

GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE

RAJNANDGAON (C.G.)



FYUP

(Four Year Undergraduate Programme)

Course Curriculum

**FOR
B.Sc. BOTANY**

**Semester VII and Semester VIII
SESSION – 2025-26**

Approved by

Central Board Of Studies & Board Of Studies

DEPARTMENT OF BOTANY

Govt. Digvijay Autonomous P.G. College, Rajnandgaon, C.G.
Bachelor of Science (B.Sc.) Four Years UG Programme (FYUP)

Botany

2025-26

Year	Sem.	Course Type	Course Title	Credit	IA	ESE	Max Marks
First Year	I Sem.	DSC-01	Elementary Botany	3+0+0	30	70	100
		DSC-01-LAB	Elementary Botany – LAB	0+0+1	15	35	50
		GE-01	Elementary Botany	3+0+0	30	70	100
		GE-01-LAB	Elementary Botany – LAB	0+0+1	15	35	50
	II Sem.	DSC-02	Microbes and Thallophyta	3+0+0	30	70	100
		DSC-02-LAB	Microbes and Thallophyta - LAB	0+0+1	15	35	50
		GE-02	Microbes and Thallophyta	3+0+0	30	70	100
		GE-02-LAB	Microbes and Thallophyta - LAB	0+0+1	15	35	50
		SEC-01	Gardening and Floriculture	0+0+2	10	40	50
Second Year	III Sem.	DSC-03	Archegoniate and Fossils	3+0+0	30	70	100
		DSC-03-LAB	Archegoniate and Fossils – LAB	0+0+1	15	35	50
		DSE- 01	Natural resources and management	3+0+0	30	70	100
		DSE-01-LAB	Natural resources and management- LAB	0+0+1	15	35	50
		VAC- 01	Herbal Plants & Human Health	2+0+0	10	40	50
	IV Sem.	DSC- IV	Angiosperms	3+0+0	30	70	100
		DSC- IV- LAB	Angiosperms- LAB	0+0+1	15	35	50
		DSE-02	Microbiology and Phytopathology	3+0+0	30	70	100
		DSE-02-LAB	Microbiology and Phytopathology- LAB	0+0+1	15	35	50
		SEC- 02	Flower Decoration	0+0+2	10	40	50

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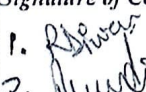




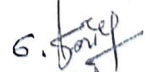
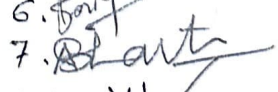
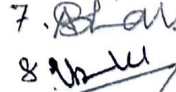
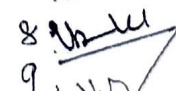

Third Year	V Sem.	DSC-05	Plant Physiology	3+0+0	20	80	100
		DSC-05-LAB	Plant Physiology- LAB	0+0+1	10	40	50
		DSE-03	Plant Metabolism	3+0+0	20	80	100
		DSE-03-LAB	Plant Metabolism- LAB	0+0+1	10	40	50
		DSE-04	Plant Diseases	3+0+0	20	80	100
		DSE-04-LAB	Plant Diseases-LAB	0+0+1	10	40	50
		SEC-03	Biofertilizer and Biopesticides	0+0+2	10	40	50
	VI Sem.	DSC-06	Plant Pathology	3+0+0	20	80	100
		DSC-06-LAB	Plant Pathology-LAB	0+0+1	10	40	50
		DSE-05	Molecular Biology and Plant Biotechnology	3+0+0	20	80	100
		DSE-05-LAB	Molecular Biology and Plant Biotechnology-LAB	0+0+1	10	40	50
		DSE-06	Economic Botany	3+0+0	20	80	100
		DSE-06-LAB	Economic Botany-LAB	0+0+1	10	40	50
		SEC-04	Mushroom Culture Technology-Project	0+0+2	10	40	50
Fourth Year Bachel or of Honors	VII Sem.	DSC-07	Ecology and Phytogeography	3+0+0	20	80	100
		DSC-07-LAB	Ecology and Phytogeography-LAB	0+0+1	10	40	50
		DSE-07	Instrumentation and Biochemical Technology	3+0+0	20	80	100
		DSE-07-LAB	Instrumentation and Biochemical Technology-LAB	0+0+1	10	40	50
		DSE-08	Biosystematics and Biodiversity	3+0+0	20	80	100
		DSE-08-LAB	Biosystematics and Biodiversity-LAB	0+0+1	10	40	50
		DSE-09	Plant Breeding and Seed Technology	3+0+0	20	80	100
		DSE-09-LAB	Plant Breeding and Seed Technology-LAB	0+0+1	10	40	50
		GE-	Growth and Stress Physiology	3+0+0	20	80	100
		GE-LAB	Growth and Stress Physiology-LAB	0+0+1	10	40	50
	VIII Sem	DSC-08	Molecular Biology and Biostatistics	3+0+0	20	80	100
		DSC-08-	Molecular Biology and	0+0+1	10	40	50

