Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
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વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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–: પરિપત્ર :–

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન Botany વિષયનાં અભ્યાસક્રમ ચલાવતી તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૪–૨૫થી અમલમાં આવનાર S.Y.B.Sc. Sem-3 નો Botany વિષયનો Major,MDC અને SECનો અભ્યાસક્રમ વનસ્પતિશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૦૬/૦૪/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંકઃ૦૨અન્વયેઆપેલ સત્તાની રૂએ ચેરમેનશ્રીએ અભ્યાસ સમિતિ વતી મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલ તા.૧૫/૦૬/૨૦૨૪ની સભાનાં ઠરાવ ક્રમાંકઃ૯૫ થી સ્વીકારી મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૧૫/૦૬/૨ ૦૨૪ની ઠરાવ ક્રમાંકઃ ૯૫

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૪–૨૫થી અમલમાં આવનાર S.Y. B.Sc. Sem-3 નો Botany વિષયનો Major, MDC અને SECનો અભ્યાસક્રમ વનસ્પતિશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૦૬/૦૪/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંકઃ૦૨ અન્વયે આપેલ સત્તાની રૂએ ચેરમેનશ્રીએ અભ્યાસ સમિતિ વતી મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ સ્વીકારી મંજૂર કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./Botany/ સિલેબસ/પરિપત્ર/૧૨૭૯૭/૨૦૨૪
તા.૧૯–૦૬–૨૦૨૪

કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન Botany વિષયનો અભ્યાસક્રમ ચલાવતી તમામ કોલેજોનાં આચાર્યશ્રીઓ.. ...આપશ્રીની કોલેજના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારૂ.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારૂ.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Course Coding Pattern for Three/Four Years UG Degree (Honours) Semester-III

FRAMED ACCORDING TO NATIONAL EDUCATION POLICY (NEP) 2020

(Effective from JUNE 2024)

FOR

BOTANY

એકેડેમિક કાઉન્સિલ તા. 15-06-2024 બાબત 95 બિડાણ/પરિશિષ્ટ 13

Course Coding Pattern for Three/Four Years UG Degree (Honours) Semester-III

Semester	Major(MJ)		Minor(ME)		Multi disciplinary (MDC)	AEC	SEC	VAC	Internship	Total Credits
	Theory	Practical	Theory	Practical	T/(T+P)	-----	T/P/ (T+P)	-----	--------	-----
II	2+2+4	2+2	-	-	2+2	2	2	2	--------	22

[**AEC:** Ability Enhancement Course; **SEC:** Skill Enhancement Course; **VAC:** Value Added Course]

Semester III[Major (BO-MJ)]

Course Code	Course Title	Teaching Schedule Hours /Week	Credits
BO-MJ-301	PLANT PATHOLOGY AND LICHENS	2	2
BO-MJ-302	PLANT ECOLOGY	2	2
BO-MJ-303	PALEOBOTANY AND EMBRYOLOGY	4	4
TOTAL CREDITS			8

Semester III[Major (BOP-MJ)]

Course Code	Course Title	Teaching Schedule Hours /Week	Credits
BOP-MJ-V	PLANT PATHOLOGY AND LICHENS	4	2
BOP-MJ-VI	PLANT ECOLOGY, PALEOBOTANY AND EMBRYOLOGY	4	2
TOTAL CREDITS			4

Semester III[Multidisciplinary (MDC)]

Course Code	Course Title	Teaching Schedule Hours /Week	Credits
BO-MDC-301	NURSERY MANAGEMENT	2	2
BOP-MDC-III	PRACTICAL	4	2
TOTAL CREDITS			4

Semester III[Skill Enhancement Course(SEC)]

Course Code	Course Title	Teaching Schedule Hours /Week	Credits
BO-SEC-301	MEDICINAL BOTANY	2	2
TOTAL CREDITS			2

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. SEMESTER - III

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BO-MJ-301

BOTANY (Major) PAPER – 301

BO-MJ-– 301 PLANT PATHOLOGY AND LICHENS **(2 credits)**

BO-MJ-– 301	**PLANT PATHOLOGY AND LICHENS**	**30 hours**
UNIT 1	PLANT PATHOLOGY	15 Hours
	➢ Differentiation between bacterial, viral and fungal diseases using morphological symptoms. ➢ Causes of Plant Diseases ➢ Study of the following diseases (symptoms, causal organism, disease cycle and disease control). ➢ Bacterial diseases – *Citrus Canker*, *Angular leaf spot of cotton*. ➢ Viral diseases - *Leaf curl of papaya*, *Tobacco mosaic virus* (TMV), ➢ Fungal diseases- White rust of crucifers, Red rot of sugarcane, Tikka disease of groundnut. ➢ Phytoplasma diseases: Little leaf of brinjal. ➢ Significant contributions of Prof.Karam Chand Mehta.	
UNIT 2	LICHENS	15 Hours
	➢ Introduction ➢ Classification ➢ Lichens symbiosis relationship with Algae and Fungi ➢ General characters ➢ Reproduction ➢ Economic importance of Lichen ➢ Classification, morphology, anatomy and reproduction of *Usnea*	

