FOUR YEAR UNDERGRADUATE PROGRAM (NEP-2020)

Program: Bachelor in Life Science (2024 -28)

DISCIPLINE – BOTANY

Session – 2024 -25

DSC -01 to 08		DSE -01 to 12	
Code	**Title**	**Code**	**Title**
BOSC -01T	*Elementary Botany*	BOSE -01T	*Natural resources and management*
BOSC -01P	*Lab. Course -01 (Elementary Botany)*	BOSE -01P	*Lab. Course -01 (Natural resources and management)*
BOSC -02T	*Microbes and Thallophyta*	BOSE -02T	*Microbiology and Phytopathology*
BOSC -02P	*Lab. Course –02 (Microbes and Thallophyta)*	BOSE -02P	*Lab. Course -02 (Microbiology and Phytopathology)*
BOSC -03T	*Archegoniate and Fossils*	B OSE -03T	*Phytopaleontology and Evolutionary Botany*
BOSC -03P	*Lab. Course-03 (Archegoniate and Fossils)*	BOSE -03P	*Lab. Course -03 (Phytopaleontology and Evolutionary Botany)*
BOSC -04T	*Angiosperms*	BOSE -04T	*Ethnobotany and Medicinal plants*
BOSC -04P	*Lab. Course – 04 (Angiosperms)*	BOSE -04P	*Lab. Course-04 (Ethnobotany & Medicinal plants)*
BOSC -05T	*Cytology and Genetics*	B OSE -05T	*Biosystematics and Biodiversity*
BOSC -05P	*Lab. Course -05 (Cytology and Genetics)*	BOSE -05P	*Lab. Course -05 (Biosystematics and Biodiversity)*
BOSC -06T	*Plant Physiology and Economic Botany*	BOSE -06T	*Plant breeding and Seed technology*
B OSC -06P	*Lab. Course -06 (Plant Physiology and Economic Botany)*	BOSE -06P	*Lab. Course -06 (Plant breeding and Seed technology)*
BOSC -07T	*Ecology and Phytogeography*	BOSE -07T	*Instrumentation and biochemical technology*
BOSC -07P	*Lab. Course –07 (Ecology and Phytogeography)*	BOSE -07P	*Lab. Course -07 (Instrumentation and biochemical technology)*
BOSC -08T	*Molecular biology and Biostatistics*	BOSE -08T	*Growth and Stress Physiology*
BOSC -08P	*Lab. Course-08 (Molecular biology and Biostatics)*	BOSE -08P	*Lab. Course -08 (Growth and Stress Physiology)*
		BOSE -09T	*Plant biotechnology and crop improvement*
		BOSE -09P	*Lab. Course -09 (Plant biotechnology and crop improvement)*
		BOSE -10T	*Applied Botany and Intellectual property right (IPR)*
		BOSE -10P	*Lab. Course -10 (Applied Botany and IPR)*
		BOSE -11T	*Biochemistry and Enzymology*
		BOSE -11P	*Lab. Course -11 (Biochemistry and Enzymology)*
		BOSE -12T	*Bioinformatics and Gene Technology*
		BOSE -12P	*Lab. Course-12 (Bioinformatics & Gene Technology)*
GE -01 & 02		**VAC**	
BOGE -01T	*Elementary Botany*	BOVAC-01	*Herbal Plant & Human Health*
BOGE -01P	*Lab. Course -01 (Elementary Botany)*	**SEC**	
BOGE -02T	*Microbes and Thallophyta*	BOSEC-01	*Gardening and Floriculture*
BOGE -02P	*Lab. Course –02 (Microbes and Thallophyta)*		

Program Outcomes (PO):

1. Demonstrate and apply the fundamental knowledge of the basic principles of major fields of biology
2. Apply knowledge to solve the issues related to plant sciences with the help of computer technology
3. Apply knowledge for conservation of endemic and endangered plant species

Program Specific Outcomes (PSO):

1. Collaborate effectively on team-oriented projects in the field of life sciences.
2. Communicate scientific information in a clear and concise manner both orally and in writing
3. Explain Biodiversity, climate change and plant pathology.
4. Apply Biotechnology, Ecology, Genetics and Plant breeding techniques in plant sciences
5. Apply knowledge of Medicinal and Economic botany in day to day life.
6. Apply the knowledge to develop the sustainable and eco-friendly technology.

Chairman
Studies
Nandkumar Patel
Raigarh (C.G

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree/Honors)*			**Semester - I**	**Session: 2024-2025**
1	**Course Code**	**BOSC -01 T**		
2	**Course Title**	**Elementary Botany**		
3	**Course Type**	**Discipline Specific course (DSC)**		
4	**Pre-requisite** (if, any)	*As per program*		
5	**Course Learning. Outcomes (CLO)**	At the end of this course, the students will be able to ➢ Understand the Basics of Botany and its branches. ➢ Get acquainted with complex interrelationship between organisms and environment. ➢ Develop a comprehensive understanding of the identification, cultivation, and processing of medicinal plants, and their chemical constituents. ➢ Utilize plants resources for livelihood.		
6	**Credit Value**	**3 Credits**	*Credit = 15 Hours - learning & Observation*	
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Basics of Plant Science**: Differences and resemblances between; living and nonliving plants and animals, plant and animal cell. Concept of prokaryotes and eukaryotes.Important features of thallophyta, Bryophyta, Pteridophyta, Gymnosperm and Angiosperm.Structure and function of a typical flowering plant.	12
II	**Branches of botany:** General idea, features, and significance; Anatomy, Cytology, Economic Botany, Ethnobotany, Forestry, Genetics, Histology, Microbiology, Paleobotany, Phytochemistry, Phytopathology , Plant biotechnology, Plant breeding, Plant ecology, Plant morphology, Plant physiology, Plant Taxonomy, etc,	11
III	**Plants for human welfare:** Plant Resources for Rural livelihood – Mahua, Tendu patta, Bamboo and Firewood.Ethnobotany in India: Methods to study Ethnobotany, Applications of Ethnobotany, ethnomedicinal plants and ethnoecology. Application of plant products for certain diseases- Cough and cold, Jaundice, Infertility, Diabetes, Blood pressure and Skin diseases.	11
IV	**Ancient Indian Botany:** Indigenous Medicinal Sciences;Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments, Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept. Charaksamhita. Ancient and modern Botanists and their contributions.-Charak, Jagdish Chandra Bose, B.P.Pal, Desikachary,K.C. Mehta M.S. Swaminathan etc.	11
Keywords	*Prokaryotes, Ethnobotany, Taxonomy, Ayurveda*	

Signature of Convener & Members (CBoS) :

Chairman
Board of Studies
Dr. Virendrakumar Patel
Botany, Raigarh (C.G.)

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. College Botany Ganguli Kar and Datta , HIMALAYA Publishers
2. "Handbook of Medicinal Plants" by L.D. Kapoor
3. "Indian Medicinal Plants: An Illustrated Dictionary" by C.P. Khare
4. "Medicinal Plants in India: Conservation and Sustainable Utilization in the Emerging Global Scenario" edited by V.K. Gupta
5. "A Compendium of Medicinal Plants in India: An Introduction to Ayurveda" by S.L. Kochhar
6. A handbook of forest utilization by T. Mehta
7. Plants and human welfare by O.P.Sharma

Reference Books Recommended –

1. Charak Samhita
2. Medicinal Plants of India" by C.P. Khare

Online Resources–

- **e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.cshlksha.mp.gov.in
- www.vlab.co.in
- www.interyashala.com
- www.ndl.iitkgp.ac.in

Online Resources–

e-Resources / e-books and e-learning portals

- https://extension.oregonstate.edu/collection/botany-basics
- https://www.pbs.org/video/botany-basics-jnn2bf/
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://www2.ca.uky.edu/agcomm/pubs/ho/hq26/hq96.pdf
- https://www.botanytoday.com/branches-of-botany/
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ummsjournal.com/articles/9403-1-11-206.pdf
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://vedpuran.files.wordpress.com/2016/07/charaksamhitasutrideshajlgupt-vol-1.pdf
- https://egyankosh.ac.in/handle/123456789/89429

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): 30 **(By Course Teacher)**	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE): 70	**Two section – A & B** Section A: **Q1.** Objective – **10 x1= 10** Mark; **Q2.** Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

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(2)
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Chairman
Studies .....
Nandkumar Patel
...ya, Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree/ Honors)*		**Semester - I**	**Session: 2024-2025**
1	Course Code	BOSC -01	
2	Course Title	Lab. Course -01 (Elementary Botany)	
3	Course Type	Laboratory course	
4	Pre-requisite (if, any)	*As per program*	
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ Understand structure of plant cell, prokaryotic cell and eukaryotic cell. ➢ Identify pteridophytes of college campus. ➢ Learn about the different types of plant tissues. ➢ Learn about Ayurvedic system of medicine.	
6	Credit Value	1 Credits	*Credit =30 Hours Laboratory or Field learning/Training*
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	1. Microscopic study of plant cell. 2. Microscopic study of prokaryotic (Bacteria) and eukaryotic cell (algae and fungi). 3. Study of thallus structure of *Riccia* and *Marchantia*. 4. Identification of different plants growing in college campus. 5. Study of a typical flowering plant and it's parts. 6. Study of internal structure of root and stem. 7. Study of parenchyma, collenchyma and sclerenchyma. 8. Study of medicinal plants of college campus. 9. Study of plants used to cure cough and cold, jaundice and skin diseases. 10. Visit to any local ayurvedic hospital / practitioner to understand Ayurveda.	30
Keywords	*Prokaryotic, Parenchyma, Jaundice, Ayurveda.*	

Signature of Convener & Members (CBoS) :

B Rath
Chairman
Studies
Nandkumar Patel
Raigarh (C.G.)

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

Text Books Recommended –

1. College Botany Ganguli Kar and dutta , HIMALAYA Publishers
2. "Handbook of Medicinal Plants" by L.D. Kapoor
3. "Indian Medicinal Plants: An Illustrated Dictionary" by C.P. Khare
4. "Medicinal Plants in India: Conservation and Sustainable Utilization in the Emerging Global Scenario" edited by V.K. Gupta
5. "A Compendium of Medicinal Plants in India: An Introduction to Ayurveda" by S.L. Kochhar
6. A handbook of forest utilization by T. Mehta
7. Plants and human welfare by O.P.Sharma

Reference Books Recommended –

1. Charak Samhita
2. Medicinal Plants of India" by C.P. Khare

Online Resources–

- **e-Resources / e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- **e-Resources / e-books and e-learning portals**
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/
- https://cms.botany.org/home/careers-jobs/careers-in-botany/areas-of-specialization-in-botany.html

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	50 Marks
Continuous Internal Assessment (CIA):	15 Marks
End Semester Exam (ESE):	35 Marks

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE): 35	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

Chairman
Dr. Chandrakumar Patel
Govt. Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree/Honors)*		Semester - II	Session: 2024-2025
1	Course Code	BOSC-02 T	
2	Course Title	Microbes and Thallophyta	
3	Course Type	Discipline Specific course (DSC)	
4	Pre-requisite (if, any)	*As per program*	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to 1. Understand about the Microbes and their Importance. 2. Identify edible mushrooms and learn cultivation techniques. 3. Learn about bio-fertilizers and their uses. 4. Understand life cycles of different algae and fungi.	
6	Credit Value	3 Credits	*Credit = 15 Hours - learning & Observation*
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	Viruses: - general characteristics,nature , structure and nomenclature, Bacteriophages and TMV; Lytic and Lysogenic cycles, transmission and replication of viruses, Symptoms of viral diseases on plants , important plant diseases, viroid, prions.Actinomycetes: general characteristics ,Structure, reproduction and economic importance. Mycoplasma, Phytoplasma,: general characteristics , structure, reproduction and their economic uses.	12
II	Bacteria: History, general character, classification and morphology, Gram positive and Gram-negative bacteria, structure of bacteria shape, size flagella and ultra structure of bacterial cell; Bacterial Growth curve, factors affecting growth of microbes; sporulation, reproduction, recombination in bacteria- Transformation Conjugation and Transduction, and Economic importance. Cyanobacteria : General characteristics, morphology,Heterocyst, cell structure of Cyanobacteria, reproduction and economic importance of Bacteria.	11
III	Phycology: General characteristic features of Algae. Algae in diversified habitat, Salient features, occurrence, classification and range of thallus organization.Prominent pigments found in Algae. Reproduction classification, general character and life cycle of –*Volvox, Oedogonium, Chara, Vaucheria,Ectocarpus*and*Polysiphonia*. Economic importance of algae - Role of algae in soil fertility, algae as biofertilizer , blue green algae and nitrogen fixation. Symbiosis : algal products - Agar, biofuel	11
IV	Mycology, Mushroom Cultivation, Lichenology &Mycorrhiza: General characteristic features of Fungi, Economic importance and Classification of Fungi, Nutrition, Heterothallism, Physiological specialization, Heterokaryosis &Parasexuality in Fungi. Fungi as biocontrol agent. Classification, general character and life cycle of -*Mucor*, Phytophthora*Penicillium, Peziza, Ustilago, Puccinia, Agaricus*; *Colletotrichum, Alternaria*, Edible Mushroom- Button and Oyster mushroom and their cultivation. General account of lichens. General account of Mycorrhiza.	11
Keywords	*Mycoplasma, Transduction, Biofertilizer, Parasexuality.*	

Signature of Convener & Members (CBoS) :

Chairman

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
4. Aggarwal, S. K. 2009. Foundation Course in Biology, A one books Pvt. Ltd., New Delhi.
5. Aneja, K. R. 1993. Experiments in Microbiology, Pathology and Tissue Culture, VishwaPrakashan, NewDelhi.
6. Annie Ragland, 2012. Algae and Bryophytes, Saras Publication, Kanyakumari, India.
7. Basu, A. N. 1993. Essentials of Plant Viruses, Vectors and Plant diseases, New Age International, New Delhi.
8. Chopra. G. L. 1984. A text book of Algae, Rastogi publications, Meerut,India.
9. Dubey, R. C. and Maheshwari, D K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., NewDelhi.
10. Fritsch, R. E. 1977. Structure and Reproduction of Algae, Cambridge University Press, London.
11. Sharma, P.D. (2011). Plant Pathology. Meerut, U.P.: Rastogi Publication.
12. Pandey B.P. 2001. College Botany Volume 1, S Chand & Company Pvt.Ltd, New Delhi.