Fourth Year Bachelor of Honors with Research		LAB	Biostatistics- LAB				
		DSE-10	Plant Biotechnology and Crop Improvement	3+0+0	20	80	100
		DSE-10-LAB	Plant Biotechnology and Crop Improvement-LAB	0+0+1	10	40	50
		DSE-11	Applied Botany and Intellectual Property Right (IPR)	3+0+0	20	80	100
		DSE-11-LAB	Applied Botany and Intellectual Property Right (IPR)-LAB	0+0+1	10	40	50
		DSE-12	Biochemistry and Enzymology	3+0+0	20	80	100
		DSE-12-LAB	Biochemistry and Enzymology-LAB	0+0+1	10	40	50
		DSE-13	Bioinformatics and Genetic Technology	3+0+0	20	80	100
		DSE-13-LAB	Bioinformatics and Genetic Technology-LAB	0+0+1	10	40	50
	VII Sem.	DSC-07	Ecology and Phytogeography	3+0+0	20	80	100
		DSC-07-LAB	Ecology and Phytogeography-LAB	0+0+1	10	40	50
		DSE-07	Research Methodology and Ethics	4+0+0	20	80	100
		DSE-08	Biosystematics and Biodiversity	3+0+0	20	80	100
		DSE-08-LAB	Biosystematics and Biodiversity-LAB	0+0+1	10	40	50
		DSE-09	Plant Breeding and Seed Technology	3+0+0	20	80	100
		DSE-09-LAB	Plant Breeding and Seed Technology-LAB	0+0+1	10	40	50
		GE-	Growth and Stress Physiology	3+0+0	20	80	100
		GE-LAB	Growth and Stress Physiology-LAB	0+0+1	10	40	50
	VIII Sem	DSC-08	Molecular Biology and Biostatistics	3+0+0	20	80	100
		DSC-08-LAB	Molecular Biology and Biostatistics- LAB	0+0+1	10	40	50
		DSE-10	Plant Biotechnology and Crop Improvement	3+0+0	20	80	100
		DSE-10-LAB	Plant Biotechnology and Crop Improvement-LAB	0+0+1	10	40	50
		Research Project/ Dissertation		12			

B.Sc. – VII Semester

BOTANY

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

PART- A: Introduction			
Program: Bachelor in Life Sciences (Honors)		Semester - VII	Session: ²⁰²⁵⁻²⁶ 2024-2025
1	Course Code	BOSC- 07 T	
2	Course Title	Ecology and Phytogeography	
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, students will be able to understand: <ul style="list-style-type: none">▪ The interrelationship between organisms and environment.▪ Methods to study vegetation, community patterns and processes. ecosystem functions, and principles of phytogeography.▪ Evolving strategies for sustainable natural resource management and biodiversity conservation.▪ Climatic changes and its restoration▪ Familiar with sustainable development	
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	Ecological Factors and Management : Climatic- light; temperature, air and water. topographic. edaphic. soil formation soil texture, type of soil, soil profile. classification. physio-chemical properties, soil organic matter, biotic factors, interrelationships, major soil type of the world. Ecological management: Concepts, sustainable development, sustainability indicators.		12
II	. Ecosystem Organization : Structure and function, primary production (methods of measurements, global pattern, controlling factors), energy dynamics, trophic organization, energy flow pathways. ecological efficiencies, litter fall and decomposition- mechanism, substrate quality and climate factors. global biogeochemical cycle of C, N, P, S, minerals cycle- pathways, processes, budgets in terrestrial and aquatic ecosystem.		11
III	Community and Eco-Stability Concepts of community and continuum, analysis of communities (analytical and synthetic characters), community coefficients. inter-specific associations, ordination. concept of ecological niche. Vegetation Development: Temporal changes (cyclic and non-cyclic), mechanism of ecological successions (relay floristic and initial floristic composition, facilitation, tolerance and inhibition models), changes in ecosystem properties during succession. Ecological Stability: Concept of resistance and resilience, ecological perturbations (natural and anthropogenic) and their impact on plants and ecosystem, ecology of plant invasion, environmental impact assessment, ecosystem restoration.		11
IV	Phytogeography Pollution, Climatic Changes Phytogeographical regions of India with reference to Chhattisgarh. Pollution : Air, Water, Soil & Sound - kinds, sources, quality parameters, effect on plans and ecosystem. Climate change: Green house gases(CO ₂ , CH ₄ , N ₂ O, CFCs) sources, trends and role, ozone layer and ozone hole, consequences of climate changes, (CO ₂ fertilization, global warming, sea level rise, UV radiation).		11
Keywords	Ecological Factors community and continuum ecosystem .Phytogeographical .climate changes		
Signature of Convener & Members (CBoS) :			
1. 			
2. 			
3. 			
4. 			
5. 			
6. 			
7. 			
8. 			
9. 			
10. 			

