current scenario of the world.
2. Identify and appropriately classify the plants by using the key characters under a known and established system of classification.
3. Prepare and view specimens for examination using light microscopy.

4. Use pure culture and selective techniques to isolate fungi, plant pathogens, algae and identify them growing on media.
5. Demonstrate the various techniques of plant tissue culture and micro-propagation of economically and ecologically important plant species.
6. Qualitative and quantitative estimation of biodiversity components.
7. Use appropriate plant molecular techniques and use of instrumentation related to it.
8. Practice safe laboratory procedures, using appropriate protective, biosafety and emergency procedures.
9. Documentation and report writing on experimental protocols, results and conclusions, study tours and field visits etc.
10. Understand the need for research work and Conduct independent research work in an appropriate and scientific manner and be able to prepare scientific reports/articles.
11. Analyze and interpret results generated through studies in botany, taxonomical treatments, field studies, excursion tours and laboratory techniques used in the subject.
12. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development with respect to assessment, conservation and utilization of floral diversity
13. Understand the importance of medicinal plants and its potential in the market.

Semester -1

Paper No.	Title of paper	Type of Paper	Credit
1001	Biology and Diversity of Microbes	Core-1	4
1002	Mycology and plant Pathology	Core-2	4
1003	Phycology and Lichen	Core-3	4
1004	Organic Farming and Sustainable Agriculture	Elective	4
1005	Medicinal Plants	Skill based Elective (any one)	2
	Mushroom Cultivation		

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER - I
BOTANY PAPER - 1001
(Biology And Diversity of Microbes)
(Effective from June 2022)

Number of Theory Credits	Number of Lecture hours/semester	Number of Practical Credits	Number of Practical hours/semester
4	60	2	60

➤ **Course Outcome:**

- 1) To teach fundamentals of Botany and its applications
- 2) The syllabus pertaining to M.Sc. (2 years- i.e., 4-Semester Degree Course) in subject of Botany has been prepared as per norms of New Education Policy, 2020 UGC module and demand of present academic scenario.
- 3) To update course contents by introducing in good measure recent development in plant sciences and to ensure that student of this university do not have any academic disadvantages over their counterparts in India and overseas.
- 4) To make provision for improvement in the quality of laboratory and field work for want of which the students are able to appreciate the beauty and variety of form, structure, function and ecological significance of plant and their biological services.

BOT 1001: <u>Biology and Diversity of Microbes</u>		
	Content of Theory Course	60 Hours
<u>Unit – I:</u>	<u>Microscopy</u>	15 Hours
Chapter No. 1	What is microscope and Microscopy?	2 Hours
Chapter No. 2	Types of microscopes and its uses (Light, Phase contrast, Fluorescence and Electron microscope-SEM, TEM)	4 Hours
Chapter No. 3	Types of microscopy (Optical, Scanning prob. microscopy and Electron microscopy)	4 Hours
Chapter No. 4	Principles of microscopy (Magnification, Resolution, Numerical Aperture, Illusion and Focusing)	5 Hours
<u>Unit-II</u>	<u>History of virology, Classification of Virus</u>	15 Hours
Chapter No. 1	What is Virus? History and Timeline of Virology Classification of Viruses	3 Hours
Chapter No. 2	Morphology and structure of viruses	4 Hours
Chapter No. 3	Methods of transmission of Viruses Properties of Virus Symptoms of viral infection on plants.	4 Hours
Chapter No. 4	Bacteriophage and TMV	4 Hours

Unit-III	Biology of Bacteria	15 Hours
Chapter No. 1	Detailed study of bacteria with reference to their Ultra-structure The Size, Shape, and Arrangement of Bacterial Cells Ultra-Structure of Bacterial cell Structures External to the Cell Wall Flagella and Motility •Pili (Fimbriae) •Capsules •Sheaths •Prosthecae and Stalks The Cell Wall - Structure and Chemical Composition	5 Hours
Chapter No. 2	Reproduction & Growth Modes of Cell Division- Binary fission, Budding, Fragmentation, Formation of conidio spores and sporangio spores Sexual reproduction-Bacterial conjugation with sex factor. Growth-Normal Growth Cycle (Growth Curve) of Bacteria	5 Hours
Chapter No. 3	Economic and Industrial importance of Bacteria	3 Hours
Chapter No. 4	Harmful activities of Bacteria	2 Hours
Unit-IV	Fermentation Technology	15 Hours
Chapter No. 1	Introduction and Basic Principle of fermentation technology	2 Hours
Chapter No. 2	Types of fermentation Lactic acid homo fermentation Lactic acid hetero fermentation Propionic acid fermentation Alcoholic fermentation Butyric acid fermentation	5 Hours
Chapter No. 3	Application of fermentation Application in medicine Application in food industries Other Application	6 Hours
Chapter No. 4	Limitation of fermentation	2 Hours