Reference books:

1. Webster, J., Weber, R. (2007). Introduction to Fungi, 3rd edition. Cambridge, U.K.: Cambridge University Press.
2. Pelzar, 1963. Microbiology, Tata McGraw Hill, New Delhi
3. Rangaswamy, G. 2009, Disease of Crop Plants in India, Prientice Hall of India, New Delhi.
4. Microbiology Fundamental and Applications (hindi) (pb) 9. ISBN: 9788188826230 Edition: 03Year : 2016Author : Dr. Purohit SS , Dr. Deo Publisher : Student Edition Language : Hindi
5. Modern Microbiology (hindi) (hb) ISBN: 9788177543599Edition : 1Year : 2018Author : Dr. Purohit SS , Dr. Singh T Publisher : Agrobios (India)
6. Plant pathology by R.S. Mehrotra, Tata McGraw-Hill Publication

Online Resources–

- **e-Resources / e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- **e-Resources / e-books and e-learning portals**

1. https://www.classcentral.com/tag/microbiology
2. https://www.edx.org/learn/microbiology
3. https://www.mooc-list.com/tags/microbiology
4. https://www.udemy.com/topic/microbiology/
5. https://ucmp.berkeley.edu/bacteria/bacteria.html
6. https://www.livescience.com/53272-what-is-a-virus.html
7. https://eclambhatech.in/lms/Economic%20importance%20of%20Algae.pdf
8. https://www.slideshare.net/sandar1109/algae-notes-1
9. https://www.onlinebiologynotes.com/algae-general-characteristics-classification/
10. https://www.sciencedirect.com/topics/immunology-and-microbiology/fungus
11. https://ucmp.berkeley.edu/fungi/fungi.html
12. https://agrimoon.com/wp-content/uploads/Mushroom-culture.pdf
13. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=11293
14. http://www.jnkvv.org/PDF/11042020102651plant_pathology.pdf
15. https://www.apsnet.org/edcenter/disimpactmngmnt/topic/EpidemiologyTemporal/Pages/ManagementStrategi
16. https://www.agrilcareer.com/6-easy-steps-for-mushroom-cultivation/

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA):30 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE): 70	**Two section – A & B** Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit–4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree/Honors)*	Semester - II	Session: 2024-2025

1	Course Code	BOSC- 02		
2	Course Title	Lab. Course –02 (Microbes and Thallophyta)		
3	Course Type	Laboratory course		
4	Pre-requisite (if, any)	*As per program*		
5	Course Learning. Outcomes (CLO)	1. Understand the Viruses, Bacteria, Phycology, Mycology and Plant pathology 2. Learn microbial techniques which will be beneficial for agriculture and industry. 3. Learn life cycles of selected genera of different groups 4. Understand etiology of plant diseases 5. Apply their knowledge in the crop fields to eradicate or avoid the diseases		
6	Credit Value	1 Credits	*Credit =30 Hours Laboratory or Field learning/Training*	
7	Total Marks	Max. Marks: 50	Min Passing Marks:	20

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	1. Collection of viral/ Bactrial /fungal infected plants 2. Study of plant disease symptoms caused by viral/ Bactrial /fungal/ Mycoplasma 3. **BACTERIAL IDENTIFICATION:** Isolation of bacteria Staining techniques: Gram's, staining 4. Study / Slide preparation of available Cyanobacteria 5. **PHYCOLOGY:** Study / Slide preparation and Staining of algae –*Volvox, Oedogonium* and *Chara; Vaucheria;Ectocarpus Polysiphonia* 6. **MYCOLOGY:** Study/ Slide preparation and . Staining of fungi. *Mucor,Phytophthora, Penicillium, Peziza, Ustilago, Puccinia; Agaricus, colletotrichum, Alternaria.*: Study of Button and Oyster Mushroom Lichens: crustose, foliose and fruticose specimens. Study of VAM fungi	30
Keywords	infected plants, VAM, algae, fungi	

Signature of Convener & Members (CBoS) :

Chairman
Board of Studies
Dr. Sandeep Kumar Patel
Govt. College, Raigarh (C.G.)

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Practical Botany (Part I) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda & Anamika Singhvi Edition:2013 Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual).
2. Pandey S.K. (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing GmbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5).
3. Dubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., New Delhi.
4. Pandey. B.P. 2014 Modern Practical Botany, (Vol-I) S. Chand and Company Pvt. Ltd., New Delhi.

Online Resources–

- **e-Resources / e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- **e-Resources / e-books and e-learning portals**

1. https://community.plantae.org/tags/moocfuturelearn.com/courses/teaching-biology-inspiring-students-with-plants-in-science
2. https://microbiologysociety.org/publication/education-outreach-resources/basic-practical-microbiology-e-manual.html
3. https://microbiologyonline.org/file/7926d7789d8a2f7b2075109f68c3175e.pdf
4. http://allaboutalgae.com/benefits/
5. https://repository.cimmyt.org/xmlui/bitstream/handle/10883/3219/64331.pdf
6. https://www.mooc-list.com/tags/microbiology)
7. http://www.agrifs.in/sites/default/files/A%20text%20book%20of%20practical%20botany%201%20%7BAshok%20Bendre%7D%20%5B8
8. https://171339239%5D%20%281984%29.pdf

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE): 35	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

Chairman

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Life sciences (Certificate / Diploma / Degree) | **Semester - I/III/V** | **Session: 2024-2025**

1	Course Code	BOVAC-01
2	Course Title	Herbal Plant & Human Health
3	Course Type	Value Addition Course (BOVAC-01)
4	Pre-requisite (if, any)	As per program
5	Course Learning Outcomes (CLO)	***After completion of this course, the students will be able to –*** ➢ *Understand the value of herbs, herbal medicine and use of herbal medicine* ➢ *Know about botanical medicine professionals in the complementary and alternative medicine (CAM)* ➢ *Demonstrates the knowledge of the toxicity of plant and essential oil ingredients.* ➢ *Understand the possibility for allergic and unpleasant reactions to herbal products and the impact of herbal quality on potential toxicity.* ➢ *Use the herbal plants in their daily life* ➢ *Adopt the value of herbal medicine to save their health*
6	Credit Value	**2 Credits** — ***Credit = 15 Hours - learning & Observation***
7	Total Marks	Max. Marks: 50 — Min Passing Marks: 20

PART -B: Content of the Course

Total No. of Teaching-learning Periods (01 Hr. per period) - 30 Periods (30 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Introduction:** Elementary knowledge of Herbal plant and Concept of Herb as medicine. Concept of ethno-medicine, folk medicines, ethno-ecology, ethnic communities of the India & the Chhattisgarh. Concept of Herbal garden. Collection of ethnic information. ***Observation/In Practices - Survey and familiarization with herbs & local herbal plants***	08
II	**Importance of medicinal plants:** Importance of Herbal / Medicinal plant in human health care – health and balanced diet (Role of proteins, carbohydrates, lipids and vitamins). Common plants & plant parts providing metals and vitamins. ***Observation/In Practices - Survey and familiarization with local herbal medicinal plants***	07
III	**Tribal medicine and Traditional knowledge:** Introduction, Concept of Tribal medicine, methods of disease diagnosis and treatment – common Plants in folk religion. Traditional knowledge and utility of some medicinal plants in Chhattisgarh. ***Collection /Identification of Herbal plants commonly used by villagers of the state –*** • *Centella asiatica,* • *Aloe vera,* • *Solanum nigrum,* • *Achyranthus aspera,* • *Withania somnifera,* • *Papaver somniferum,* • *Strychnos nux– vomica,* • *Atropa belladonna;*	08
IV	**Plants in day to day life:** Nutritive and medicinal value of common herbal fruits and vegetables of daily use. Precautions during use of herbal medicinal products. Basic idea of contribution of national research laboratories like CDRI, CIMAP, NBRI, etc. ***Collection /Identification of Herbal plants commonly used in daily life*** - *Tulsi, Garlic, Ginger, Turmeric, Ajwain, Methi, Flax, Tea and Coffee.*	08

Keywords: *Herbal medicine, Folk medicine, Ethno-medicine, Tribal medicine*

Signature of Convener & Members (CBoS)

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Kumar, N.C. (1993). An Introduction to Medical botany and Pharmacognosy. Emkay Publicaterers, New Delhi.
2. Rao, A.P. (1999). Herbs that heal. Diamond Pocket Books (P) Ltd., New Delhi
3. Iris F. F. Benzie and Sissi Wachtel-Galor. Herbal Medicine, 2nd edition Biomolecular and Clinical Aspects. CRC Press/Taylor & Francis; 2011
4. Fabrizio Donovan (2020) Medicinal Herbs: The Ultimate Guide to Natural Healing, Learn The Benefits of Herbs and Use the Nature's Most Powerful Medicinal Plants in Making Your Own A-Z Remedies to Treat Diseases, Author's Republic.
5. Stargrove Mitchell Bebel ND, Herb, Nutrient, and Drug Interactions, Publisher: Elsevier – Health Sciences Division
6. Iris F. F. Benzie (Editor), Herbal Medicine (Oxidative Stress and Disease) 2nd Edition,

Online Resources–

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.gskillindia.org
- www.gskillsha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndhittken.ac.in

Online Resources–

- https://pubmed.ncbi.nlm.nih.gov/22893937/
- https://crimsonpublishers.com/acam/pdf/ACAM.000551.pdf
- https://www.researchgate.net/publication/329823388_Medicinal_Plants_Used_in_the_Treatment_of_Ment al_and_Neurological_Disorders_in_Ghana
- https://www.sciencedirect.com/science/article/abs/pii/S0378874115003013
- https://core.ac.uk/download/pdf/143841457.pdf
- https://practicalsolfreelance.com/medicinal-plants/
- https://practicalsolfreelance.com/medicinal-plants/
- https://www.getarrive.com/medicinal-plants-books.html

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	50 Marks
Continuous Internal Assessment (CIA):	15 Marks
End Semester Exam (ESE):	35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2):	10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance -	05	
	Total Marks -	15	
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 05 x1= 05 Mark; Q2. Short answer type- 5x2 =10 Marks Section B: Descriptive answer type ex.,1out of 2 from each unit- 4x05 =20 Marks		

Name and Signature of Convener & Members of CBoS:

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree)*		Semester - III/IV/V/VI	Session: 2024-2025
1	Course Code	BOSEC-01	
2	Course Title	Gardening and Floriculture	
3	Course Type	Skill Enhance Course (BOSEC 01)	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *understand the concept of Gardening & Floriculture* ➢ *learn about the gardening technique and familiar with gardening tools* ➢ *adopt the skill of gardening as well as floriculture* ➢ *student may delelop entrepreneurship in this field.*	
6	Credit Value	2 Credits (1C + 1C)	*Credit = 15 Hours – Theoretical learning and = 30 Hours Laboratory or Field learning/Training*
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

PART -B: Content of the Course

Total No. of Teaching-learning Periods:
Theory – 15 Periods (15 Hrs) and Lab. or Field learning/Training 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Theory Contents	1. **Concept & Types of Garden:** Concept of Garden & Landscape Gardening, Styles of garden – Formal & Informal garden, Free style gardens, Home garden, Hanging garden; Types of gardens – English, Mughal, Babylonian garden *[Observation & Practices]* 2. **Garden plants:** Ornamental plants - Shrubbery, Fernery, Arches (climbers and creepers), Pergolas, Edges & Hedges and Pot plants, Cacti and Succulents plants, Flower borders and beds, Ground covers and carpet beds *[Observation & Practices]* 3. **Floriculture:** Present situation & scope in India. Various types of flowers – Seasonal flowers, Cut flowers. Flower Crops - Rose, Chrysanthemum, Carnation, Gerbera, Gladioli, Tuberose, Aster, Lilly, Dahlia and Marigold. *[Observation & Practices]*	15
Lab/Field Training Contents	1. Familiarization with different tools and equipments used in gardening work. 2. Design and Plotting of Garden and Preparation of Soil for Garden 3. Soil decontamination techniques, Planting methods, Fertigation method 4. Propagation techniques for selected ornamental plants Weed management 5. Harvesting techniques, Post-harvest handling, Pre cooling, Pulsing, Packing, 6. Preparation of composite mixture and manuring practice in nursery and pots. 7. Practice in budding, cutting, layering and grafting etc. 8. Practice of flower arrangements, flower bouquet.	30
Keywords	*Garden, Flower, Floriculture, Garden tools*	

Signature of Convener & Members (CBoS)

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PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Randhawa, G. S. and Mukhopadhyay, A. (1986)"Floriculture in India." Allied Publisher (India)
2. Bhattacharjee, S. K. (2006) "Advances in Ornamental Horticulture." Vols. I-VI. Pointer Pub.
3. Lauria, A. and Victor, H. R. (2001) "Floriculture – Fundamentals and Practices." Agrobios.
4. Salvina, G. T. and Peter, K. V. (2008) "Ornamental Plants for Gardens." New India pub. India.