REFERENCE:

- Baudoin ABAM, Hooper GR, Mathre DE & Carroll RB. 1990.
- Laboratory Exercises in Plant Pathology: An Instructional Kit. Scientific Publ., Jodhpur. Dhingra OD & Sinclair JB. 1986.
- Basic Plant Pathology Methods. CRC Press, London, Tokyo. Fox RTV. 1993.
- Principles of Diagnostic Techniques in Plant Pathology. CABI Wallington. Mathews REF. 1993.
- Diagnosis of Plant Virus Diseases. CRC Press, Boca Raton, Tokyo. Pathak VN. 1984.
- Laboratory Manual of Plant Pathology. Oxford & IBH, New Delhi. Forster D & Taylor SC. 1998.
- Plant Virology Protocols: From Virus Isolation to Transgenic Resistance. Methods in Molecular Biology. Humana Press, Totowa, New Jersey. Matthews REF. 1993.
- Diagnosis of Plant Virus Diseases. CRC Press, Florida. Noordam D. 1973.
- Identification of Plant Viruses, Methods and Experiments. Cent. Agic. Pub. Doc. Wageningen. Trigiano RN, Windham MT & Windham AS. 2004.
- Plant Pathology- Concepts and Laboratory Exercises. CRC Press, Florida. Chakravarti BP. 2005.
- Methods of Bacterial Plant Pathology. Agrotech, Udaipur.
- Pandey S.K. Quick Concept of Botany, Lambert Academic publishing, Germany
- Pandey S.N., Mishra S,P. & Trivedi P.S. A Text Book of Botany (Vol.-I), Vikas Publishing, New Delhi
- Singh, Pandey and Jain, A Text book of Botany, Rastogi Publication, Meerut.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

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BO-MJ-302

BOTANY (Major) PAPER – 302

BO-MJ-302 **PLANT ECOLOGY** **(2 credits)**

BO-MJ-302	**PLANT ECOLOGY**	**30 hours**
UNIT 1	Basic of Plant Ecology	15 Hours
	➢ Ecology: definition, branches and significance of ecology. ➢ Ecosystem: Concept and components, energy flow, food chain, food web, ecological pyramids. ➢ Ecological succession: Hydrosere and Xerosere. ➢ Methods of vegetation sampling: quadrat method, transect method, plot less method ➢ Hotspots in India – Concept and basis of 'hotspot' identification.	
UNIT 2	ECOLOGICAL FACTORS	15 Hours
	➢ Climatic Factors : Light, Temperature and Wind ➢ Topographic Factors: Height of mountain chains; Direction of mountains and valleys; Steepness of slope; Exposure of slope. ➢ Edaphic Factors : Importance of soil; Definition and composition of soil; Formation (origin) of soil; Factors affecting soil formation; Soil profile; Some processes in soil formation, characteristic to the climate type; Soil classification; Soil complex- components and properties; Soil erosion; Soil conservation. ➢ Biotic Factors: Symbiotic Interactions Positive Interactions: Mutualism, Commensalism, Protocooperation. Negative Interactions: Exploitation (Parasitism, Predation) Antibiosis, Competition	

REFERENCE:

- Textbook of Ecology by G.Tailer Miller, Jr.Scott E. Spoolman. Cengage Learning
- Plants and Environment by Daubenmire (Wiley-Eastern Pvt. Ltd., New Delhi)
- Ecology and Environment by P.D.Sharma Rastogee Publication
- Basic Ecology – Eugene P. Odum (v) Fundamentals of Ecology- P. Odum
- Concept in Indian Ecology and Environmental Science – S. V. S. Rana
- Ecology Theories and Application – Peter Stiling
- Ecology & Environment – P. D. Sharma, Rastogi Publications
- Indian Manual of Plant Ecology – R .Misra & G. S. Puri

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SYLLABUS FOR B.Sc. SEMESTER - III

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BOP-MJ-V

BOTANY (Major) PRACTICAL – V

BOP-MJ-V:	**PLANT PATHOLOGY AND LICHENS**	**2 credits**

- The candidates should study their environment and the typical vegetation in natural condition and should record their observation in journals.
- Excursion should be arranged during the year to local places.
- 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.