References

- Virus: An Illustrated Guide to 101 Incredible Microbes Marilyn J. Roossinck
- Plant Viruses : Diversity, Interaction and Management- Dorokhov, Yuri, Gaur, Rajarshi Kumar, Khurana, SMP
- Plant Pathology-George N Agrios 5th Ed.
- Virus-insect-plant interactions- Kerry F. Harris, Oney P. Smith and James E. Duffus
- Plant Immunity against Viruses. Jian-Zhong Liu¹, Feng Li and Yule Liu.
- Micro biology by Michael J. Pelczar, JR., E. C. S. Chan
- Prescott's Microbiology
- Bergey's Manual of Systematic Bacteriology

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR M.Sc. SEMESTER - I

BOTANY PRACTICAL - 1 BASED ON PAPER 1001

(Biology and Diversity of Microbes)

(Effective from June 2022)

➤ **Course Outcome:**

- 1) To update course contents by introducing in good measure recent development in plant sciences and to ensure that student of this university do not have any academic disadvantages over their counterparts in India and overseas.
- 2) To make provision for improvement in the quality of laboratory and field work for want of which the students are able to appreciate the beauty and variety of form, structure, function and ecological significance of plant and their biological services.

	Content of Practical Course : List of Experiments to be conducted	60 Hours
Practical:1	Introduction to Compound Microscope	
Practical:2	Structure and function of Florescence Microscope.	
Practical:3	Structure and Function Electron Microscope (SEM)	
Practical:4	Structure and Function Electron Microscope (TEM)	
Practical:5	To study different types (shape) of Bacteria.	
Practical :6	Gram Staining of Bacteria	
Practical:7	Micrometry for the Bacteria slide.	
Practical:8	Aseptic methods and working and principle of instruments – Autoclave	
Practical : 9	Aseptic methods and working and principle of instruments –Laminar Air flow	
Practical:10	Aseptic methods and working and principle of instruments – Hot air oven	
Practical:11	Aseptic methods and working and principle of instruments –Incubator.	
Practical :12	Direct examination of root nodule bacteria under microscope.	
Practical:13	Study of Viruses by chart or Specimen – TMV, CaMV, Potato Virus, Tomato yellow leaf Curl virus, Ralstonia Phage Virus.	
Practical :14	Fermentation of Sugars by E. coli	
Practical:15	Fermentation of Sugars by yeast	

References :

- 1 Practical Microbiology Vol.1 and 2- Rakesh Patel
- 2 Practical Botany vol-1 and 2 by B. P. Pandey
- 3 Fermentation -
https://www.csus.edu/indiv/l/landerholmt/documents/bio02/lab%2011%20fermentation_spr10.pdf

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER - I
BOTANY PAPER – 1002
(Mycology and Plant Pathology)
(Effective from June 2022)

Number of Theory Credits	Number of Lecture hours/semester	Number of Practical Credits	Number of Practical hours/semester
4	60	2	60

Course outcome

1. Students will be able to understand important characters of fungi and their life cycle.
2. Students can compare & contrast in writing theory as well as practical's of fungi.
3. At the end of the course, students should be able to identify various plant diseases and their control measures.

BOT 1002 : Mycology and Plant Pathology		
Content of Theory Course		60 Hours
Unit - I:	Mycology-I	15 Hours
Chapter No. 1	Fungi General Characters (Hyphal structure, modification of hyphae, reproduction)	4 Hours
Chapter No. 2	Classification of Fungi (Alexopoulos 1968)	4 Hours
Chapter No. 3	Parasexuality in Fungi (Mechanism of Parasexual cycle and applications of Parasexuality)	4 Hours
Chapter No. 4	Edible Fungi: Mushrooms and their cultivation Economic importance of Fungi (Useful activities and Harmful activities)	3 Hours
		15 Hours
Unit - II:	Mycology-II	
Chapter No. 1	Occurrence, classification, thallus, cell structure, nutrition and reproduction of: <ul style="list-style-type: none"> • <i>Phytophthora</i> • <i>Rhizopus</i> • <i>Penicillium</i> • <i>Claviceps</i> • <i>Ustilago</i> • <i>Colletotrichum</i> 	15 Hours
Unit - III:	Plant Pathology -I	15 Hours
Chapter No. 1	Plant disease introduction <ul style="list-style-type: none"> • Pathogenesis (Pre-penetration changes, Penetration process, Post-penetration changes) 	4 Hours