Online Resources–

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.dfpa.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.interviewbala.com
- www.nalanda.nitt.edu

Online Resources–

- e-Resources / e-books and e-learning portals
- https://indiagranet.com/horticulture/CONTENTS/LANDSCAPE.htm
- https://www.youtube.com/watch?v=ZUHq6ZFO48c&ab_channel=MountainGardens
- https://www.youtube.com/watch?v=EE0oQ36n9IA
- https://www.teachmint.com/ttfile/studymaterial/bsc/11063fog/11stylesofgardeningpdf/0d ba825d0ed-4180-a6e1-28950aa4245d
- https://k8449r.weebly.com/uploads/3/0/7/3/30731055/types_of_gardens_[compatibility_mode]_pdf-signed.pdf
- https://www.egyankosh.ac.in/bitstream/123456789/73050/1/Unit-2.pdf
- https://www.academia.edu/40140208/A_HANDBOOK_ON_FLORICULTURE_And_Landscaping
- https://k8449r.weebly.com/uploads/3/0/7/3/30731055/landscape_gardening.pdf
- https://homeguides.sfgate.com/gardening-tools-uses-41745.html
- https://tractorguru.in/blog/floriculture-types-of-flowers-tips-and-importance-of-floriculture/

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	50 Marks
Continuous Internal Assessment (CIA):	15 Marks
End Semester Exam (ESE):	35 Marks

Continuous Internal Assessment (CIA): 15 (By Course Coordinator)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE): 35	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on learned skill - 20 Marks B. Spotting based on tools (written) - 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Coordinator as per skilling

Name and Signature of Convener & Members of CBoS:

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 -2028)
DEPT. OF BOTANY: VALUE ADDITION COURSE
COURSE CURRICULUM (2024-25)

PART-A: Introduction				
Program: Undergraduate (Certificate / Diploma / Degree/Honors)		Semester - I/III/V		Session: 2024-2025
1	Course Code	BOVAC – 02		
2	Course Title	Academic Research & Report Writing		
3	Course Type	Value Addition Course (VAC)		
4	Pre-requisite(if,any)	As per Government norms / Institutional scheme		
5	Course Learning Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *Understand the academic research and its scope & prospects.* ➢ *Know the Importance of Report writing in academic and Research and Necessity of report writing for achievement of academic & research goals* ➢ *Demonstrates the knowledge of the toxicity of plant and essential oil ingredients.* ➢ *Understand the kinds & characteristics of academic and research reports / presentation and its prospective application.* ➢ *Use the tools and techniques of academic research and report writing* ➢ *Adopt the skill of research designing and report/ paper / thesis writing*		
6	Credit Value	2 Credits	*Credit = 15 Hours - learning & Observation*	
7	Total Marks	Max. Marks: 50		Min Passing Marks: 20

PART -B: Content of the Course		
Total No. of Teaching–learning Periods (01 Hr. per period) - 30 Periods (30 Hours)		
Module	Topics (Course contents): Learning and Practices	No. of Hrs
I	**Introduction:** Concept of - Academic Research and Research Project, Component of a concept Paper for academic research, Research–Characteristics, Type, Formulation & Design, Format, Scope, Motivation & Prospects. Popular Scheme & Organization in India promoting Research - INSPIRE, NSF, MEF, DBT, DST, DNES, STARD, ICAR, ICMR, CSIR, INSA.	08 Hours
II	**Research paper / Review writing:** Steps of writing a research report. Types of Research paper, Structure of Research papers, Research paper formats, Abstract writing, Methodology, Results and Discussion, Different formats referencing, Ways of communicating a research papers, (Assignments)	07 Hours
III	**Report/ Dissertation / Thesis Writing** - Structure of a thesis , Scope of the work, Literature review, Experimental / Computational details, Preliminary studies, Result and Discussion, Figures & Table Preparation, Conclusion and Future works, Bibliography, Appendixes (Assignments)	07 Hours
IV	**Tools, Techniques & Presentation**– Various word processors - MS Office- Word, Excel & PowerPoint, Libra-office, Latex etc. Making effective presentations using Power Point and Beamer. Basic idea of Data collection, Tabulation & Presentation. Plagiarism detection tools (Assignments)	08 Hours
Keywords	*Academic Research, Research report, Project, Thesis/ Dissertation/ Review writing*	

Signature of Convener & Members of CBOS:

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PART–C

BVAC – 02 (Academic Research & Report Writing)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended –

- Technical Report Writing and Research Methodology by Dr Naushad Alam Dr Qundri Javeed Ahmad Peer Dr Banarsi Lal, Write & Print Publications
- Research Writing A Complete Guide (PB) by Srinivasan R, How Academies
- GUIDE TO REPORT WRITING by Netzley, Snow. PEARSON INDIA
- A Student Guide to Writing Research Reports, Papers, Theses and Dissertations By Cathal Ó Siochrú; ISBN 9780367621049. Published 2022 by Routledge
- **https://www.goodreads.com/shelf/show/report-writing**

Online Resources–

- **e-Resources / e-books and e-learning portals**
  - **https://www.questionpro.com/blog/research-reports/**
  - **https://egyankosh.ac.in/bitstream/123456789/39238/1/Unit-5.pdf**
  - **https://www.studocu.com/in/document/visvesvaraya-technological-university/research-methodology/general-format-of-a-research-report/33791300**
  - **https://students.unimelb.edu.au/academic-skills/resources/report-writing/research-reports**
  -

- **Use of following sites**

- https://www.wiley.com/en-ie/Student+Research+and+Report+Writing:+From+Topic+Selection+to+the+Complete+Paper-p-9781118963913
- https://www.researchgate.net/publication/275654158_HAND_BOOK_FOR_WRITING_RESEARCH_PAPER

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: Q1. Objective – **05 x1= 05** Mark; Q2. Short answer type- **5x2 =10 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit- **4x05 =20 Marks**	

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 -2028)
DEPT. OF BOTANY: SKILL ENHANCEMENT COURSE
COURSE CURRICULUM (2024-25)

PART-A: Introduction				
Program: Undergraduate (Certificate / Diploma / Degree/Honors)			Semester - II/IV	Session: 2024-2025
1	Course Code	BOSEC–02		
2	Course Title	Flower Decoration		
3	Course Type	Skill Enhance Course (SEC)		
4	Pre-requisite (if, any)	As per Government norms / Institutional scheme		
5	Course Learning Outcomes(CLO)	*After completion of this course, the students will be able to-* ➢ *-understand the concept of Flower arrangement & Decoration* ➢ *-learn the idea, design and style of Flower decoration and its importance* ➢ *-learn the skill of different types Flower arrangement with local/social application, commercial value and social demand* ➢ *-adopt the skill of Indian, Western, Japanese and other/local style of flower arrangement / decoration towards level of entrepreneurs' start-up*		
6	Credit Value	2 Credits (1C + 1C)	*Credit = 15 Hours – Theoretical learning and = 30 Hours Laboratory or Field learning/Training*	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20	

PART -B: Content of the Course		
Total No. of Teaching–learning Periods: Theory – 15 Periods (15 Hrs) and Lab. or Field learning/Training 30 Periods (30 Hours)		
Module	Topics (Course contents): learning, Observation and Preparation	No. of Hrs
I	**Introduction:** Basic knowledge of Flowering plants, Ornamental plants, Decorative plants- Shade plants, Ferns, Bonsai, Decorative Flowers, Flower shows. Commercial flowers, Common Ornamental plants and flowers of local area /state. Famous flower Gardens of India. *[Learning and Practices]*	04Hours Learning and 07 Hours Practices
II	**Floral ornaments & Flower arrangements:** Garlands, Floral bouquets, Floral rangoli, Flower arrangements – concept, idea , design and style – Western styles, Japanes or Ikebana styles, Common types of Flower arrangement – Elliptical, Vertical, Horizontal Triangular, Crescent, S & Oval shapes and Cascade .flower arrangement. *[Learning and Practices]*	04Hours Learning and 07HoursPractices
III	**Flower decoration:** Flowers used for decoration; Different idea of flower decoration for Home, Festivals, office, Gallery, Stage, Wall, Table, Gate. Flower Pot / Vas / Bottle decoration. *[Learning and Practices]*	03 Hours + 07 Hours
IV	**Creative decorations:** Flower drying and Dry flower decoration, Foliage arrangement; Dry foliage decoration; Flower decoration by Oil Painting, Resin art of Flower decoration Terrarium – concept, design and creation of different forms. Bonsai, Shady foliage, Fern and Water plant/ flower decoration. *[Learning and Practices]*	04Hours Learning and 09 Hours Practices
Keywords	*Floral ornaments, Flower arrangement, Flower decoration*	

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PART–C

BOSEC–02 (Flower Decoration)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

Textbooks:

1. Floriculture in India, G. S. Randhawa and A. Mukhopadhyay, Allied Publishers Pvt. Ltd.
2. Modern Ikebana: A New Wave in Floral Design Hardcover–2020byTom Loxley & VictoriaGaiger
3. On Flowers: Lessons from an Accidental Florist, Illustrated,2019byAmy Merrick(Author)
4. Flower School: A Practical Guide to the Art of Flower Arranging,2020 by Calvert Crary(Author)
5. The Flower Expert: Ideas and Inspiration for a LifeWithFlowers,2019byFleurMcHarg(Author)
6. The Art of FlowerArranging,1992 by Jan Hall(Author)
7. A Personal Guide to Flower Arranging: Volume 2 Spring and Summer, 2021 by Wendy Markby
8. The Flower Chef: A Modern Guide to Do-It-Yourself Floral Arrangements,2016byCarlyCylinder
9. Easy Ikebana: 30Beautiful FlowerArrangements,2020 by Shinichi Nagatsuka(Author)

Reference Book:

https://www.gardensillustrated.com/reviews/the-best-new-floristry-books

Online Resources–

❖ **e-Resources/e-books and e-learning portals Use of following sites**

- **https://en.wikipedia.org/wiki/Ikebana**
- **https://www.artsy.net/article/artsy-editorial-thriving-art-ikebana-japanese-tradition-flower-arranging**
- **https://agritech.tnau.ac.in/horticulture/horti_Landscaping_dryflower_tech.html**
- **https://library.ihbt.res.in/Institute%20Brochures/dry%20flower.pdf**
- **https://static.vikaspedia.in/media/files_en/agriculture/farm-based-enterprises/value-added-products/dry-flower-production-1.pdf**
- **https://www.researchgate.net/publication/362645798_Dry_Flower_Technology_A_Value_Addition_to_Floriculture_Industry**
- **https://in.pinterest.com/smsastry/flower-decoration/**
- **https://in.pinterest.com/galisreelatha/flower-decoration/**
- **https://www.britannica.com/art/floral-decoration**
- **https://homebnc.com/best-creative-flower-decoration-ideas/**
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PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Coordinator)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on learned skill - 20 Marks** **B. Spotting based on tools (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Coordinator as per skilling**

Name and Signature of Convener & Members of CBOS:

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Kumar, N.C. (1993). An Introduction to Medical botany and Pharmacognosy. Emkay Publications, New Delhi.
2. Rao, A.P. (1999). Herbs that heal. Diamond Pocket Books (P) Ltd., New Delhi.
3. Iris F. F. Benzie and Sissi Wachtel-Galor. Herbal Medicine, 2nd edition Biomolecular and Clinical Aspects, CRC Press/Taylor & Francis; 2011
4. Fabrizio Donovan (2020) Medicinal Herbs: The Ultimate Guide to Natural Healing, Learn The Benefits of Herbs and Use the Nature's Most Powerful Medicinal Plants in Making Your Own A.Z. Remedies to Treat Diseases, Author's Republic.
5. Stargrove Mitchell Bebel ND, Herb, Nutrient, and Drug Interactions, Publisher: Elsevier – Health Sciences Division
6. Iris F. F. Benzie (Editor), Herbal Medicine (Oxidative Stress and Disease) 2nd Edition,

Online Resources–

- **e-Resources / e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- https://pubmed.ncbi.nlm.nih.gov/22593937/
- https://crimsonpublishers.com/acam/pdf/ACAM.000551.pdf
- https://www.researchgate.net/publication/329823398_Medicinal_Plants_Used_in_the_Treatment_of_Mental_and_Neurological_Disorders_in_Ghana
- https://www.sciencedirect.com/science/article/abs/pii/S0378874115003013
- https://core.ac.uk/download/pdf/143841457.pdf
- https://practicalselfreliance.com/medicinal-plants/
- https://practicalselfreliance.com/medicinal-plants/
- https://www.pdfdrive.com/medicinal-plants-books.html

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1.** Objective – 05 x1= 05 Mark; **Q2.** Short answer type- 5x2 =10 Marks Section B: Descriptive answer type qts.,1out of 2 from each unit- 4x05 =20 Marks	

Name and Signature of Convener & Members of CBoS:

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शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

राष्ट्रीय शिक्षा नीति – 2020
के तहत तृतीय एवं चतुर्थ सेमेस्टर
नवीन पाठ्यक्रम
(सत्र 2025–26)

.....वनस्पति शास्त्र.....