PART A –Plant Pathology Equipments and Glassware : (30 Hours)

1. To study Equipments/Instruments used in common during laboratory exercises.
   1. Autoclave
   2. Hot air oven
   3. BOD incubator
   4. Laminar in flow
   5. Inoculation chamber
   6. Water bath
   7. Hot plate
   8. Microtome
   9. Centrifuge
   10. Microscope
2. To study Tools used in common during laboratory exercises.
   1. Spirit lamp
   2. Inoculation needle
   3. Forceps
   4. Scissors
   5. Needle
   6. Cork borer

7. Sieves
8. Mortar & pestle

3. To study Glass wares used in common during laboratory exercises.
   1. Conical flasks
   2. Beakers
   3. Culture tubes
   4. Petri dishes
   5. Volumetric flasks
   6. Distillation apparatus
   7. Micro slides
   8. Cavity slides
   9. Cover slips
   10. Pipettes
   11. Watch glasses
   12. Funnels
   13. Specimen jars
   14. Measuring cylinders
   15. Coplin jars

PART B –Plant Diseases : (25 Hours)

4. Collect any two plant disease sample and preservation in the glass bottle following wet preservation protocol.
5. Prepare herbarium of at least two sample of plant diseases with all the details in it (Dry preservation)
6. To study following diseases (Causal organism, symptoms and disease control).
   - Bacterial diseases – *Citrus Canker*, *Angular leaf spot of cotton*.
   - Viral diseases - *Leaf curl of papaya*, *Tobacco mosaic virus* (TMV),
   - Fungal diseases- White rust of crucifers, Red rot of sugarcane, Tikka disease of groundnut.
   - Phytoplasma diseases: Little leaf of brinjal

PART C – Lichen : (05 Hours)

7. To study External and Internal structure of Foliose and Fruticose Lichen.
8. To study Soridium and Apothecium of Lichen.
9. Permanent Slide/Specimen : Foliose Lichen, Fruticose Lichen, T.S. of Lichen Thallus, Lichen Soridia, Lichen Apothecia V.S.

REFERENCES:

- Pandey S.K. Quick Concept of Botany, Lambert Academic publishing, Germany
- Pandey S.N., Mishra S,P. & Trivedi P.S. A Text Book of Botany (Vol.-I), Vikas Publishing, New Delhi
- Singh, Pandey and Jain, A Text book of Botany, Rastogi Publication, Meerut.
- Rao Dheeraj, Laboratory Manual: Fundamentals of Plant Pathology.
- Chandrashekhar V. & Johnson M.; Introduction to plant Pathogen, Practical manual.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. SEMESTER - III

FRAMED ACCORDING TO

NATIONAL EDUCATION POLICY (NEP) 2020 (Effective from June 2024)

BOP-MJ-VI

BOTANY (Major) PRACTICAL – VI

BOP-MJ-VI:	PLANT ECOLOGY, PALEOBOTANY AND EMBRYOLOGY	2 credits

- The candidates should study their environment and the typical vegetation in natural condition and should record their observation in journals.
- Excursion should be arranged during the year to local places.
- 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.

PART A – PLANT ECOLOGY : (30 Hours)

1. To determine the minimum size of the quadrate by Species area curve.
2. To determine the frequency of various species occurring in a given area.
3. To determine the density of various species occurring in a given area.
4. To determine the abundance of various species occurring in a given area.
5. To study the morphological and anatomical characters of hydrophytes.
6. To study the morphological and anatomical characters of xerophytes.
7. To study the morphological and anatomical characters of halophytes.
8. To study the morphological and anatomical characters of mesophytes.

PART B – PALEOBOTANY : (10 Hours)

- To study following Fossil Slides (Pteridophytes)

9. Rhynia: (I) T.S. of stem
10. Lepidodendron : (I) T.S. of Lepidodendron Stem (II) T.S. of Lepidophyllum (III) L.S. of Lepidostrobus (IV) T.S. of Stigmaria rootlet (V) T.S. of Stigmaria rootlet with secondary xylem.
11. Sphenophyllum: (I) T.S. of Sphenophyllum Stem
12. *Calamites* : (I) T.S of *Calamites* stem
13. **To study following Fossil Stone**

(i) *Calamites* stem (ii) *Annularia*

- To study following Fossil Slides (Gymnosperms)