Chapter No. 2	General symptoms of plant diseases <ul style="list-style-type: none"> • Symptoms due to the Nature, Structure and Appearance of visible pathogen • Anatomical and Morphological symptoms on Host 	4 Hours
Chapter No. 3	Classification of Plant diseases <ul style="list-style-type: none"> • On the basis of Infection • On the basis of Pathogen • On the basis of Occurrence and geographical distribution • On the basis of perpetuation of spread 	3 Hours
Chapter No. 4	Disease control <ul style="list-style-type: none"> • Prophylatic measure • Curative measures • Biological measures 	4 Hours
Unit - IV :	Plant Pathology -II	15 Hours
Chapter No. 1	Bacterial Diseases of Plants <ul style="list-style-type: none"> • Bacterial blight of Cotton • Bacterial blight of Paddy 	4 Hours
Chapter No. 2	Viral Diseases of Plants <ul style="list-style-type: none"> • Leaf curl of Papaya • Yellow Vein Mosaic of Bhindi 	4 Hours
Chapter No. 3	Fungal Diseases of Plants <ul style="list-style-type: none"> • Red rot of Sugarcane • Apple scab 	3 Hours
Chapter No. 4	Mycoplasmal Disease of Plants <ul style="list-style-type: none"> • Little leaf of Brinjal Abiotic diseases <ul style="list-style-type: none"> • Mango black tip • Blossom rot of tomato 	4 Hours

REFERENCES :

- 1 Alexopoulos, C. J., Mims, C. W. and Blackwel, M., Introductory Mycology, John Wiley & Sons Inc.
- 2 Mandahar, C. L. Introduction to Plant Viruses. Chand & Co. Ltd., Delhi.
- 3 Mehrotra, R. S. and Aneja, R. S. An Introduction to Mycology. New Age Intermediate Press.
- 4 Rangaswamy, G. and Mahadevan, A. 1999. Diseases of Crop Plants in India. Prentice Hall of India Pvt. Ltd., New Delhi.
- 5 Singh R S. Plant diseases. 6th edition. Oxford and IBH, New Delhi.
- 6 Singh R.S. Principles of plant pathology. 3rd edition. Oxford and IBH, New Delhi.
- 7 H C Dube: An introduction to Fungi. (Fourth edition) Scientific publishers (India).
- 8 Singh, Pande and Jain. A text book of Botany. Rastogi Publications. Meerut.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER -I
BOTANY PRACTICAL-II BASED ON PAPER 1002
(Mycology and Plant Pathology)
(Effective from June 2022)

➤ **Course Outcome:**

1. Students will be able to understand important characters of fungi and their life cycle.
2. Students can compare & contrast in writing practical's of fungi.
3. Students should be able to identify various plant diseases and their control measures.

	Content of Practical Course : List of Experiments to be conducted	60 Hours
Practical :1	Study of distinguishing morphological, anatomical, reproductive characters, classification and identification of the <i>Phytophthora</i> .	
Practical :2	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Rhizopus</i>	
Practical :3	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Penicillium</i>	
Practical :4	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Claviceps</i>	
Practical :5	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Ustilago</i>	
Practical :6	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Colletotrichum</i>	
Practical :7	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Morchella</i>	
Practical :8	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Ganoderma</i>	
Practical :9	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Polyporus</i>	
Practical :10	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Synchytrium</i>	
Practical :11	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Alternaria</i>	
Practical :12	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Peronospora</i>	
Practical :13	Study of distinguishing morphological anatomical, reproductive characters, classification and identification of the <i>Balanophora</i>	
Practical :14	Causal organisms/agent, symptoms and control measures of the following plant diseases. Bacterial Diseases of plants <ul style="list-style-type: none"> • Bacterial blight of Cotton • Bacterial blight of Paddy 	