FOUR YEAR UNDERGRADUATE PROGRAM (NEP–2020)

Program: Bachelor in Life Science (2024 -28)

DISCIPLINE – BOTANY

Session – 2024 -25

DSC -01 to 08		DSE -01 to 12	
Code	**Title**	**Code**	**Title**
BOSC -01T	*Elementary Botany*	BOSE -01T	*Natural resources and management*
BOSC -01P	*Lab. Course -01 (Elementary Botany)*	BOSE -01P	*Lab. Course -01 (Natural resources and management)*
BOSC -02T	*Microbes and Thallophyta*	BOSE -02T	*Microbiology and Phytopathology*
BOSC -02P	*Lab. Course –02 (Microbes and Thallophyta)*	BOSE -02P	*Lab. Course -02 (Microbiology and Phytopathology)*
BOSC -03T	*Archegoniate and Fossils*	B OSE -03T	*Phytopaleontology and Evolutionary Botany*
BOSC -03P	*Lab. Course-03 (Archegoniate and Fossils)*	BOSE -03P	*Lab. Course -03 (Phytopaleontology and Evolutionary Botany)*
BOSC -04T	*Angiosperms*	BOSE -04T	*Ethnobotany and Medicinal plants*
BOSC -04P	*Lab. Course – 04 (Angiosperms)*	BOSE -04P	*Lab. Course-04 (Ethnobotany & Medicinal plants)*
BOSC -05T	*Cytology and Genetics*	B OSE -05T	*Biosystematics and Biodiversity*
BOSC -05P	*Lab. Course -05 (Cytology and Genetics)*	BOSE -05P	*Lab. Course -05 (Biosystematics and Biodiversity)*
BOSC -06T	*Plant Physiology and Economic Botany*	BOSE -06T	*Plant breeding and Seed technology*
B OSC -06P	*Lab. Course -06 (Plant Physiology and Economic Botany)*	BOSE -06P	*Lab. Course -06 (Plant breeding and Seed technology)*
BOSC -07T	*Ecology and Phytogeography*	BOSE -07T	*Instrumentation and biochemical technology*
BOSC -07P	*Lab. Course –07 (Ecology and Phytogeography)*	BOSE -07P	*Lab. Course -07 (Instrumentation and biochemical technology)*
BOSC -08T	*Molecular biology and Biostatistics*	BOSE -08T	*Growth and Stress Physiology*
BOSC -08P	*Lab. Course-08 (Molecular biology and Biostatics)*	BOSE -08P	*Lab. Course -08 (Growth and Stress Physiology)*
		BOSE -09T	*Plant biotechnology and crop improvement*
		BOSE -09P	*Lab. Course -09 (Plant biotechnology and crop improvement)*
		BOSE -10T	*Applied Botany and Intellectual property right (IPR)*
		BOSE -10P	*Lab. Course -10 (Applied Botany and IPR)*
		BOSE -11T	*Biochemistry and Enzymology*
		BOSE -11P	*Lab. Course -11 (Biochemistry and Enzymology)*
		BOSE -12T	*Bioinformatics and Gene Technology*
		BOSE -12P	*Lab. Course-12 (Bioinformatics & Gene Technology)*
GE -01 & 02		VAC	
BOGE -01T	*Elementary Botany*	BOVAC-01	*Herbal Plant & Human Health*
BOGE -01P	*Lab. Course -01 (Elementary Botany)*	SEC	
BOGE -02T	*Microbes and Thallophyta*	BOSEC-01	*Gardening and Floriculture*
BOGE -02P	*Lab. Course –02 (Microbes and Thallophyta)*		

Program Outcomes (PO):

1. Demonstrate and apply the fundamental knowledge of the basic principles of major fields of biology
2. Apply knowledge to solve the issues related to plant sciences with the help of computer technology
3. Apply knowledge for conservation of endemic and endangered plant species

Program Specific Outcomes (PSO):

1. Collaborate effectively on team-oriented projects in the field of life sciences.
2. Communicate scientific information in a clear and concise manner both orally and in writing
3. Explain Biodiversity, climate change and plant pathology.
4. Apply Biotechnology, Ecology, Genetics and Plant breeding techniques in plant sciences
5. Apply knowledge of Medicinal and Economic botany in day to day life.
6. Apply the knowledge to develop the sustainable and eco-friendly technology.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10.

Chairman
Studies
Nandkumar Patel
Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

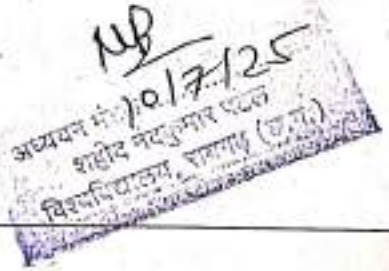
PART- A: Introduction				
Program: Bachelor in Life Sciences *(Diploma / Degree/Honors)*			**Semester - III**	Session: 2024-2025
1	**Course Code**	**BOSC-03 T**		
2	**Course Title**	**Archegoniate and Fossils**		
3	**Course Type**	**Discipline Specific course (DSC)**		
4	**Pre-requisite** (if, any)	*As per program*		
5	**Course Learning. Outcomes (CLO)**	➢ students will be familiar with amphibians and reptiles plants ➢ progressive evolution in plants ➢ relics of past plants ➢ diversity in plants ➢ development of seeds.		
6	**Credit Value**	**3 Credits**	*Credit = 15 Hours - learning & Observation*	
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Bryophyta:** Morphology, structure, reproduction and life history, distribution, classification, evolution of gametophytes and sterilization of sporogenous tissue. General account of- Riccia, Marchantia, Anthoceros and Funaria , Economic and ecological importance of bryophytes.	12
II	**Pteridophytes:** Morphology, anatomy and reproduction, classification, evolution of stele, heterospory, telome theory and origin of seed habit, general account and life history of of Psilotum, Lycopodium, Sellaginella, Equisetum Pteris, Marsilea	11
III	**Gymnosperm :** Characteristics of Gymnosperms, the vessel - less & fruitless seed plants, Classification of Gymnosperm; Polyembryony in Gymnosperms and its role; Distribution of Gymnosperm in India; Economic importance of Gymnosperm. General account of Cycas, Pinus, Gnetum Concepts of living fossil (Cycas & Ginkgo); Angiospermic characters of Gnetum.	11
IV	**Fossil:** Fossil and fossilization, types of fossils Geological time table **Brief account of the families of Pteridospermales** –Rhynia, Calamites. **General Account and Affinities** - Cycadeoidales Pentoxylales and Cordaitales	11
Keywords	Archegonia, seedless, heterospory, fossils	

Signature of Convener & Members (CBoS) :



PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Puri, P. (1980) Bryophytes, Atma Ram and Sons, Delhi.
2. Vashishtha, B. R. (2005) Pteridophytes S. Chand and Co., Delhi.
3. Bhatnagar, S. P., Moitra, A. (1996) Gymnosperms, New Age International Pvt. Ltd., New Delhi.

Text Books Recommended –

4. Sporne, K. K. (1991) The Morphology of Gymnosperm. B. I. Publishing Pvt. Ltd., Bombay.
5. Stewart, W. N. and Ruthwell, G. W. (1993) Paleobotany and the Evolution of Plants. Cambridge Univ. Press, UK.
6. Singh, H. (1978) Embryology of Gymnosperms; Encyclopedia of Plant Anatomy X. Gebruder Bortraeger, Berlin.

Online Resources–

- **e-Resources / e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

e-Resources / e-books and e-learning portals

- https://study.com/learn/lesson/bryophytes-characteristics-examples.html
- https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_General_Biology_(Boundless)/26%3A_Seed_Plants/26.02%3A_Gymnosperms/26.2A%3A_Characteristics_of_Gymnosperms
- https://www.google.com/search?q=fossils&sca_esv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn09ytjeqBGwbvdx-p8sOZFXGRamfcw%3A1713546819943&ei=Q6YiZvefOde5vr0PtMuyqAg&oq=fossils&gs_lp=Egxnd3Mtd2l6LXNlcnAiB2Zvc3NpbHMqAggAMg0QABiABBixAxhDGIoFMgoQLhiABBhDGIoFMgUQABiABDIFEAAYgAQyBRAAGIAEMgoQABiABBhDGIoFMgUQABiABDIFEAAYgAQyBRAAGIAEMgUQABiABEjhKlAAWPIUcAB4AJABAJgBgwKgAYeLqgEFMC41LjK4AQHIAQD4AQGYAgegAukLwgIKECMYgAQYJxiKBcICBBAjGCfCAhEQLhiABBixAxjRAxiDARjHAcICCBAAGIAEGLEDwgIKEAAYgAQYFBiHApgDAJIHBTAuMy40oAfSWw&sclient=gws-wiz-serp
- https://www.google.com/search?q=fossils&sca_esv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn09ytjeqBGwbvdx-p8sOZFXGRamfcw%3A1713546819943&ei=Q6YiZvefOde5vr0PtMuyqAg&oq=fossils&gs_lp=Egxnd3Mtd2l6LXNlcnAiB2Zvc3NpbHMqAggAMg0QABiABBixAxhDGIoFMgoQLhiABBhDGIoFMgUQABiABDIFEAAYgAQyBRAAGIAEMgoQABiABBhDGIoFMgUQABiABDIFEAAYgAQyBRAAGIAEMgUQABiABEjhKlAAWPIUcAB4AJABAJgBgwKgAYeLqgEFMC41LjK4AQHIAQD4AQGYAgegAukLwgIKECMYgAQYJxiKBcICBBAjGCfCAhEQLhiABBixAxjRAxiDARjHAcICCBAAGIAEGLEDwgIKEAAYgAQYFBiHApgDAJIHBTAuMy40oAfSWw&sclient=gws-wiz-serp
- https://www.google.com/search?q=pteridophytes&sca_esv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn0-V0ip7SOZG3chfKrflfXB0GPdZvA%3A1713546628592&ei=hKUiZuvFI9q-juMPkr-DkAY&oq=pter&gs_lp=Egxnd3Mtd2l6LXNlcnAiBHB0ZXIqAggAMg0QABiABBixAxhDGIoFMgoQABiABBhDGIoFMgoQABiABBhDGIoFMgoQABiAItBhDGIoFMgUQABiABDIKEAAYgAQYQxiKBTINEC4YgAQYsQMYQxiKBTIFEC4YgAQvChAAGIAEGEMYigUvChAAGIAEGEMYigVI_ihQAFixCnAAuACQAQCYAfQBoAGiBqoBBTAuMi4yuAEByAEA-AEBmAIEoALgBsICChAjGIAEGCcYigXCAgQQIxgnwgIKEC4YgAQYQxiKBZgDAJIHBTAuMi4yoAfOSg&sclient=gws-wiz-serp
- https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_General_Biology_(Boundless)/26%3A_Seed_Plants/26.02%3A_Gymnosperms/26.2A%3A_Characteristics_of_Gymnosperms

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA):30 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE): 70	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts.,1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Life Sciences (Diploma / Degree/Honors)		Semester - III	Session: 2024-2025
1	Course Code	BOSC-03	
2	Course Title	Lab. Course-03 (Archegoniate and Fossils)	
3	Course Type	Laboratory course	
4	Pre-requisite (if, any)	*As per program*	
5	Course Learning Outcomes (CLO)	At the end of the course students will be familiar ➢ with amphibians and reptiles plants ➢ progressive evolution in plants ➢ relics of past plants ➢ diversity in plants ➢ Development of seeds.	
6	Credit Value	1 Credits	*Credit =30 Hours Laboratory or Field learning/Training*
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	**Bryophyta:** Comparative study of the anatomy of vegetative and reproductive parts of *Marchantia, Pellia, Anthoceros, Notothylus, Funaria, Polytrichum.* **Pteridophyta:** Comparative study of the anatomy of vegetative and reproductive parts of *Psilotum, Lycopodium, Selaginella, Equisetum, Gleichenia, Pteris, Ophioglossum, Isoetes.* **Gymnosperms:** Comparative study of the anatomy of vegetative and reproductive parts of *Cycas, Ginkgo, Cedrus, Abies, Picea, Cupressus, Araucaria, Cryptomeria, Taxodium, Podocarpus, Agathis, Taxus, Ephedra* and *Gnetum.* • Collection of various gymnospermic plant materials. • Field work – as far practicable conveniently. **Fossil:** Study of important fossil gymnosperms from prepared photographs, slides and specimens.	30
Keywords	Archegonia, venter, bryophytes, pteridophytes	

Signature of Convener & Members (CBoS) :

अध्यक्ष 10/07/25

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. The Practical Fossil Finder (Practical Handbook) Hardcover – 1 October 1991by Steve Parker (Author) Publishers Facts On File Inc
2. Practical Botany (Part I) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda & Anamika Singhvi Edition:2013 Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual).
3. Pandey S.K. (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing GmbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5).
4. Dubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., New Delhi.
5. Pandey. B.P. 2014 Modern Practical Botany, (Vol-I) S. Chand and Company Pvt. Ltd., New Delhi.