Ecological factors
management
Ecosystem organisation

@CS PR

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Brady, N. C. (1990) The Nature and Properties of Soil Macmillan, Sydney, Australia.
2. Begon, M; Harper, J. L. And Townsend, C. R. (1996) Ecology. Blackwell Science, Cambridge, USA
3. Chapman, J. L. and Raiss, M. J. (1988) Ecology: Principles and Applications. Cambridge Univ. Press, Cambridge, U.K.
4. Kumar, H. D. (1986) Modern Concept of Ecology, Vikas Publishing House Private Ltd., New Delhi.

Reference books:

1. Hill, M. K. (1997) Understanding Environmental Pollution. Cambridge Univ. Press, Cambridge, U. K.
2. Odum, E. P. (1971) Fundamentals of Ecology. Saunders, Philadelphhia.
3. Odum, E. P. (1983) Basic Ecology. Saunders, Philasephia

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

- > <https://courses.lumenlearning.com/wm-biology2/chapter/community-structure-and-dynamics/>
- > <https://education.nationalgeographic.org/resource/ecosystem/>
- > <https://www.embibe.com/exams/ecological-factors/>
- > [https://www.sciencedirect.com/topics/earth-and-planetary-sciences/environmental-pollution#:~:text=Environmental%20pollution%20is%20unwarranted%20disposal,both%20quantitatively%20and%20qualitatively%20\(Hussain%2C](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/environmental-pollution#:~:text=Environmental%20pollution%20is%20unwarranted%20disposal,both%20quantitatively%20and%20qualitatively%20(Hussain%2C)
- > https://onlinecourses.nptel.ac.in/noc24_ce03/preview
- > https://onlinecourses.swayam2.ac.in/nou24_ge10/preview

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): ~~30~~ Marks **20**

End Semester Exam (ESE): ~~70~~ Marks **80**

Continuous Internal Assessment (CIA): 30 20 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 /10 Assignment / Seminar - 10 Total Marks - 2030	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks 20
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End Semester Exam (ESE): 70 80	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
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Name and Signature of Convener & Members of CBoS:

① *Rajiv*
② *Ram*
③ *Sudhin*
④ *M. S.*
⑤ *A. S.*
⑥ *A.*

⑦ *A.*
⑧ *Govind*
⑨ *A. S.*
⑩ *U. S.*

ACS *PP*

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

PART- A: Introduction			
Program: Bachelor in Life Sciences (Honors)		Semester - VII	Session: 2024-2025 2025-26
1	Course Code	BOSC-07 P	
2	Course Title	Lab. Course – 07 (Ecology and Phytogeography)	
3	Course Type	Laboratory course	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> ➤ Students will be able to determine frequency, abundance and density of any area. ➤ Learn community relationships of plants. ➤ Understand IVI and biomass. ➤ Can determine diversity indices. ➤ Biodiversity of different ecosystems ➤ Interaction among different community ➤ Pollution and its effect 	
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	<ol style="list-style-type: none"> 1. to determine minimum size and number of quadrates required for reliable estimate of biomass in grass land ecosystem. 2. To study the frequency, abundance and density of plants in the local ecosystem by quadrat method. 3. To determine gross and net productivity by light and dark bottle method. 4. To determine soil moisture content, porosity and bulk density of soil collected from different locations. 5. To determine the water holding capacity of various soils. 6. To determine the basal cover, or vegetational cover of one herbaceous community by quadrat method. 7. To determine IVI of the grass land. 8. To measure the above-ground plant biomass in a grassland. 9. To determine diversity indices (richness, Simpson, Shannon-Wiener) in grazed and protected grassland. 10. Experiment on Physico-Chemical Analysis of Water (pH, Temperature, etc). 11. To determine transparency or turbidity of different water bodies. 12. To measure the amount of dissolved oxygen in pond water. 13. To determine the total dissolved solids (TDS) in water 14. To measure the amount of BOD in different types of water. 15. Ombrothermic diagram of your locality. 		30
Keywords	Quadrat, Productivity, Turbidity, TDS.		
Signature of Convener & Members (CBoS) :			

① R. Rao

② R. Rao

③ R. Rao

④ M. Rao

⑤ R. Rao

⑥ R. Rao

⑦ R. Rao

⑧ R. Rao

⑨ R. Rao

⑩ R. Rao

(Signature)

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Bendre and Kumar, 2018. A text book of botany practical , Vol-2
2. Raj Mandcep, 2022. Principles of ecology .
3. Rao K S, 1993 Practical Ecology
4. Ashok K. Rathoure Bioremediation: Current Research and Applications .