Practical :15	Causal organisms/agent, symptoms and control measures of the following plant diseases. Viral Diseases of plants <ul style="list-style-type: none"> • Leaf curl of Papaya • Yellow Vein Mosaic of Bhindi 	
Practical :16	Causal organisms/agent, symptoms and control measures of the following plant diseases. Fungal Diseases of plants <ul style="list-style-type: none"> • Red rot of Sugarcane • Apple scab 	
Practical :17	Causal organisms/agent, symptoms and control measures of the following plant diseases. Mycoplasmal Disease of Plants <ul style="list-style-type: none"> • Little leaf of Brinjal Abiotic diseases <ul style="list-style-type: none"> • Mango black tip • Blossom rot of tomato 	
Practical: 18	<ul style="list-style-type: none"> • Student should collect and identify common field Fungi and submit a field report of collection activities. • Student should collect and identify common diseased plant samples and submit a field report of collection activities. 	

REFERENCES :

- 1 Practical Botany vol-1 and 2 by B. P. Pandey
- 2 A text book of Practical Botany -1 by Bendre and Kumar. Rastogi Publications. Meerut.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER - I
BOTANY PAPER – 1003
(Phycology and Lichen)
(Effective from June 2022)

Number of Theory Credits	Number of Lecture hours/semester	Number of Practical Credits	Number of Practical hours/semester
4	60	2	60

➤ **Course Outcome:**

- 1) To increase the understanding of the students about the diversity of algae.
- 2) The students will develop understanding about the diversity, Identification, Classification and economic importance of algae.
- 3) To acquaint students with algal diversity and its ecological and economic importance
- 4) To acquaint students with Lichen diversity and its ecological and economic importance

BOT 1003 : (Phycology and Lichen)			
Content of Theory Course			60 Hours
Unit - I:			15
Chapter No. 1	Introduction to Phycology		5
	General Characters of Algae Algal diversity with respect to habit and thallus Similarities and Dissimilarities with Fungi and Bryophytes		
Chapter No. 2	Classification of Algae		4
	G.M. Smith's classification		
Chapter No. 3	Algal Occurrence		2
	Aquatic Algae, Terrestrial Algae Lithophytic Algae, Halophytic Algae, Epibiotic Algae, Epipelagic Algae, Thermal Algae, Cryophytic Algae, Epiphytic Algae, Endophytic Algae, Epizoic and Endozoic Algae, Parasitic Algae, Planktons, Calcific Algae, Algae in Lichen		
Chapter No. 4	Reproduction in Algae		4
	Vegetative Reproduction Asexual Reproduction Sexual Reproduction		
Unit - II:			10
Chapter No. 1	Life Cycles in Algae		3
	Haplontic Life cycle, Diplontic Life Cycle, Diplohaplontic Life cycle, haplobiontic Life Cycle, Haplodiplontic Life Cycle		
Chapter No. 2	Methods of Algal Study		3
	Observation algae in the field, Collection of Algae, Preservation of Algae, Preparation of Herbarium Specimens of Algae, Preparation of Temporary Mounts of Algae, Method of Preparation of Permanent algal Slides		
Chapter No. 3	Economic Importance of Algae		2

	Beneficial Aspects Negative Aspects Application of Algology		
Chapter No. 4	Sexual Reproduction in Algae	2	
	Origin and Evolution of Sex in Algae		
Unit - III:		20	
	Classification (as per Smith's System), Morphology, Cell Structure, Reproduction and Life cycle of following types:		
Chapter No. 1	Myxophyceae	4	
	<i>Lyngbya, Scytonema</i>		
Chapter No. 2	Chlorophyceae	8	
	<i>Hydrodictyon, Zygnema, Nitella</i>		
Chapter No. 3	Phaeophyceae	4	
	<i>Fucus</i>		
Chapter No. 4	Rhodophyceae	4	
	<i>Gracilaria</i>		
Unit - IV:		15	
Chapter No. 1	General Account of Lichens	5	
	Introduction, Occurrence, General Characters of Lichens, Nature of Fungal and Algal Association in Lichens, Ecology and Physiology of Lichen		
Chapter No. 2	Classification and Structure of Lichen	3	
	Classification and thallus structure of Lichens		
Chapter No. 3	Importance of Lichens	3	
	Economic and Ecological importance of Lichens		
Chapter No. 4	Usnea	4	
	Classification, Morphology, Internal Structure, Reproduction and Economic Importance of <i>Usnea</i>		