Reference Books Recommended –

1. Principles of Palcontology Edition 3 Paperback–1 January 2006 by Arnold Miller, Michael Foote Publishers - W.H.Freeman & Co Lt

Online Resources–

- **e-Resources / e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshikshа.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- **e-Resources / e-books and e-learning portals**

1. https://efaidnbmnnnibpcajpcglclefindmkaj/https://egyankosh.ac.in/bitstream/123456789/69611/1/Unit-9.pdf
2. https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/fossil-and-fossilization
3. https://palaeobotany.org

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE): 30	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on lab. work - **20 Marks** B. Spotting based on tools & technology (written) – **10 Marks** C. Viva-voce (based on principle/technology) - **05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Life sciences *(Diploma / Degree/Honors)*		Semester - IV	Session: 2024-2025
1	Course Code	BOSC-04 T	
2	Course Title	Angiosperms	
3	Course Type	Discipline Specific course (DSC)	
4	Pre-requisite (if, any)	*As per program*	
5	Course Learning. Outcomes (CLO)	At the end of the course, the students will be able : ➢ Understand basics of plant identification, classification and nomenclature ➢ Understand the concept, diversity and evolution of Angiosperm plants. ➢ Become familiar with the internal structure of plants and concept of plant tissues with its revolutionary concept. ➢ Understand the reproductive system in flowering plants.	
6	Credit Value	3 Credits	*Credit = 15 Hours - learning & Observation*
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Plant taxonomy:** Types of classification-artificial, natural and phylogenetic Bentham & Hooker (upto series), Engler & Prantl (upto series) and Hutchinson system of classification with its merit and demerits,Modern trends of taxonomy and Numerical taxonomy.Binomial-nomenclature system. , Principles and rules (ICBN/ICN)Ranks and names, Typification, author citation, valid publication, principle of priority and its limitations;. Herbarium technique, important herbaria, c herbarium and Botanical gardens of India .	12
II	**Taxonomic Description:** Characteristics, systematics and economic importance of Dicotyledonous families- Brassicaceae, Malvaceae, Fabaceae (subfamily), Apiaceae, Rutaceae, Euphorbiaceae, Lamiaceae, Asteraceae. Monocotyledonous families -Orchidaceae, Liliaceae, Cyperaceae, Musaceae and Poaceae. (Floral features, Floral formulaand floral diagram are essential)	11
III	**Anatomy:**Tissue system features, functions of different types of meristematic and permanent tissues. Internal Structure of dicot and monocot root stem and leaf.Root and shoot apex organization: Structure and function of cambium and secondary growth in root and stem. Wood (heartwood and sapwood, annual rings) Abnormal Secondary Growth (*Dracaena Achyranthes, Nyctanthes, Boerhavia*)	11
IV	**Embryology:** Structure of anther and pollen. Structure and types of ovules, Embryo sacs-types , Pollination and Fertilization, Double fertilization, Endosperm types, structure and functions Development of embryo-Dicot and monocot embryo. Concept of Apomixes and Polyembryony, Seed structure; appendages and dispersal mechanisms.	11
Keywords	*Taxonomy, Herbarium,Tissue,Fertilization*	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Simpson, M.G. (2006) Plant Systematics. Elsevier Academic Press, San Diego, CA, USA
2. Beck, C.B. (2010). An Introduction to Plant Structure and Development, II edition.
3. Johri, B.M. (1984). Embryology of Angiosperms. Springer-Verlag, Berlin
4. Singh, G. (2012) Plant Systematics. Theory and Practice. Oxford & IBH Pvt. Ltd, New Delhi.
5. Bhojwani, SS. & Bhatnagar, SP (2011). Embryology of Angiosperms. Vikas Publication House Pvt.Ltd. New Delhi 5 edition
6. Mauseth. 1.1) (1988) Plant Anatomy. The Benjamin Cummings Publisher. USA
7. Pandey, B. P. (LatesEdt), Plant Anatomy

Reference Books Recommended –

1. Simpson, M.G. (2006) Plant Systematics. Elsevier Academic Press, San Diego, CA, USA
2. Beck, C.B. (2010). An Introduction to Plant Structure and Development, II edition.
3. Mauseth. 1.1) (1988) Plant Anatomy. The Benjamin Cummings Publisher. USA
4. Jeffrey, C. (1982). An Introduction to Plant Taxonomy. Cambridge University Press,Cambridge
5. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Plant Systematics-A Phylogenetic Approach. Sinauer Associates Inc., U.S.A. 2 nd edition.
6. Maheshwari, J.K. (1963). Flora of Delhi. CSIR, New Delhi.
7. Radford, A.E. (1986). Fundamentals of Plant Systematics. Harper and Row, New York
8. Saxena N.B. and Saxena S. (2012). Plant Taxonomy Pragati Prakashan.
9. Sharma O.P. (2013). Plant Taxonomy. MC GRAW HILL INDIA.
10. Sharma, M.K. (2013) Plant Structures (An Introduction to Plant Anatomy). VayuEducation of India.
11. Chopra G.L. (2005) Angiosperm, Pradeep Publication, Jalandhar.

Online Resources–

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- e-Resources / e-books and e-learning portals

https://www.fs.usda.gov/managing-land/wildflowers/pollinators/what-ispollinationhttps://www.pw.live/exams/neet/embryo/#:~:text=Dicot%20and%20monocot%20embryos%20develop,one%20that%20is%20significantly%20smaller.

https://byjus.com/biology/apomixis/

https://examupdates.in/plant-anatomy-and-embryology-book

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE): 35	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

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10/07/25

अध्ययन मंडल ... शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Diploma / Degree/ Honors)*			**Semester - IV**	**Session: 2024-2025**
1	**Course Code**	**BOSC-04**		
2	**Course Title**	**Lab. Course – 04 (Angiosperms)**		
3	**Course Type**	**Laboratory Course**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	At the end of this course, students will be able to: ➢ Understand the systematic status of flowering plants. ➢ Learn collection of local flora , identification and herbarium preparation. ➢ Understand internal structure of different plant parts. ➢ Understand the pollination and seed dispersal mechanism. ➢ Understand about reproduction system in flowering plants.		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	• Description of local plants of the syllabus in semitechnical language, floral formula and floral diagrams should be drawn. • Prepration of herbarium of local flora. • Anatomy of primary and secondary growth in monocuts and dicots stem using hand sections or permanent slides. • Anatomy of root, primary and secondary structure. • Study of placentation. • Study of types of ovule in permanent slide. • Isolation of globular, heart shape and torpedo embryo. • Study of pollination by insects.	**30**
Keywords	Herbarium, Monocot, Placentation, Pollination	

Signature of Convener & Members (CBoS) :

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अध्यक्ष 10/07/25
शहीद नंदकुमार पटेल
विश्वविद्यालय, सरगुजा (छ.ग.)

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Pandey, B.P. (2014). Modern Practical Botany Vol. II. S. Chand and Company Ltd., NewDelhi.
2. Bendre, A.M. and Kumar A. (2003). Manual of Practical Botany Vol. II. RastogiPublications, Meerut.
3. Santra S.C. and Chatterjee (2005). College Botany Practical Vol. II New Central Book Agency Pvt. Ltd

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **www.swayam.ac.in**
- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.internshala.com**
- **www.ndl.iitkgp.ac.in**

Online Resources–

- **e-Resources / e-books and e-learning portals**

https://visiblebody.com/learn/biology/monocot-dicot/roots

https://www.toppr.com/guides/biology/differences-between/monocot-and-dicot-stem/

https://examupdates.in/plant-anatomy-and-embryology-book/

https://jts.ac.in/working folder/DOWNLOAD-D-12-180- 618C09F700115.pdf

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks
Continuous Internal Assessment (CIA): 15 Marks
End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA):15 (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE): 35	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Diploma / Degree/Honors)*			**Semester - III**	**Session: 2024-2025**
1	Course Code	BOSE- 01 T		
2	Course Title	Natural resources and management		
3	Course Type	Discipline specific Elective (DSE)		
4	Pre-requisite (if, any)	*As per program*		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ Understand natural resources and their sustainable utilization. ➢ Knowledge on land, water, energy, and forest resources. ➢ Students will learn about the practices of natural resource management. ➢ Knowledge on the international and national efforts of natural resource management.		
6	Credit Value	3 Credits	*Credit = 15 Hours - learning & Observation*	
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

PART -B: Content of the Course

Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Natural resources** ➢ Definition and types. ➢ Natural resources' conservation Role of an individual in conservation of natural recourses, Significance, ➢ Sustainable utilization of resources' : Concept, approaches economic, ecological, and socio-cultural activities.	12
II	**Land and freshwater resources** ➢ Land as a resource ➢ Soil erosion and desertification ➢ Soil degradation and management. ➢ Forest resources use and over exploitation, deforestation ➢ Water resources, use and overutilization of surface and ground water ➢ Fresh Marine and estuarine ecosystems; ➢ Wetlands threats and management strategies	11
III	**Biological Resources** ➢ Biodiversity-definition and types ➢ Value of biodiversity ➢ Biodiversity at global, national an regional levels ➢ Threats; Management strategies; ➢ Bioprospecting. IPR; CBD; National Biodiversity Action Plan). ➢ Forests: Cover and its significance (with special reference to India); ➢ Major and minor Forest products; ➢ Renewable and non-renewable sources of energy.	11
IV	**Contemporary practices in resource management** ➢ National and international efforts in resource management and conservation. ➢ Waste management practices ➢ Natural resource Accounting ➢ Environmental impact assesement EIA ➢ Geographical information System GIS ➢ Participatory Appraisal of natural Resource ➢ Ecological Footprint with emphasis on carbon footprint,	11
Keywords	Resources, Biodiversity, Resources management, IPR, CBD.	

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House, New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.