Text Books Recommended –

1. Penny A. Cook, James R. Bell , C. Philip Wheater , 2011. Practical Field Ecology: A Project Guide
2. D. D. Gilbertson , M. Kent , F. B. Pyatt, 1985. Practical Ecology for Geography and Biology
3. Masood, A.A. A text book of botany practical , Edn.-5
4. Gaurav Saxena Vineet Kumar and Maulin P. Shah . Bioremediation for Environmental Sustainability: Toxicity, Mechanisms of Contaminants Degradation, Detoxification and Challenges .

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.litkgp.ac.in

Online Resources–

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

- <https://ecologicalprocesses.springeropen.com/articles/10.1186/s13717-022-00401-0>
- <https://www.internationalscholarsjournals.com/articles/applied-ecology-and-its-economical-applications-88784.html>
- <https://link.springer.com/book/10.1007/978-981-15-3372-3>
- <https://www.jstor.org/stable/2405009>
- <https://en.wikipedia.org/wiki/Bioremediation>
- <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/bioremediation>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5026719/>
- <https://www.ysi.com/parameters/turbidity>
- https://www.davidzeleny.net/wiki/doku.php/vegsurvey:materials:how_to_calculate_ivi

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks 10

End Semester Exam (ESE): 35 Marks 40

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10/5 Assignment/Seminar + Attendance - 05 Total Marks - 10 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks 10
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End Semester Exam (ESE): 35 40	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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Name and Signature of Convener & Members of CBOS: - 05

① Rishu
② Ramesh
③ Rishu
④ Rishu
⑤ Rishu
⑥ Rishu
⑦ Rishu
⑧ Rishu
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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Honors)		Semester - VII	Session: 2025-2026 2024-2025
1	Course Code	BOSE-07 T	
2	Course Title	Instrumentation and biochemical technology	
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 ➤ Develop a solid understanding of different analytical methods and instruments used in plant sciences. ➤ Acquire practical skills in sample preparation, data collection, and data analysis using analytical techniques. ➤ Understand the working principles of important instrumentation tools. ➤ Understand modern technologies in the field of Biochemistry	
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	<ul style="list-style-type: none">Principles of microscopy; Light microscopy; Fluorescence microscopy; Confocal microscopy;Use of fluorochromes in : (a) Flow cytometry (b) fluorescence microscopy: for Chromosome bandingPhase contrast, electron, scanning and transmission electron microscopy,Single and double staining techniques for light microscopy for temporary and permanent slidesStain techniques: Single and double staining.		12
II	Instruments: Salient features, Principle and applications. <ul style="list-style-type: none">Autoclave,Oven,Laminar air flow,Centrifuge.ColorimetrySpectrophotometry,Fermenters.,Water bath,pH meter		11
III	<ul style="list-style-type: none">Chromatography: Principle and its application in biological research: Paper chromatography, Column chromatography, Affinity chromatography, TLC, GLC,Electrophoresis: AGE, PAGE, SDS-PAGE.Radioisotopes: Principles and its application in biological research.ELISA test		11
IV	Biochemical Technology, Biofuel, CRISPR Technology, RDT Biodegradable plastics Gene Therapy, DNA fingerprinting, GMO food, Pest resistant crops.		11
Keywords: Microscope, biochemical technology			

Signature of Convener & Members (CBOS) :

① R. Suresh
② R. Suresh
③ R. Suresh

④ R. Suresh
⑤ R. Suresh
⑥ R. Suresh

⑦ R. Suresh
⑧ R. Suresh
⑨ R. Suresh
⑩ R. Suresh

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Bioinstrumentation by L. VEERAKUMARI

Reference Books Recommended –

1. Biological Instrumentation & Methodology by Bajpai P. K.

Online Resources–

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

1. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SMB2103.pdf
2. [https://cbpbu.ac.in/userfiles/file/2020/STUDY_MAT/ZOO/PK%20\(4\).pdf](https://cbpbu.ac.in/userfiles/file/2020/STUDY_MAT/ZOO/PK%20(4).pdf)
3. <https://kanchiuniv.ac.in/coursematerials/Biomedical%20instrumentation.pdf>

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.cshiksha.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 20End Semester Exam (ESE): ~~70~~ Marks 80
**Continuous Internal
Assessment (CIA): 30
(By Course Teacher)**