REFERENCES:

- 1 Phycology by Annie Ragland; Saras publication
- 2 An introduction to Algae by V.K. Gupta and Y. P. Varshneya; Kendarnath Ram Nath Publishers
- 3 An Introduction to Algae by Suresh Kumar; Campus books.
- 4 An Introduction to Algae by Ian Morris; Hutchinson University Library
- 5 A text book of Algae by S.K. Sarkar; Central book depot
- 6 A text book of Botany: The Algae by Brahma Prakash Pandey; Jai Prakash Nath and Co.
- 7 A class book of Algae by G.L. Chopra; S. Hagin and Co.
- 8 A text book on Algae by H.D. Kumar and H.S. Singh; East-west press.
- 9 Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
- 10 Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
- 11 Fritsch F.E. (1935 The Structure & Reproduction of Algae 1945): Cambridge University Press Cambridge, U.K. Vol. I, Vol. II.
- 12 Smith, G.M (1955) :Cryptogamic Botany(Vol. I Algae, Fungi, & Lichens) McGraw-Hill Book Co., New York .

- 13 Ian Morris (1967): An Introduction to the Algae, Hutchinson, London.
- 14 A Textbook of Botany vol. I and II S.N. Pandey, P. S. Trivedi and S. P. Misra., Vikas Publication House Pvt. Ltd.
- 15 Collage Botany Vol. I & II Das, Dutta, Gangulce and Kar., New Central Book Agency
- 16 Algae, Fungi, Bryophyte, Pteridophyte by Vashishta., S. Chand Pub, New Delhi

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER - I
BOTANY PRACTICAL – III BASED ON PAPER 1003
(Phycology and Lichen)
(Effective from June 2022)

➤ Course Outcome:

- 1) Students will be able to understand important characters of algae and their life cycle.
- 2) Students should be able to identify various group of algae.

	Content of Practical Course : List of Experiments to be conducted	60 Hours
Practical :1	To study algae <i>Lyngbya</i> . (Permanent Slide : Lyngbya WM)	
Practical :2	To study algae <i>Scytonema</i> . (Permanent Slide : Scytonema WM)	
Practical :3	To study algae <i>Gleocapsa</i> . (Permanent Slide : Gleocapsa WM)	
Practical :4	To study algae <i>Anabaena</i> . (Permanent Slide : Anabaena WM)	
Practical :5	To study algae <i>Pandorina</i> . (Permanent Slide : Pandorina WM)	
Practical :6	To study algae <i>Hydrodictyon</i> . (Permanent Slide : Hydrodictyon WM)	
Practical :7	To study algae <i>Pediastrum</i> . (Permanent Slide : Pediastrum WM)	
Practical :8	To study algae <i>Ulva</i> . (Permanent Slide : Ulva WM)	
Practical :9	To study algae <i>Pithophora</i> . (Permanent Slide : Pithophora WM)	
Practical :10	To study algae <i>Zygnema</i> . (Permanent Slide : Zygnema WM, Zygnema Conjugation)	
Practical :11	To study algae <i>Nitella</i> . (Permanent Slide : Nitella WM, Nitella Reproductive Structure)	
Practical :12	To study algae <i>Fucus</i> .	
Practical :13	To study algae <i>Gracilaria</i> .	
Practical :14	To study lichen <i>Usnea</i> .	
Practical :15	Student should collect and identify common field Algae and prepare a field report of collection activities in the journal itself.	

References:

1. Practical Botany vol-1 and 2 by B. P. Pandey
2. A text book of Practical Botany -1 by Bendre and Kumar. Rastogi Publications. Meerut.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER –I
BOTANY ELECTIVE PAPER -1004
(ORGANIC FARMING & SUSTAINABLE AGRICULTURE)
(Effective from June 2022)

Number of Theory Credits	Number of Lecture hours/semester	Number of Practical Credits	Number of Practical hours/semester
4	60	-	-

➤ **Course Outcome:**

1. Students will be able to understand the process and importance of organic farming.
2. Students can understand the methods of plant protection by organic methods and certification process for organic farming.