Reference Books Recommended –

1. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

Online Resources–

- e-Resources / e-books and e-learning portals
- https://www.sciencedirect.com/topics/social-sciences/natural-resource
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://egyankosh.ac.in/bitstream/123456789/66166/2/Unit4.pdf
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ers.usda.gov/webdocs/publications/41964/30289_biological.pdf?v=0#:~:text=16-,What%20Are%20Biological%20Resources%3F,forests%2C%20and%20other%20natural%20lands.
- http://surl.li/spcdd
- https://shorturl.at/ewyIP
- https://shorturl.at/cimoF

Online Resources–

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	100 Marks
Continuous Internal Assessment (CIA):	30 Marks
End Semester Exam (ESE):	70 Marks

Continuous Internal Assessment (CIA): 30 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE): 70	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts.,1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Diploma / Degree/ Honors)*		**Semester - III**	**Session: 2024-2025**	
1	Course Code	BOSE -01 P		
2	Course Title	Lab course -01 (Natural resources and management)		
3	Course Type	Laboratory course		
4	Pre-requisite (if, any)	*As per program*		
5	Course Learning. Outcomes (CLO)	*at the end og then of the sesn* O To understand natural resources and their sustainable utilization. O Acquire knowledge on land, water, energy, and forest resources. O Students will learn about the practices of natural resource management. O Acquire knowledge on the international and national efforts of natural resource management.		
6	Credit Value	1 Credits	*Credit =30 Hours Laboratory or Field learning/Training*	
7	Total Marks	Max. Marks:- 50	Min Passing Marks:	20

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	1) To compare protected and unprotected grassland stands using community coefficients 2) To estimate IVI of the species in a woodland using point centered quarter method. 3) To find out important grassland species using chi square test. 4) Scientific visits to a protected area, a wet land, a mangrove, NBPGR, BSI, CSIR, ICAR labs and a recognized botanical gardens or a museum. 5) To determine diversity indices (Shannon Wiener, concentration of dominance, species richness, equability and B diversity. 6) Field survey of a part of town or city to make the students aware of the diversity of plants in urbon ecosystems. 7) Estimation of solid waste generated by a domestic system (biodegradable and non biodegradable) and its impact on land degradation. 8) Collection of data on forest covers of specific area. 9) Measurement of dominance of woody species by DBH (diameter at breast height) method. 10) Calculation and analysis of ecological footprint. 11) Ecological modeling.	30
Keywords	Community coefficient, IVI, diversity indices	

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. A Handbook of Human Resource Management Practice
2. Environmental and Natural Resource Economics_ A Contemporary Approach
3. Sustainable Management of Natural Resources_ Mathematical Models and Methods (Environmental Science and Engineering Environmental Science)

Online Resources–

- **e-Resources / e-books and e-learning portals**

1) https://shorturl.at/uIMTW
2) https://shorturl.at/yFJM3

Online Resources–

- **e-Resources / e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE): 35	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on lab. work - **20 Marks** B. Spotting based on tools & technology (written) – **10 Marks** C. Viva-voce (based on principle/technology) - **05 Marks**	**Managed by Course teacher as per lab. status**

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शासकीय नेशनल पीजी
विश्वविद्यालय, रायपुर (छ.ग.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Life Science *(Diploma / Degree/Honors)*		Semester - IV	Session: 2024-2025
1	Course Code	BOSE- 02 T	
2	Course Title	Microbiology and Phytopathology	
3	Course Type	Discipline specific Elective (DSE)	
4	Pre-requisite (if, any)	*As per program*	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to get ➢ Basic idea of different microbes present in biotic and abiotic environment. ➢ Knowledge of principle concept and methods in the field of Microbiology and Phytopathology ➢ Idea of living, non living and environmental causes of plant diseases. ➢ Knowledge of different technique to isolate microbes study their cultural characteristics,. ➢ How disease occurs by microbes, their identification and control measures.	
6	Credit Value	3 Credits	*Credit = 15 Hours - learning & Observation*
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) – 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Microbiology:** ❖ General account, distribution and classification of microorganism. ❖ Major microbes of air soil water and food ❖ Isolation and cultivation of microorganism ❖ Important tools and techniques used in microbiological studies.	12
II	**Plant pathology:** ❖ Nature and concept of diseases in plants, ❖ History and development of plant pathology, contribution of Indian plant pathologist in India and abroad, pathology and trends in 21st century ❖ Symptom of parasitic and non-parasitic diseases, ❖ Classification of plant diseases. ❖ Important plant diseases caused by different Pathogens ❖ Plant quarantine ❖ HR and hypersensitivity	11
III	**Techniques of Studying Plant Diseases:** ❖ Field Studies, Collection of samples and its preservation. ❖ **Sterilization technique**- Standard Methods of sterilization - Physical methods, Chemical methods, Radiation methods, ❖ **Isolation technique:** Preparation of different media for growth of pathogen by using standard inoculation techniques like- plate streak, serial dilution and pour plate methods to obtain a pure culture. ❖ **Staining Technique:** Nature and Types of stains, ❖ **Preservation** : methods of preservation of culture	11
IV	**Host Parasite Relation:** ❖ Terms and concept ❖ Disease cycle and environmental relations ❖ Plant disease dissemination ❖ Role of enzymes and toxins in pathogenesis and mode of infection, ❖ Inoculums and inoculums potential ❖ Koch's postulates ❖ Defense mechanism in plant against pathogens, ❖ Prevention and control of plant diseases	11
Key words	Microorganism, Disease, Pathogens , Culture	

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Bridges, P. (1998) Molecular Variability Of Fungal Pathogens. CAB
2. Bilgrami, K. S. and Dubey, H. C. (1985) Plant Pathology, Vikas Publ. House, Sahibabad U.P.
3. Ali, s. s. and Kulshereshta, p. (1986) plant pathology, adeeb educational, Raipur.
4. Singh, R. S. (1980) Plant Pathology, Oxford IBH Publ. Co, New Delhi.
5. Malhotra R. Plant Pathology Publisher: McGraw Hill Education India

REference Books Recommended-

1. Agrios, G. N. (1997) Plant Pathology, Academic Press, London

Online Resources–

- **e-Resources / e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- **e-Resources / e-books and e-learning portals**

1. https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/plant-pathology#:~:text=Plant%20pathology%20is%20a%20science,parasitic%20microorganisms%20that%20cause%20disease.
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4600171/
3. https://bnrc.springeropen.com/articles/10.1186/s42269-021-00627-6
4. https://www.sciencedirect.com/science/article/abs/pii/S0065308X08604339
5. https://www.researchgate.net/publication/371501301_Fundamentals_of_Plant_Pathology

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	100 Marks
Continuous Internal Assessment (CIA):	30 Marks
End Semester Exam (ESE):	70 Marks

Continuous Internal Assessment (CIA): 30 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE): 70	**Two section – A & B** Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts. 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

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शहीद नंदकुमार पटेल
विश्वविद्यालय, [illegible]

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Science *(Diploma / Degree/ Honors)*		Semester - IV	Session: 2024-2025
1	Course Code	BOSE-02 P	
2	Course Title	Lab course 02 (Microbiology and Phytopathology)	
3	Course Type	Discipline specific Elective (DSE)	
4	Pre-requisite (if, any)	*As per program*	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to get ➢ Basic idea of microbes. ➢ Culture of microbes in the laboratory ➢ How disease occurs by microbes ➢ Basic idea of host parasite interrelationship ➢ Control measure of pathogen by different biological sources.	
6	Credit Value	1 Credits	*Credit –30 Hours Laboratory or Field learning/Training*
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	❖ Calibration of microscope. ❖ Study of symptoms of various plants disease caused by viruses, bacteria and fungi. ❖ Sterilization of glass wares by detergent, chromic acid and dry sterilization ❖ Preparation and sterilization of culture media NAM, PDA, to culture bacteria and fungi respectively. ❖ Isolation of micro-organism from soil, water and air by using standard inoculation technique. ❖ Identification of the isolated fungi by slide preparation. ❖ Micrometry – measurement of length and width of spore/ conidia of the isolated /given fungi. ❖ Preparation of camera lucida diagram of the isolated / given fungi. ❖ Cultural charecteristics the the cultured bacteria. ❖ Gram staining of Bacteria ❖ Host parasite relationship- slide preparation of infected / diseased portion of the host to study host parasite relationship by smearing and section cutting methods isolated from local field. ❖ Demonstration of the effect of various bio-pesticides (essential oils, neem, turmeric and garlic) against microbe/pathogens ❖ Preparation of herbarium of different plant diseases of local area	30
Keywords	Disease, symptoms, medium, pathogenesis	

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विश्वविद्यालय, धनबाद (झा.)

PART–C: Learning Resources
Text Books, Reference Books and Others
Text Books Recommended –   1. Experiments In Microbiology, Plant Pathology And Biotechnology By K. R. Aneja. Publisher New Age International
Online Resources–   ➢ **e-Resources / e-books and e-learning portals**   1. https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/plant-pathology#:~:text=Plant%20pathology%20is%20a%20science,parasitic%20microorganisms%20that%20cause%20disease.   2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4600171/   3. https://bnrc.springeropen.com/articles/10.1186/s42269-021-00627-6   4. https://www.sciencedirect.com/science/article/abs/pii/S0065308X08604339   1) https://www.researchgate.net/publication/371501301_Fundamentals_of_Plant_Pathology
Online Resources–   ➢ **e-Resources / e-books and e-learning portals**   ➢ https://efaidnbmnnnibpcajpcglclefindmkaj/https://mis.alagappauniversity.ac.in/siteAdmin/dde-   ➢ https://admin/uploads/3/PG_M.Sc._Botany_34631%20MICROBIOLOGY%20AND%20PLANT%20PATHOLOGY.pdf

PART –D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Marks Continuous Internal Assessment (CIA): 15 Marks End Semester Exam (ESE): 35 Marks		
Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE): 35	Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

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विश्वविद्यालय, रायगढ़ (छ.ग.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life sciences *(Certificate / Diploma / Degree)*			**Semester** - I/III/V	**Session: 2024-2025**
1	**Course Code**	**BOVAC-01**		
2	**Course Title**	**Herbal Plant & Human Health**		
3	**Course Type**	**Value Addition Course (BOVAC-01)**		
4	**Pre-requisite** (if, any)	As per program		
5	**Course Learning. Outcomes (CLO)**	***After completion of this course, the students will be able to –*** ➢ *Understand the value of herbs, herbal medicine and use of herbal medicine.* ➢ *Know about botanical medicine professionals in the complementary and alternative medicine (CAM)* ➢ *Demonstrates the knowledge of the toxicity of plant and essential oil ingredients.* ➢ *Understand the possibility for allergic and unpleasant reactions to herbal products and the impact of herbal quality on potential toxicity.* ➢ *Use the herbal plants in their daily life* ➢ *Adopt the value of herbal medicine to save their health.*		
6	**Credit Value**	**2 Credits**	*Credit = 15 Hours - learning & Observation*	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course

Total No. of Teaching-learning Periods (01 Hr. per period) - 30 Periods (30 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Introduction:** Elementary knowledge of Herbal plant and Concept of Herb as medicine. Concept of ethno-medicine, folk medicines, ethno-ecology, ethnic communities of the India & the Chhattisgarh. Concept of Herbal garden. Collection of ethnic information. ***Observation/In Practices - Survey and familiarization with herbs & local herbal plants***	08
II	**Importance of medicinal plants:** Importance of Herbal / Medicinal plant in human health care – health and balanced diet (Role of proteins, carbohydrates, lipids and vitamins). Common plants & plant parts providing metals and vitamins. ***Observation/In Practices - Survey and familiarization with local herbal medicinal plants***	07
III	**Tribal medicine and Traditional knowledge:** Introduction, Concept of Tribal medicine, methods of disease diagnosis and treatment – common Plants in folk religion. Traditional knowledge and utility of some medicinal plants in Chhattisgarh. ***Collection /Identification of Herbal plants commonly used by villagers of the state –*** • *Centella asiatica,* • *Aloe vera,* • *Solanum nigrum,* • *Achyranthus aspera,* • *Withania somnifera,* • *Papaver somniferum,* • *Strychnos nux– vomica,* • *Atropa belladonna;*	08
IV	**Plants in day to day life:** Nutritive and medicinal value of common herbal fruits and vegetables of daily use. Precautions during use of herbal medicinal products. Basic idea of contribution of national research laboratories like CDRI, CIMAP, NBRI, etc. ***Collection /Identification of Herbal plants commonly used in daily life - Tulsi, Garlic, Ginger, Turmeric, Ajwain, Methi, Flax, Tea and Coffee.***	08
Keywords	*Herbal medicine, Folk medicine, Ethno-medicine, Tribal medicine*	

Signature of Convener & Members (CBoS)

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Kumar, N.C. (1993). An Introduction to Medical botany and Pharmacognosy. Emkay Publications, New Delhi.
2. Rao, A.P. (1999). Herbs that heal. Diamond Pocket Books (P) Ltd., New Delhi.
3. Iris F. F. Benzie and Sissi Wachtel-Galor. Herbal Medicine, 2nd edition Biomolecular and Clinical Aspects, CRC Press/Taylor & Francis; 2011
4. Fabrizio Donovan (2020) Medicinal Herbs: The Ultimate Guide to Natural Healing, Learn The Benefits of Herbs and Use the Nature's Most Powerful Medicinal Plants in Making Your Own AZ Remedies to Treat Diseases, Author's Republic.
5. Stargrove Mitchell Bebel ND, Herb, Nutrient, and Drug Interactions, Publisher: Elsevier – Health Sciences Division
6. Iris F. F. Benzie (Editor), Herbal Medicine (Oxidative Stress and Disease) 2nd Edition,

Online Resources–

- **e-Resources / e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- https://pubmed.ncbi.nlm.nih.gov/22593937/
- https://crimsonpublishers.com/acam/pdf/ACAM.000551.pdf
- https://www.researchgate.net/publication/329823398_Medicinal_Plants_Used_in_the_Treatment_of_Mental_and_Neurological_Disorders_in_Ghana
- https://www.sciencedirect.com/science/article/abs/pii/S0378874115003013
- https://core.ac.uk/download/pdf/143841457.pdf
- https://practicalselfreliance.com/medicinal-plants/
- https://practicalselfreliance.com/medicinal-plants/
- https://www.pdfdrive.com/medicinal-plants-books.html

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: Q1. Objective – 05 x1= 05 Mark; Q2. Short answer type- 5x2 =10 Marks Section B: Descriptive answer type qts.,1out of 2 from each unit- 4x05 =20 Marks	

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree)*	Semester - II/IV/V/VI	Session: 2024-2025