 Internal Test / Quiz-(2): ~~20+20~~ 10
 Assignment / Seminar - 10
 Total Marks - 20 ~~30~~

 Better marks out of the two Test / Quiz
 + obtained marks in Assignment shall be
 considered against ~~30~~ Marks 20

**End Semester Exam
(ESE): ~~70~~ 80**

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:

① R. Rave

② Rave

③ Rave

④ Rave

⑤ Rave

⑥ Rave

⑦ Rave

⑧ Rave

⑨ Rave

⑩ Rave

COURSE CURRICULUM

Signature of Convener & Members (CBoS) :

Signature of Convener & Members (CBOS) :

① Ramesh	⑦ Anil Kumar
② Anand	⑧ Anil Kumar
③ Anand	⑨ Anil Kumar
④ Anand	⑩ Anil Kumar
⑤ Anand	
⑥ Anand	

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

Reference book recommended

1. Bioinstrumentation: Research, Development and Applications Hardcover Impert, 31 July 1990 by Donald L. Wise

Online Resources–

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

1. <https://www.lumentum.com/en/commercial-lasers/applications/biomedical-and-analytics-instrumentation>
2. <https://www.rgcb.res.in/instraining>
3. [https://admin/uploads/3/PG M.Sc. Botony 34631%20MICROBIOLOGY%20AND%20PLANT%20PATHOLOGY.pdf](https://admin/uploads/3/PG_M.Sc._Botony_34631%20MICROBIOLOGY%20AND%20PLANT%20PATHOLOGY.pdf)

Online Resources–

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

- www.swavam.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 10

End Semester Exam (ESE): ~~35~~ Marks 40

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10/5 Assignment/Seminar + Attendance - 05 Total Marks - 10 +5	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
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End Semester Exam (ESE): ~~35~~ 40

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

D. Sessional

- 05

Name and Signature of Convener & Members of CBOS:

① S. Siver
② B. Siver
③ M. Siver
④ S. Siver
⑤ A. Siver
⑥ B. Siver

⑦ S. Siver
⑧ B. Siver
⑨ M. Siver
⑩ S. Siver

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Honors)		Semester - VII	Session: ²⁰²⁵⁻²⁶ 2024-2025
1	Course Code	BOSE- 087 08 T	
2	Course Title	Biosystematics and Biodiversity	
3	Course Type	Discipline Specific elective (DSE)	
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 different classification and nomenclature system in botany. ➤ Learn plant collection and preservation techniques . ➤ Get knowledge about the biodiversity and its importance. ➤ Analyse the different conservation practices for nature.	
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	Definition and basic concepts of biosystematics taxonomy and classification. History and theories of biological Classification. Difference between botanical and zoological nomenclature system. Trends in biosystematics: Chemotaxonomy, cytotaxonomy and molecular taxonomy. Dimensions of speciation.		12
II	Taxonomic procedures: Taxonomic collections, preservation, process of identification. Taxonomic keys, different types of keys, their merits and demerits. How to use flora, Species concepts: Typological, Nominalist and Biological species concepts. Subspecies and other infra-specific categories.		11
III	Biodiversity : Concept and level, role of biodiversity in ecosystem, function and stability, speciation and extinction, IUCN categories of threat, distribution and global pattern, terrestrial biodiversity, hot spots. Plant biodiversity: Concept, status in India, utilization and concerns.		11
IV	Principles of Conservation: In-situ conservation: Strategies for In situ conservation, international efforts and Indian initiatives, protected areas in Indian sanctuaries, national parks, biosphere reserves, wetland, mangroves and coral reefs for conservation of wild biodiversity. Ex-situ Conservation: Strategies for Ex- situ conservation, Principles and practices, Botanical gardens, gene bank, seed in vitro repositories, cryo banks.		11
Keywords	Chemotaxonomy, Cladogram, Biodiversity, Conservation.		
Signature of Convener & Members (CBOS):			