14. Lyginopteris Stem T.S.
15. Laglnostoma L.S.
16. Cordaites root T.S.
17. Cordaites leaf T.S.

- To study following Fossil Stone

18. Cordaites leaf
19. Pterophyllum

PART C – EMBRYOLOGY : (20 Hours)

20. Different stages of anther, embryo sac, endosperm and embryo development through permanent slides/photographs.
21. Pollen germination and viability test
22. Dissection of embryo – Tridax and Crotalaria
23. Endosperm and endosperm haustoria – Cucurbitaceae members
24. Study of mature egg apparatus through slides/photographs
25. Demonstration of different types of Pollination and seed dispersal.
26. Study of percentage germination of pollen grains in a given medium.
27. Demonstration of pollen germination,
28. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.

REFERENCES:

- Bhojwani, S.S., Bhatnagar, S.P. , Dantu P. K. (2015). Embryology of Angiosperms, 6th edition. New Delhi, Delhi: Vikas Publication House Pvt. Ltd.
- Gymnosperms and Palaeobotany by S. K Singh; Campus books
- Pteridophytes, Gymnosperms and Palaeobotany by Kumarsan and Annie; Saras Publication
- Systematic embryology of the Angiosperm by Devis G.L. ;John Willey and sons
- An Introduction to the embryology of Angiosperms by Maheshwari P.; MacGraw Hill Book.
- Fossil plants by Seward A. C.; New York
- Bendre and Kumar, A Text book of Practical Botany I, Rastogi Publication
- Bendre and Kumar, A Text book of Practical Botany II, Rastogi Publication

BO-MJ-303 **PALEOBOTANY AND EMBRYOLOGY** **(4 credits)**

BO-MJ-303	PALEOBOTANY AND EMBRYOLOGY	60 hours
UNIT 1	**PALEO BOTANY**	15 Hours
	➢ Ecological timeline/geological timescale ➢ Fossilization and Types of fossils ➢ Fossils parks in India: Indroda (Gujarat), Ghughua(Madhya Pradesh), Salkhan(Uttar Pradesh) ➢ Classification and life history of *Rhynia*, *Lepidodendron* and *Lyginopteris*	
UNIT 2	**STRUCTURAL ORGANIZATION OF FLOWER**	15 Hours
	➢ Organization of flower ➢ Structure of Anther (No developmental stage) and development of Pollen grains; ➢ Ovules: Structure and types; ➢ Embryo sac Types (monosporic, bisporic and tetrasporic) and development (with special reference to Polygonum type).	
UNIT 3	**POLLINATION AND FERTILIZATION**	15 Hours
	➢ Pollination types and adaptations; ➢ Double fertilization and triple fusion; ➢ Seed: Structure (Dicot and Monocot, No developmental stages) appendages and dispersal mechanisms (– Autochory, Anemochory, Hydrochory, Zoochory with 1 example each) ➢ Adaptations (aril, caruncle).	
UNIT 4	**EMBRYO AND ENDOSPERM**	15 Hours
	➢ Endosperm types (one example of each type), ➢ structure and functions; ➢ Dicot and Monocot embryo ➢ Embryo endosperm relationship (General account).	

REFERENCE:

- Maheshwari P. (1950). An introduction to Embryology of angiosperms. McGrew Hill, New York.
- Bhojwani S. S. and Bhavnagar S. P. (2000). The embryology of Angiosperms (4th revised and enlarged edition) Vikas Publishing house, New Delhi.
- Raghavan V. (1997). Molecular embryology of flowering plants. Cambridge University press, Cambridge.
- Raghavan V. (1986). Embryogenesis in angiosperms- A developmental and experimental studies. Cambridge University Press New York USA.
- Raghavan V. (1987). Molecular Biology of flowering plants Cambridge University Press New York USA.
- Shivanna K. R. and Sawhney V. K. (eds) 1997. Pollen Biotechnology for crop production and improvement. Cambridge University, Cambridge.
- Gymnosperms and Palaeobotany by S. K Singh; Campus books
- Pteridophytes, Gymnosperms and Palaeobotany by Kumarsan and Annie; Saras Publication
- Systematic embryology of the Angiosperm by Devis G.L. ;John Willey and sons
- An Introduction to the embryology of Angiosperms by Maheshwari P.; MacGraw Hill Book.
- Fossil plants by Seward A. C.; New York
- Bendre and Kumar, A Text book of Practical Botany I, Rastogi Publication
- Bendre and Kumar, A Text book of Practical Botany II, Rastogi Publication