1	Course Code	BOSEC-01	
2	Course Title	Gardening and Floriculture	
3	Course Type	Skill Enhance Course (BOSEC 01)	
4	Pre-requisite (if, any)	As per program	
5	Course Learning. Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *understand the concept of Gardening & Floriculture* ➢ *learn about the gardening technique and familiar with gardening tools* ➢ *adopt the skill of gardening as well as floriculture* ➢ *student may delelop entrepreneurship in this field.*	
6	Credit Value	2 Credits (1C + 1C)	*Credit = 15 Hours – Theoretical learning and = 30 Hours Laboratory or Field learning/Training*
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

PART -B: Content of the Course

Total No. of Teaching–learning Periods:
Theory – 15 Periods (15 Hrs) and Lab. or Field learning/Training 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Theory Contents	1. **Concept & Types of Garden:** Concept of Garden & Landscape Gardening, Styles of garden – Formal & Informal garden, Free style gardens, Home garden, Hanging garden; Types of gardens – English, Mughal, Babylonian garden *[Observation & Practices]* 2. **Garden plants:** Ornamental plants - Shrubbery, Fernery, Arches (climbers and creepers), Pergolas, Edges & Hedges and Pot plants, Cacti and Succulents plants, Flower borders and beds, Ground covers and carpet beds *[Observation & Practices]* 3. **Floriculture:** Present situation & scope in India. Various types of flowers – Seasonal flowers, Cut flowers. Flower Crops - Rose, Chrysanthemum, Carnation, Gerbera, Gladioli, Tuberose, Aster, Lilly, Dahlia and Marigold. *[Observation & Practices]*	15
Lab./Field Training Contents	1. Familiarization with different tools and equipments used in gardening work. 2. Design and Plotting of Garden and Preparation of Soil for Garden 3. Soil decontamination techniques, Planting methods, Fertigation method 4. Propagation techniques for selected ornamental plants Weed management 5. Harvesting techniques, Post-harvest handling, Pre cooling, Pulsing, Packing, 6. Preparation of composite mixture and manuring practice in nursery and pots. 7. Practice in budding, cutting, layering and grafting etc. 8. Practice of flower arrangements, flower bouquet.	30
Keywords	*Garden, Flower, Floriculture, Garden tools*	

Signature of Convener & Members (CBoS)

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Randhawa, G. S. and Mukhopadhyay, A. (1986)"Floriculture in India." Allied Publisher (India)
2. Bhattacharjee, S. K. (2006) "Advances in Ornamental Horticulture." Vols. I-VI. Pointer Pub.
3. Lauria, A. and Victor, H. R. (2001) "Floriculture – Fundamentals and Practices." Agrobios.
4. Subina, G. T. and Peter, K. V. (2008) "Ornamental Plants for Gardens." New India pub. India.

Online Resources–

- **e-Resources / e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **https://indiaagronet.com/horticulture/CONTENTS/LANDSCAPE.htm**
- **https://www.youtube.com/watch?v=ZUIh6ZFO48c&ab_channel=MountainGardens**
- **https://www.youtube.com/watch?v=EE0oQO6n9iA**
- **https://www.teachmint.com/tfile/studymaterial/bse/j1063fog/11styleofgardeningpdf/0dba825bd66d-4180-afe1-28950aa42454**
- **https://k8449r.weebly.com/uploads/3/0/7/3/30731055/types_of_gardens_[compatibility_mode]_pdf-signed.pdf**
- **https://www.egyankosh.ac.in/bitstream/123456789/73050/1/Unit-2.pdf**
- **https://www.academia.edu/40140208/A_HANDBOOK_ON_FLORICULTURE_And_Landscaping**
- **https://k8449r.weebly.com/uploads/3/0/7/3/30731055/landscape_gardening.pdf**
- **https://homeguides.sfgate.com/gardening-tools-uses-41745.html**
- **https://tractorguru.in/blog/floriculture-types-of-flowers-tips-and-importance-of-floriculture/**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): 15 (By Course Coordinator)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE): 35	Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on learned skill – 20 Marks B. Spotting based on tools (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Coordinator as per skilling

Name and Signature of Convener & Members of CBoS:

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 -2028)
DEPT. OF BOTANY: VALUE ADDITION COURSE
COURSE CURRICULUM (2024-25)

PART-A: Introduction				
Program: Undergraduate *(Certificate / Diploma / Degree/Honors)*		**Semester - I/III/V**		Session: **2024-2025**
1	Course Code	**BOVAC – 02**		
2	Course Title	**Academic Research & Report Writing**		
3	Course Type	**Value Addition Course (VAC)**		
4	Pre-requisite(if,any)	As per Government norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *Understand the academic research and its scope & prospects.* ➢ *Know the Importance of Report writing in academic and Research and Necessity of report writing for achievement of academic & research goals* ➢ *Demonstrates the knowledge of the toxicity of plant and essential oil ingredients.* ➢ *Understand the kinds & characteristics of academic and research reports / presentation and its prospective application.* ➢ *Use the tools and techniques of academic research and report writing* ➢ *Adopt the skill of research designing and report/ paper / thesis writing*		
6	Credit Value	**2 Credits**	***Credit = 15 Hours - learning & Observation***	
7	Total Marks	**Max. Marks: 50**		**Min Passing Marks: 29**

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 30 Periods (30 Hours)

Module	Topics (Course contents): Learning and Practices	No. of Hrs
I	**Introduction:** Concept of - Academic Research and Research Project, Component of a concept Paper for academic research, Research–Characteristics, Type, Formulation & Design, Format, Scope, Motivation & Prospects. Popular Scheme & Organization in India promoting Research - INSPIRE, NSF, MEF, DBT, DST, DNES. STARD, ICAR, ICMR, CSIR, INSA.	**08 Hours**
II	**Research paper / Review writing:** Steps of writing a research report. Types of Research paper, Structure of Research papers, Research paper formats, Abstract writing, Methodology, Results and Discussion, Different formats referencing, Ways of communicating a research papers, (Assignments)	**07 Hours**
III	**Report/ Dissertation / Thesis Writing** - Structure of a thesis , Scope of the work, Literature review, Experimental / Computational details, Preliminary studies, Result and Discussion, Figures & Table Preparation, Conclusion and Future works, Bibliography, Appendixes (Assignments)	**07 Hours**
IV	**Tools, Techniques & Presentation**-- Various word processors - MS Office- Word, Excel & PowerPoint, Libra-office, Latex etc. Making effective presentations using Power Point and Beamer. Basic idea of Data collection, Tabulation & Presentation. Plagiarism detection tools (Assignments)	**08 Hours**
Keywords	*Academic Research, Research report, Project, Thesis/ Dissertation/ Review writing*	

Signature of Convener & Members of CBOS:

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PART–C

BVAC – 02 (Academic Research & Report Writing)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended –

- Technical Report Writing and Research Methodology by Dr Naushad Alam Dr Quadri Javeed Ahmad Peer Dr Banarsi Lal, Write & Print Publications
- Research Writing A Complete Guide (PB) by Srinivasan R, How Academics
- GUIDE TO REPORT WRITING by Netzley, Snow, PEARSON INDIA
- A Student Guide to Writing Research Reports, Papers, Theses and Dissertations By Cathal Ó Siochrú; ISBN 9780367621049. Published 2022 by Routledge
- **https://www.goodreads.com/shelf/show/report-writing**

Online Resources–

- **e-Resources / e-books and e-learning portals**
  - **https://www.questionpro.com/blog/research-reports/**
  - **https://egyankosh.ac.in/bitstream/123456789/39238/1/Unit-5.pdf**
  - **https://www.studocu.com/in/document/visvesvaraya-technological-university/research-methodology/general-format-of-a-research-report/33791300**
  - **https://students.unimelb.edu.au/academic-skills/resources/report-writing/research-reports**
  -

- **Use of following sites**

- https://www.wiley.com/en-ie/Student+Research+and+Report+Writing:+From+Topic+Selection+to+the+Complete+Paper-p-9781118963913
- https://www.researchgate.net/publication/275654158_HAND_BOOK_FOR_WRITING_RESEARCH_PAPER

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Two section – A & B** Section **A: Q1.** Objective – **05 x1= 05** Mark; **Q2.** Short answer type- **5x2 =10 Marks** Section **B:** Descriptive answer type qts.,**1out of 2** from each unit- **4x05 =20 Marks**	

Signature of Convener & Members of CBOS:

1. R Dayal
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अध्ययन मंडल ... 10/07/25
शहीद भगतसिंह पटेल
विश्वविद्यालय

FOUR YEAR UNDERGRADUATE PROGRAM (2024 -2028)
DEPT. OF BOTANY: SKILL ENHANCEMENT COURSE
COURSE CURRICULUM (2024-25)

PART-A: Introduction				
Program: Undergraduate *(Certificate / Diploma / Degree/Honors)*			Semester - II/IV	Session: 2024-2025
1	Course Code	BOSEC–02		
2	Course Title	Flower Decoration		
3	Course Type	Skill Enhance Course (SEC)		
4	Pre-requisite (if, any)	As per Government norms / Institutional scheme		
5	Course Learning. Outcomes(CLO)	*After completion of this course, the students will be able to-* ➢ *-understand the concept of Flower arrangement & Decoration* ➢ *-learn the idea, design and style of Flower decoration and its importance* ➢ *-learn the skill of different types Flower arrangement with local/social application, commercial value and social demand* ➢ *-adopt the skill of Indian, Western, Japanese and other/local style of flower arrangement / decoration towards level of entrepreneurs' start-up*		
6	Credit Value	2 Credits (1C + 1C)	*Credit = 15 Hours – Theoretical learning and = 30 Hours Laboratory or Field learning/Training*	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20	

PART -B: Content of the Course		
Total No. of Teaching–learning Periods: Theory – 15 Periods (15 Hrs) and Lab. or Field learning/Training 30 Periods (30 Hours)		
Module	Topics (Course contents): learning, Observation and Preparation	No. of Hrs
I	**Introduction:** Basic knowledge of Flowering plants, Ornamental plants, Decorative plants- Shade plants, Ferns, Bonsai, Decorative Flowers, Flower shows. Commercial flowers, Common Ornamental plants and flowers of local area /state. Famous flower Gardens of India. *[Learning and Practices]*	04Hours Learning and 07 Hours Practices
II	**Floral ornaments & Flower arrangements:** Garlands, Floral bouquets, Floral rangoli, Flower arrangements – concept, idea , design and style – Western styles, Japanes or Ikebana styles, Common types of Flower arrangement – Elliptical, Vertical, Horizontal Triangular, Crescent, S & Oval shapes and Cascade .flower arrangement. *[Learning and Practices]*	04Hours Learning and 07HoursPractices
III	**Flower decoration:** Flowers used for decoration; Different idea of flower decoration for Home, Festivals, office, Gallery, Stage, Wall, Table, Gate. Flower Pot / Vas / Bottle decoration. *[Learning and Practices]*	03 Hours + 07 Hours
IV	**Creative decorations:** Flower drying and Dry flower decoration, Foliage arrangement; Dry foliage decoration; Flower decoration by Oil Painting, Resin art of Flower decoration Terrarium – concept, design and creation of different forms. Bonsai, Shady foliage, Fern and Water plant/ flower decoration. *[Learning and Practices]*	04Hours Learning and 09 Hours Practices
Keywords	*Floral ornaments, Flower arrangement, Flower decoration*	

Signature of Convener & Members of CBOS:

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शहीद भगत सिंह
विश्वविद्यालय, फरीदाबाद (हरियाणा)

PART–C	BOSEC–02 (Flower Decoration)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

Textbooks:

1. Floriculture in India, G. S. Randhawa and A. Mukhopadhyay, Allied Publishers Pvt. Ltd.
2. Modern Ikebana: A New Wave in Floral Design Hardcover–2020byTom Loxley & VictoriaGaiger
3. On Flowers: Lessons from an Accidental Florist, Illustrated,2019byAmy Merrick(Author)
4. Flower School: A Practical Guide to the Art of Flower Arranging,2020 by Calvert Crary(Author)
5. The Flower Expert: Ideas and Inspiration for a LifeWithFlowers,2019byFleurMcHarg(Author)
6. The Art of FlowerArranging,1992 by Jan Hall(Author)
7. A Personal Guide to Flower Arranging: Volume 2 Spring and Summer, 2021 by Wendy Markby
8. The Flower Chef: A Modern Guide to Do-It-Yourself Floral Arrangements,2016byCarlyCylinder
9. Easy Ikebana: 30Beautiful FlowerArrangements,2020 by Shinichi Nagatsuka(Author)

Reference Book:

https://www.gardensillustrated.com/reviews/the-best-new-floristry-books

Online Resources–

- e-Resources/e-books and e-learning portals **Use of following sites**

- https://en.wikipedia.org/wiki/Ikebana
- https://www.artsy.net/article/artsy-editorial-thriving-art-ikebana-japanese-tradition-flower-arranging
- https://agritech.tnau.ac.in/horticulture/horti_Landscaping_dryflower_tech.html
- https://library.ihbt.res.in/Institute%20Brochures/dry%20flower.pdf
- https://static.vikaspedia.in/media/files_en/agriculture/farm-based-enterprises/value-added-products/dry-flower-production-1.pdf
- https://www.researchgate.net/publication/362645798_Dry_Flower_Technology_A_Value_Addition_to_Floriculture_Industry
- https://in.pinterest.com/smsastry/flower-decoration/
- https://in.pinterest.com/galisreelatha/flower-decoration/
- https://www.britannica.com/art/floral-decoration
- https://homebnc.com/best-creative-flower-decoration-ideas/

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Coordinator)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on learned skill - 20 Marks B. Spotting based on tools (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	**Managed by Coordinator as per skilling**

Name and Signature of Convener & Members of CBOS:

1. 2. 3. 4. 5. 6. 7. 8. 9. 10.