Systematics

taxonomic Procedures

Biodiversity

Principles of Conservation

① R. Singh

② S. Singh

③ P. Singh

④ A. Singh

⑤ A. Singh

⑥ P. Singh

⑦ A. Singh

⑧ A. Singh

⑨ A. Singh

⑩ A. Singh

⑪ A. Singh

⑫ A. Singh

⑬ A. Singh

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Kochar, S. L. (1998) Economic Botany of The Tropics. McMillan India Ltd., New Delhi.
2. Paroda, R. S. and Arora R. K. (1991) Plant Genetic Resources and Conservation and Management IPGRI (publications). South Asia Office, c/o NBPGR, Pusa Campus, New Delhi.
3. Scheri, R. W. (1972) Plants for Man. Englewood Cliffs, New Jersey, Prentice Hall.
4. Anonymous (1997) National Gene Bank. Indian Heritage on Plant Genetic Resources (Booklet) NBPGR, New Delhi.
5. Swaminathan, M. S. And Kocchar (1989) Plants and Society, MacMillan Publication Ltd. London.
6. Kothari, A. (1997) Understanding Bio-Diversity: Life Sustainability and Equity. Orient Longman
7. Johri, B.M. (1984). Embryology of Angiosperms. Springer-Verlag, Berlin
8. Singh, G. (2012) Plant Systematics. Theory and Practice. Oxford & IBH Pvt. Ltd, New Delhi.
9. Bhojwani, SS. & Bhatnagar, SP (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi 5 edition
10. Mauseth. 1.1 (1988) Plant Anatomy. The Benjamin Cummings Publisher. USA
11. Pandey, B. P. (LatesEdt), Plant Anatomy
12. Maheshwari, J.K. (1963). Flora of Delhi. CSIR, New Delhi.
13. Saxena N.B. and Saxena S. (2012). Plant Taxonomy Pragati Prakashan.
14. Sharma O.P. (2013). Plant Taxonomy. MC GRAW HILL INDIA.
15. Sharma, M.K. (2013) Plant Structures (An Introduction to Plant Anatomy). Vayu Education of India.
16. Chopra G.L. (2005) Angiosperm, Pradeep Publication, Jalandhar.

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.
2. Radford, A.E. (1986). Fundamentals of Plant Systematics. Harper and Row, New York
3. Jeffrey, C. (1982). An Introduction to Plant Taxonomy. Cambridge University Press, Cambridge.
4. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Plant Systematics-A Phylogenetic Approach. Sinauer Associates Inc., U.S.A. 2nd edition.
5. Simpson, M.G. (2006) Plant Systematics. Elsevier Academic Press, San Diego, CA, USA
6. Beck, C.B. (2010). An Introduction to Plant Structure and Development, II edition.
7. Heywood, V. (1995) Global Bio-Diversity Assessment, UNEP. Cambridge Univ. Press, Cambridge, U.K.
8. Heywood, V.H. and Wyse Jackson, P. S. (1991) Tropical Botanical Garden: Their Role in Conservation and Development. Academic Press, San Digo.
9. Barker, H. G. (1978) Plant and Civilization. C. A. Wadsworth, Belmont.
10. Frankel, O. H., Brown, A. H. D. and Burdon, J. J., (1995) Conservation, of Plant Diversity. Cambridge Univ. Press, Cambridge, U. K.
11. Pinstrup- Anderson, P. Et Al (1999) World Food Prospects; Critical Issues for Early 21st Century. International Food Policy Research Institute, Washington D. C. USA.
12. Rogers, N. A. And Panwar, H. S. (1998) Planning A Wild Life Protected Area Network In India Vol. I The Report, Wildlife Institute Of India, Dehradun.

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/spcdl>
- <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

① R. S. Paroda
② R. S. Paroda
③ R. S. Paroda
④ R. S. Paroda
⑤ R. S. Paroda
⑥ R. S. Paroda

⑦ R. S. Paroda
⑧ R. S. Paroda
⑨ R. S. Paroda
⑩ R. S. Paroda

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PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): ~~30~~ Marks 20End Semester Exam (ESE): ~~70~~ Marks 80Continuous Internal
Assessment (CIA): ~~30~~
(By Course Teacher) 20Internal Test / Quiz-(2): 20 +20/10
Assignment / Seminar - 10
Total Marks - 20 ~~30~~Better marks out of the two Test / Quiz
+ obtained marks in Assignment shall be
considered against ~~30~~ Marks 20End Semester Exam
(ESE): ~~70~~ 80

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., 1 out of 2 from each unit-4x10=40 Marks

Name and Signature of Convener & Members of CBoS:

① R. Srinivas② hundi③ Is④ Shyl⑤ Apurva⑥ Shanthi⑦ Madhavi⑧ Preethi⑨ Sh⑩ MehaGas OP

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Honours)		Semester - VII	Session: 2025-26 2024-2025
1	Course Code	BOSE- 08 08 P	
2	Course Title	Lab course -05 (Biosystematics and Biodiversity)	
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 collection and preservation techniques for plants. ➤ Learn use of flora for plant identification. ➤ Understand about protected area of the country ➤ Analyze various IUCN categories of threats.	
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	<ul style="list-style-type: none"> • Herbarium technique. • Non destructive collection of plants • Preservation techniques for plants part . • Prepration of taxonomic keys • How to use flora and digital flora for plant identification. • Use of flora for identification of plants of college campus. • Cladogram and dendrogram • Visit of any botanical garden , national park/wildlife sanctuary/ protected area. • Learn about IUCN categories of threats. 1) Evaluation of alfa, beta and gama biodiversitiy of college campus..		30
Keywords	Herbarium, Flora, Protected area, IUCN categories.		
Signature of Convener & Members (CBoS) :			