BOT 1004 : ORGANIC FARMING & SUSTAINABLE AGRICULTURE		
Content of Theory Course		60 Hours
Unit - I:	Concept of organic farming	15 Hours
Chapter No. 1	<ul style="list-style-type: none"> • Introduction: Farming, organic farming, concept and development of organic farming. 	4 Hours
Chapter No. 2	<ul style="list-style-type: none"> • Principles of organic farming, types of organic farming, biodynamic farming. 	3 Hours
Chapter No. 3	<ul style="list-style-type: none"> • Benefits of organic farming, need for organic farming, conventional farming v/s organic farming 	4 Hours
Chapter No. 4	<ul style="list-style-type: none"> • Scope of organic farming; National and International status. • Agencies and institutions related to organic agriculture. <p>Requirements for organic farming, farm components for an organic farm.</p>	4 Hours
Unit - II:	Organic plant nutrient management	15 Hours
Chapter No. 1	<ul style="list-style-type: none"> • Organic farming systems, soil tillage, land preparation and mulching. • Choice of varieties of plants for organic farming. 	4 Hours
Chapter No. 2	<ul style="list-style-type: none"> • Propagation-seed, planting materials and seed treatments, water management. • Green manuring, composting- principles, stages, types and factors, composting methods and Vermi composting 	4 Hours
Chapter No. 3	<ul style="list-style-type: none"> • Bulky organic manures, concentrated organic manures, organic preparations, organic amendments and sludge. 	4 Hours
Chapter No. 4	<ul style="list-style-type: none"> • Bio-fertilizers- types, methods of application, advantages and 	3 Hours

	disadvantages, standards for organic inputs- fertilizers	
Unit - III :	Organic plant protection	15 hours
Chapter No. 1	<ul style="list-style-type: none"> Plant protection- cultural, mechanical, biopesticides and biological control agents. 	5 Hours
Chapter No. 2	<ul style="list-style-type: none"> Weed management in Organic farm. 	5 Hours
Chapter No. 3	<ul style="list-style-type: none"> Standards for organic inputs- plant protection. 	5 Hours
Unit - IV :	Organic practices and certification	15 Hours
Chapter No. 1	Organic crop production practices <ul style="list-style-type: none"> Organic crop production methods- rice and mango Organic crop production methods- vegetables- okra, amaranthus and cucurbits Livestock component in organic farming Sustainable Agriculture-Apiculture 	7 Hours
Chapter No. 2	Organic Certification <ul style="list-style-type: none"> Farm economy: Basic concept of economics- demand & supply, economic viability of a farm. Basic production principles, reducing expenses, ways to increase returns, cost of production system. Benefit/ cost ratio, marketing, imports and exports. Policies and incentives of organic production Farm inspection and certification Terrace farming 	8 Hours

REFERENCES :

- 1 Palaniappan SP & Anandurai K. 1999. Organic Farming–Theory and Practice. Scientific Publishers, Jodhpur
- 2 Joshi, M. 2014. New Vistas of Organic Farming 2nd Ed. Scientific Publishers, Jodhpur.
- 3 Farming system : Theory and Practice - S.A.Solaimalai
- 4 Organic Farming: Theory and Practice- S.P.Palaniappan and K.A. Annadurai
- 5 A hand book of Organic Farming by A.K.Sharma

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER - I
Skill Based Elective Paper – 1005
(Mushrooms Cultivation)
(Effective from June 2022)

Number of Theory Credits	Number of Lecture hours/semester	Number of Practical Credits	Number of Practical hours/semester
2	30	-	-

➤ Course Outcome:

- 5) Student can become self sustain by gaining the thorough knowledge of edible mushroom and its cultivation.
- 6) Student can start own startup and be an entrepreneur.

BOT 1005 : Mushrooms Cultivation		
	Content of Theory Course	30 Hours
Unit - I:	Introduction to Mushrooms	6 Hours
Chapter No. 1	Common future	1 Hours
Chapter No. 2	Types of Mushrooms	1 Hours
Chapter No. 3	Importance of Mushrooms	2 Hours
Chapter No. 4	Biology of Mushrooms (Reproduction)	2 Hours
Unit - II:	Cultivation of Mushrooms -I	8 Hours
Chapter No. 1	Commercial cultivation of Mushrooms	3 Hours
Chapter No. 2	Selection of Importance types of Mushrooms for cultivation.	3 Hours
Chapter No. 3	Designing and construction of Mushrooms farm.	2 Hours
Unit - III:	Cultivation of Mushrooms -II	8 Hours
Chapter No. 1	Process and using of Mushrooms spawn	3 Hours
Chapter No. 2	Selection of correct Mushrooms spawn	3 Hours
Chapter No. 3	Disease control, pest management activity and mites controls.	2 Hours
Unit - IV:	Post Harvesting procedure	8 Hours
Chapter No. 1	Identification of quality Mushrooms, Harvesting, Cleaning, Packing, Storage and grading of Mushrooms	3 Hours
Chapter No. 2	Use of Mushrooms	2 Hours
Chapter No. 3	Preparation of Value added products of Mushrooms(Pickle, Powder, Papad and different items of food)	3 Hours