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. SEMESTER - III

FRAMED ACCORDING TO

NATIONAL EDUCATION POLICY (NEP) 2020 (Effective from June 2024)

Multidisciplinary Courses

BO-MDC-301 : NURSERY MANAGEMENT

BO-MDC-301	**Multidisciplinary Courses :** NURSERY MANAGEMENT	**2 credits**

BO-MDC-301	**Multidisciplinary Courses :** NURSERY MANAGEMENT	**30 hours**
UNIT 1	Basics of Nursery	15 Hours
	➢ Nursery: definition, types ➢ Management strategies - planning, layout, budgeting - production unit, sales unit ➢ Design and layout of nursery facilities ➢ Greenhouse and shade structure management ➢ Nursery equipment operation	
UNIT 2	Nursery Management Techniques	15 Hours
	➢ Principles of plant nursery management ➢ Propagation methods in plant nurseries ➢ Soil preparation and potting techniques ➢ Irrigation and fertilization practices ➢ Pest and disease control measures in the nursery ➢ Greenhouse technology ➢ Cultivation of Rose and Gerbera in greenhouse.	

REFERENCE

- Dr. Arun kumar Singh and Abhinav kumar (2020). Propagation and nursery management.
- R.R.Sharma and Manish Srivastav (2004). Plant propagation and nursery management.
- B.S. Chundawat (2017). Plant propagation and nursery management

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. SEMESTER - III

FRAMED ACCORDING TO

NATIONAL EDUCATION POLICY (NEP) 2020 (Effective from June 2024)

Multidisciplinary Courses PRACTICAL

BOP-MDC-3 :

BOP-MDC-301	**Multidisciplinary Courses :** NURSERY MANAGEMENT	**2 credits**

BOP-MDC-3	**Multidisciplinary Courses :** NURSERY MANAGEMENT	**60 Hours**
	1. Visit to a garden/orchard/vegetable farm 2. Preparation of potting mixture of known combination and potting in earthen pots/poly bags. 3. Preparation of nursery beds. 4. Preparation of compost/vermin-compost using different substrates. 5. Working knowledge and identification of garden tools and implements. 6. Practical knowledge in different plant propagation techniques. 7. Propagation through asexual methods-cuttings, layering, runners, suckers, grafting, and budding. 8. Propagation of horticultural crops through seeds. 9. Identification of different fertilizers-NPK 10. Identification of organic manures-FYM, vermicompost, cakes, bonemeal. 11. To identify various cut flower crops based on primary morphological characters. (Locally available any three flowers) 12. To identify various loose flower crops based on primary morphological characters. (Locally available any three flowers) 13. To identify various ornamental trees for avenues based on primary morphological characters. (Locally available any three plants) 14. To identify various ornamental shrubs for avenues based on primary morphological characters. (Locally available any three plants) 15. To identify various foliage/ house plants based on primary morphological characters. (Locally available any three plants) 16. To prepare a report on a visit to any three nursery from local area.	

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. SEMESTER - III

FRAMED ACCORDING TO

NATIONAL EDUCATION POLICY (NEP) 2020 (Effective from June 2024)

Skill Enhancement Courses

BO-SEC-301 : MEDICINAL BOTANY

BO-SEC-301	**Skill Enhancement Courses :** MEDICINAL BOTANY **(2 credits)**	**30 hours**
UNIT 1	MEDICINAL PLANT CONSTITUENTS	15 Hours
	➢ Plant secondary metabolites and importance: Alkaloids, Glycosides, Mucilage, Steroids ➢ Sources and uses of in Modern Science: Morphine, Reserpine, Atropine ➢ Chemical constituents and traditional uses of following medicinal important plants: 1. Root – *Asparagus racemosus*, *Rauwolfia serpentina* 2. Bark - *Cinchona* 3. Leaves - *Adathoda* and *Eucalyptus* 4. Flower – *Clove* 5. Seed-*Trigonella foenum graceum, Cuminum cyminum*.	
UNIT 2	CONSERVTION OF MDICINAL PLANTS	15 Hours
	➢ Concept of IUCN ➢ Red list Criteria ➢ Concept of Endemism ➢ Threatened and endemic medicinal plants ➢ In-situ conservation (National park and Sanctuaries) ➢ Ex-situ conservation (Botanical garden and Seed bank)	

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- Hand Book of Aromatic Plants by S.K. Bhattacharjee (2004).
- Handbook of MAPs by S.K. Bhattacharjee (2009).
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- Handbook of Ayurvedic Medicinal Plants by L.D. Kapoor (2005).
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