- ① Shiva
- ② Shiva
- ③ Shiva
- ④ Shiva
- ⑤ Shiva
- ⑥ Shiva
- ⑦ Shiva
- ⑧ Shiva
- ⑨ Shiva
- ⑩ Shiva

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Kothari, A. (1997) Understanding Bio-Diversity: Life Sustainability and Equity. Orient Longman
2. Singh, G. (2012) Plant Systematics. Theory and Practice. Oxford & IBH Pvt. Ltd, New Delhi.
3. Maheshwari, J.K. (1963). Flora of Delhi. CSIR, New Delhi.

Reference Books Recommended –

1. . flora of India by Botanical Survey of India
2. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Plant Systematics-A Phylogenetic Approach. Sinauer Associates Inc., U.S.A. 2nd edition.
3. Simpson, M.G. (2006) Plant Systematics. Elsevier Academic Press, San Diego, CA, USA

Online Resources–

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

- > <https://www.worldfloraonline.org/>
- > <https://bsi.gov.in/page/en/digital-resources>
- > <https://indiaflora-ces.iisc.ac.in/FloraPeninsular/>
- > <http://www.efloras.org/>
- > <https://creately.com/guides/what-is-a-dichotomous-key/herpsteppp.inflibort.ac.in/Home/ViewSubject?catid=1pBOY7YTCLSD2K>
- > <https://eppp.inflibort.ac.in/Home/ViewSubjectPratid-100YJVTCLSDKUBW>
- > <https://proinfibnet.ac.in/Home/ViewSubjectcatid-1pbyZY1BCS02E>
- > <https://www.amazon.in/Plant-Taxonomy-past-present-future-chook/dp/B016021014>
- > <https://www.instructables.com/How-to-Make-a-Cladogram/>
- > [file:///C:/Users/user/Downloads/ajol-file-journals_452_articles_122070_submission_proof_122070-5365-335203-1-10-20150914%20\(1\).pdf](file:///C:/Users/user/Downloads/ajol-file-journals_452_articles_122070_submission_proof_122070-5365-335203-1-10-20150914%20(1).pdf)

Online Resources–

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

- > www.swayam.ac.in
- > www.ignou.ac.in
- > www.egvankosh.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 10

End/Semester Exam (ESE): 35 Marks 40

Continuous Internal Assessment (CIA): 15 (By Course Teacher) 10	Internal Test / Quiz-(2): 10 & 10/5 Assignment/Seminar + Attendance - 05 Total Marks - 10-15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks 10
End Semester Exam (ESE): 35 40	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:

D. Sossiana

- 05 marks

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Honors)		Semester - VII	Session: ²⁰²⁵⁻²⁶ 2024-2025
1	Course Code	BOSE- 09 09 T	
2	Course Title	Plant breeding and Seed technology	
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 ➤ Gain knowledge and comprehension of the breeding systems ➤ knowledge of reproductive biology in angiosperms to address real-world challenges related to plant breeding, crop production, and conservation. provide students with a comprehensive understanding of plant breeding principles and techniques.	
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 breeding: Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding.		12
II	Methods of crop improvement: Introduction: Centers of origin and domestication of crop plants, plant genetic resources; Acclimatization; Selection methods: For self pollinated, cross pollinated and vegetatively propagated plants; Hybridization: For self, cross and vegetatively propagated plants – Procedure, advantages and limitations. Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement.		11
III	Breeding Methods for Stress Resistance: Breeding for drought, salinity, heat, cold, disease and insect resistance, breeding for protein and oil quality. Heterosis and inbreeding depression, hybrid and synthetic varieties. Hardy-Weinberg law, systems of mating.		11
IV	Seed Technology: Principle & Concept of Seed Technology. Quality seeds, Indian seed act. Classes of quality seeds - breeder, foundation, registered and certified seeds, operations essential for seed production, seed processing, certification and maintenance storage of improved seeds, seed productions organizations- national and state seed corporations and private seed companies. Artificial seeds, terminator seeds.		11
Keywords	Breeding, Heterosis, Self incompatibility, Hybridization.		