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Diploma / Degree/Honors)*			**Semester –** III/IV/V/VI/VII/VIII	**Session: 2024-2025**
1	Course Code	**BOGE -01 T**		
2	Course Title	**Elementary Botany**		
3	Course Type	**Generic elective (GE)**		
4	Pre-requisite (if, any)	*As per program*		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ Understand the Basics of Botany and its branches. ➢ Get acquainted with complex interrelationship between organisms and environment. ➢ Develop a comprehensive understanding of the identification, cultivation, and processing of medicinal plants, and their chemical constituents. ➢ Utilize plants resources for livelihood.		
6	Credit Value	**3 Credits**	*Credit = 15 Hours - learning & Observation*	
7	Total Marks	**Max. Marks: 100**		**Min Passing Marks: 40**

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Basics of Plant Science:** Differences and resemblances between; living and nonliving plants and animals, plant and animal cell. Concept of prokaryotes and eukaryotes.Importan features of thallophyta, Bryophyta, Pteridophyta, Gymnosperm and Anglosperm.Structure an function of a typical flowering plant.	12
II	**Branches of botany:** General idea, features, and significance; Anatomy, Cytology, Economic Botany, Ethnobotany, Forestry, Genetics, Histology, Microbiology, Paleobotany, Phytochemistry, Phytopathology , Plant biotechnology, Plant breeding, Plant ecology, Plant morphology, Plant physiology, Plant Taxonomy, etc,	11
III	**Plants for human welfare:** Plant Resources for Rural livelihood – Mahua, Tendu patta, Bamboo and Firewood.Ethnobotany in India: Methods to study Ethnobotany, Applications of Ethnobotany, ethnomedicinal plants and ethnoecology. Application of plant products for certain diseases- Cough and cold, Jaundice, Infertility, Diabetes, Blood pressure and Skin diseases.	11
IV	**Ancient Indian Botany:** Indigenous Medicinal Sciences;Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments, Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept. Charaksamhita. Ancient and modern Botanists and their contributions.-Charak, Jagdish Chandra Bose, B.P.Pal, Desikachary,K.C. Mehta M.S. Swaminathan etc.	11
Keywords	*Prokaryotes, Ethnobotany, Taxonomy, Ayurveda*	

Signature of Convener & Members (CBoS) :

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अध्ययन मंडल 10/12/25
शहीद गंगाधर महिला

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. College Botany Ganguli Kar and dutta , HIMALAYA Publishers
2. "Handbook of Medicinal Plants" by L.D. Kapoor
3. "Indian Medicinal Plants: An Illustrated Dictionary" by C.P. Khare
4. "Medicinal Plants in India: Conservation and Sustainable Utilization in the Emerging Global Scenario" edited by V.K. Gupta
5. "A Compendium of Medicinal Plants in India: An Introduction to Ayurveda" by S.L. Kochhar
6. A handbook of forest utilization by T. Mehta
7. Plants and human welfare by O.P.Sharma

Reference Books Recommended –

1. Charak Samhita
2. Medicinal Plants of India" by C.P. Khare

Online Resources–

- **e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

e-Resources / e-books and e-learning portals

- https://extension.oregonstate.edu/collection/botany-basics
- https://www.pbs.org/video/botany-basics-luu2bl/
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://www2.ca.uky.edu/agcomm/pubs/ho/ho96/ho96.pdf
- https://www.botanytoday.com/branches-of-botany/
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://www.unanijournal.com/articles/94/3-1-11-206.pdf
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://wgbis.ces.iisc.ac.in/biodiversity/sahyadri/documents/botany_history.pdf
- https://vedpuran.files.wordpress.com/2016/07/charaksamhitaatridevajigupt-vol-1.pdf
- https://egyankosh.ac.in/handle/123456789/89429

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): 30 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE): 70	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts..1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

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अध्ययन मंडल ....
शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024–28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Diploma / Degree/ Honors)*		**Semester –** III, IV, V, VI,VII,VIII		Session: **2024-2025**
1	**Course Code**	**BOGE -01 P**		
2	**Course Title**	**Lab. Course -01 (Elementary Botany)**		
3	**Course Type**	**Laboratory course**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	At the end of this course, the students will be able to ➢ Understand structure of plant cell, prokaryotic cell and eukaryotic cell. ➢ Identify pteridophytes of college campus. ➢ Learn about the different types of plant tissues. ➢ Learn about Ayurvedic system of medicine.		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**		**Min Passing Marks: 20**

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	1. Microscopic study of plant cell. 2. Microscopic study of prokaryotic (Bacteria) and eukaryotic cell (algae and fungi). 3. Study of thallus structure of *Riccia* and *Marchantia*. 4. Identification of different plants growing in college campus. 5. Study of a typical flowering plant and it's parts. 6. Study of internal structure of root and stem. 7. Study of parenchyma, collenchyma and sclerenchyma. 8. Study of medicinal plants of college campus. 9. Study of plants used to cure cough and cold, jaundice and skin diseases. 10. Visit to any local ayurvedic hospital / practitioner to understand Ayurveda.	**30**
Keywords	***Prokaryotic, Parenchyma, Jaundice, Ayurveda.***	

Signature of Convener & Members (CBoS) :

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अध्ययन मंडल .....
शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

Text Books Recommended –

1. College Botany Ganguli Kar and dutta , HIMALAYA Publishers
2. "Handbook of Medicinal Plants" by L.D. Kapoor
3. "Indian Medicinal Plants: An Illustrated Dictionary" by C.P. Khare
4. "Medicinal Plants in India: Conservation and Sustainable Utilization in the Emerging Global Scenario" edited by V.K. Gupta
5. "A Compendium of Medicinal Plants in India: An Introduction to Ayurveda" by S.L. Kochhar
6. A handbook of forest utilization by T. Mehta
7. Plants and human welfare by O.P.Sharma

Reference Books Recommended –

1. Charak Samhita
2. Medicinal Plants of India" by C.P. Khare

Online Resources–

- **e-Resources / e-books and e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- **e-Resources / e-books and e-learning portals**
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/
- https://cms.botany.org/home/careers-jobs/careers-in-botany/areas-of-specialization-in-botany.html

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE): 35	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on lab. work - **20 Marks** B. Spotting based on tools & technology (written) – **10 Marks** C. Viva-voce (based on principle/technology) - **05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

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अध्ययन मंडल .....
शहीद गंगा पुस्तकालय
विश्वविद्यालय, रायगढ़ (छ.ग.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Diploma / Degree/Honors)*			**Semester –** III/ IV/V/VI/VII/VIII	Session: **2024-2025**
1	**Course Code**	**BOGE -02 T**		
2	**Course Title**	**Microbes and Thallophyta**		
3	**Course Type**	**Generic elective (GE)**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	At the end of this course, the students will be able to 1. Understand about the Microbes and their Importance. 2. Identify edible mushrooms and learn cultivation techniques. 3. Learn about bio-fertilizers and their uses. 4. Understand life cycles of different algae and fungi.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	Viruses: - general characteristics,nature , structure and nomenclature, Bacteriophages and TMV; Lytic and Lysogenic cycles, transmission and replication of viruses, Symptoms of viral diseases on plants , important plant diseases, viroid, prions.Actinomycetes: general characteristics ,Structure, reproduction and economic importance. Mycoplasma, Phytoplasma,: general characteristics , structure, reproduction and their economic uses.	12
II	**Bacteria:** History, general character, classification and morphology, Gram positive and Gram-negative bacteria, structure of bacteria shape, size flagella and ultra structure of bacterial cell; Bacterial Growth curve, factors affecting growth of microbes; sporulation, reproduction, recombination in bacteria- Transformation Conjugation and Transduction, and Economic importance. Cyanobacteria : General characteristics, morphology,Heterocyst, cell structure of Cyanobacteria, reproduction and economic importance of Bacteria.	11
III	**Phycology:** General characteristic features of Algae. Algae in diversified habitat, Salient features, occurrence, classification and range of thallus organization.Prominent pigments found in Algae. Reproduction classification, general character and life cycle of –*Volvox, Oedogonium, Chara, Vaucheria,Ectocarpus*and*Polysiphonia*. Economic importance of algae - Role of algae in soil fertility, algae as biofertilizer , blue green algae and nitrogen fixation. Symbiosis ; algal products - Agar, biofuel	11
IV	**Mycology, Mushroom Cultivation, Lichenology &Mycorrhiza:** General characteristic features of Fungi, Economic importance and Classification of Fungi, Nutrition, Heterothallism, Physiological specialization, Heterokaryosis &Parasexuality in Fungi. Fungi as biocontrol agent. Classification, general character and life cycle of -*Mucor*, Phytophthora*Penicillium, Peziza. Ustilago, Puccinia, Agaricus; Colletotrichum, Alternaria*. Edible Mushroom- Button and Oyster mushroom and their cultivation. General account of lichens. General account of Mycorrhiza.	11
Keywords	***Mycoplasma, Transduction, Biofertilizer, Parasexuality.***	

Signature of Convener & Members (CBoS) :

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अध्यक्ष संकाय
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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
4. Aggarwal, S. K. 2009. Foundation Course in Biology, A one books Pvt. Ltd., New Delhi.
5. Aneja, K. R. 1993. Experiments in Microbiology, Pathology and Tissue Culture, VishwaPrakashan, NewDelhi.
6. Annie Ragland, 2012. Algae and Bryophytes, Saras Publication, Kanyakumari, India.
7. Basu, A. N. 1993. Essentials of Plant Viruses, Vectors and Plant diseases, New Age International, New Delhi.
8. Chopra. G. L. 1984. A text book of Algae, Rastogi publications, Meerut,India.
9. Dubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., NewDelhi.
10. Fritsch, R. E. 1977. Structure and Reproduction of Algae, Cambridge University Press, London.
11. Sharma, P.D. (2011). Plant Pathology. Meerut, U.P.: Rastogi Publication.
12. Pandey B.P. 2001. College Botany Volume 1, S Chand & Company Pvt.Ltd, New Delhi.

Reference books:

1. Webster, J., Weber, R. (2007). Introduction to Fungi, 3rd edition. Cambridge, U.K.: Cambridge University Press.
2. Pelzar, 1963. Microbiology, Tata McGraw Hill, New Delhi
3. Rangaswamy, G. 2009, Disease of Crop Plants in India, Prientice Hall of India, New Delhi.
4. Microbiology Fundamental and Applications (hindi) (pb) 9. ISBN: 9788188826230 Edition: 03Year : 2016Author : Dr. Purohit SS , Dr. Deo Publisher : Student Edition Language : Hindi
5. Modern Microbiology (hindi) (hb) ISBN: 9788177543599Edition : 1Year : 2018Author : Dr. Purohit SS , Dr. Singh T Publisher : Agrobios (India)
6. Plant pathology by R.S. Mehrotra, Tata McGraw-Hill Publication

Online Resources–

- **e-Resources / e-learning portals**
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- **e-Resources / e-books and e-learning portals**

1. https://www.classcentral.com/tag/microbiology
2. https://www.edx.org/learn/microbiology
3. https://www.mooc-list.com/tags/microbiology
4. https://www.udemy.com/topic/microbiology/
5. https://ucmp.berkeley.edu/bacteria/bacteria.html
6. https://www.livescience.com/53272-what-is-a-virus.html
7. https://gclambathach.in/lms/Economic%20importance%20of%20Algae.pdf
8. https://www.slideshare.net/sardar1109/algae-notes-1
9. https://www.onlinebiologynotes.com/algae-general-characteristics-classification/
10. https://www.sciencedirect.com/topics/immunology-and-microbiology/fungus
11. https://ucmp.berkeley.edu/fungi/fungi.html
12. https://agrimoon.com/wp-content/uploads/Mashroom-culture.pdf
13. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=11293
14. http://www.jnkvv.org/PDF/11042020110265lplant_pathology.pdf
15. https://www.apsnet.org/edcenter/disimpactmngmnt/topic/EpidemiologyTemporal/Pages/ManagementStrategies.aspx
16. https://www.agrilcareer.com/6-easy-steps-for-mushroom-cultivation/

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA):30 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE): 70	**Two section – A & B** Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts.,1out of 2 from each unit-4x10=40 Marks	