REFERENCES :

- 1 Manual for Mushroom Cultivation by Chenjerayi Kashangura (2004)
- 2 Mushroom Cultivation in India, Daya Publishing House by BC Suman and VP Verma (2007)
- 3 Text book of Horticulture, Macmilan India Limited by K. Manibhusan Rao (2005)

- 4 Improved Agriculture and allied practices for Farmers, New India publishing Agency, New Delhi by JPS Dabas (2019)
- 5 Modern Mushroom Cultivation, Agrobios (India) by Ritti Singh (2005)
- 6 Mushroom cultivation and processing, Asia Pacific Business Press by NIIR Board of Consultants and Engineers (2006)
- 7 Hand book of Mushrooms, oxford and IBH publishing Company by Nita Bahi (1984)
- 8 Mushroom cultivation, Process and Uses, Agrobios (India) by BC Suman and VP Sharma (2006)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER -I
SKILL BASED ELECTIVE PAPER– 1005
(Medicinal plant)
(Effective from June 2022)

Number of Theory Credits	Number of Lecture hours/semester
2	30

➤ Course Outcome:

- 7) Students will learn to identify the important medicinal plants
- 8) Students will learn the uses and commercial importance of medicinal plant
- 9) This paper will prepare students to get job in pharma company.
- 10) Student will learn to conserve and plant more medicinal plant which can be commercially helpful

BOT : Medicinal plant		
Content of Theory Course		30 Hours
Unit - I :	Introduction to Medicinal Plants	8
Chapter No. 1	Definition, History and development of Medicinal Plants in India and other countries of the world	3
Chapter No. 2	Present status of Medicinal Plants	
Chapter No. 3	Medicinal Plants conservation and issues	2
Unit - II :	National Medicinal Plant Board	7
Chapter No. 1	National Medicinal Plant Board, objectives and Functions	4
Chapter No. 2	Herbal Industries in India	3
Unit - III :	Identification, geographical distribution and Importance of some Medicinal Plants	8
Chapter No. 1	<i>Asparagus racemosus</i> <i>Boerhavia diffusa</i> <i>Tphrosia purpuria</i>	2
Chapter No. 2	<i>Withania somnifera</i> <i>Terminalia arjuna</i> <i>Moringa olifera</i>	2
Chapter No. 3	<i>Vitex negundo</i> <i>Madhuka indica</i> <i>Terminalia chebula</i>	2
Chapter No. 4	<i>Terminalia bellirica</i> <i>Sterculia urens</i> <i>Commiphora wightiana</i>	2
Unit - IV :	Traditional System of Medicine in India	7

Chapter No. 1	Introduction to Traditional System of Medicine in India (Ayurveda, Unani and Homeopathy)	3
Chapter No. 2	Importance of Traditional System of Medicine (TSM)	2
Chapter No. 3	Different types of Traditional Medicines used in India	2

REFERENCES :

- 1 Indian Medicinal Plants by PC Trivedi (2009)
- 2 Medicinal Plants of Indian Himalaya by SS Samant and U. Dhar
- 3 Handbook of Medicinal and Aromatic plants by SK Bhattacharjee (2009)
- 4 Recent progress in medicinal plants volume 12
- 5 Globalization of herbal health by AK Sharma (2006)
- 6 Indian Medicinal plants Volume 1 to 8 (2nd Edn.) by KR Kirtikar and BD Basu (2006)
- 7 IUCN red list categories by IUCN (1993)
- 8 The Useful plants of India, CSIR New Delhi by SP Ambasta (1986)
- 9 Ethnovet Heritage –Indian Ethno Veterinary Medicine, Pathik Enterprize Ahmedabad By J. Anjaria, MH Parabia and S. Dwivedi (2002)