Signature of Convener & Members (CBoS) :

① R. P. Singh
② S. K. Singh
③ M. Singh
④ S. Singh
⑤ S. Singh
⑥ S. Singh

⑦ S. Singh
⑧ S. Singh
⑨ S. Singh
⑩ S. Singh

⑪ S. Singh
⑫ S. Singh

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Plant breeding by B.D Singh.
2. BD Singh (2003) Plant Breeding. Kalyani Publishers
3. PLANT BREEDING: PRINCIPLE AND METHODS B D SINGH - IN HINDI
4. Sharma JR (1994) Principles and Practices of Plant Breeding. Tata McGraw-Hill Pub. Co. New Delhi.
5. Chaudhari, H.K. (1984). Elementary Principles of Plant Breeding. Oxford – IBH.
6. Acquaah, G. (2007). Principles of Plant Genetics & Breeding. Blackwell Publishing.
7. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.

Reference Books Recommended –

1. Allard (1960) Principles of Plant Breeding. John Wiley and Sons, Inc. New York.
2. Hayes, Immer and Smith (1955) Methods of Plant Breeding, MacGraw- Hil Book Co. Inc. New York.
3. Jonossy and Lupton (1976) Heatersis in Plant Breeding. Elsevier, Amsterdam.
4. Poehlman and Borthakur (1969) Breeding Asian Field Crops With Special Reference To Crops I India. Oxford and IBH Publishing Company, New Delhi.

Online Resources–

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

1. <https://chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://courseware.cutm.ac.in/wp-content/uploads/2020/05/Download-Notes-8.pdf>
2. <https://chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://www.eagri.org/eagri50/GBPR211/lec16.pdf>
3. <https://efaidnbmnnnibpcajpcglclefindmkaj/http://www.eagri.org/eagri50/GBPR211/lec16.pdf>
4. <https://www.sciencelearn.org.nz/resources/77-pollination-and-fertilisation>
5. <https://www.crops.org/about-crops/seed-technology#:~:text=What%20is%20seed%20technology%3F,that%20people%20and%20livestock%20eat.>
6. <https://plantbreeding2010.blogspot.com/2020/12/seed-and-seed-technology-introduction.html>
7. <https://www.nature.com/articles/s41477-018-0309-4>

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 20
 End Semester Exam (ESE): ~~70~~ Marks 80

Continuous Internal Assessment (CIA): 30 (By Course Teacher) 20	Internal Test / Quiz-(2): 20 +20/10 Assignment / Seminar - 10 Total Marks - 20 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks 20
End Semester Exam (ESE): 70 80	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:

① R. P. Singh
 ② S. K. Singh
 ③ M. Singh

④ S. K. Singh
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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Honors)		Semester - VII	Session: 2024-2025 2025-26
1	Course Code	BOSE- 09P 09P	
2	Course Title	Lab. Course- 05 (Plant breeding and Seed Technology)	
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 - > Idea of seeds which carries a new generation. > Knowledge of plant breeding techniques. > Knowledge of breeding methods for stress tolerance. > Idea of seed processing and certification 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	1. Study of seed parts 2. Collection of different types of mature seeds 3. Techniques of hybridization- Emasculation. 4. Techniques of hybridization - Bagging and tagging. 5. Study of vegetatively grown plants part of your locality 6. Collection of seeds of different varieties of locally grown crops. 7. Inter-varietal cross in an ornamental plant. 8. Visit to state and national seed corporation companies and prepare a report.		30
Keywords	Seed, Emasculation, Bagging and tagging.		

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources

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Text Books, Reference Books and Others			
Text Books Recommended – <ol style="list-style-type: none"> Allard (1960) Principles of Plant Breeding. John Wiley and Sons, Inc. New York. Hayes, Immer and Smith (1955) Methods of Plant Breeding, MacGraw- Hill Book Co. Inc. New York. Plant breeding by B.D Singh Reference Books Recommended – <ol style="list-style-type: none"> Jonosy and Lupton (1976) Heatersis in Plant Breeding. Elsevier, Amsterdam. Poehlman and Borthakur (1969) Breeding Asian Field Crops With Special Reference To Crops I India. Oxford and IBH Publishing Company, New Delhi. 			
Online Resources– <ul style="list-style-type: none"> e-Resources / e-books and e-learning portals https://www.merriam-webster.com/dictionary/emasculate https://agritech.tnau.ac.in/crop improvement/crop imprv emasculatation cereals.html https://www.toppr.com/guides/biology/reproduction-in-organisms/vegetative-propagation/#:~:text=Vegetative%20Propagation%20by%20Roots,example%2C%20Sweet%20potato%20and%20Dahlia. 			
Online Resources– <ul style="list-style-type: none"> 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 10 End Semester Exam (ESE): 35 Marks 40			
Continuous Internal Assessment (CIA): 15 (By Course Teacher) 10	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar + Attendance - 05 Total Marks - 10 + 5	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks 10	
End Semester Exam (ESE): 35 40	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	

D. Sessional

- as marks

Name and Signature of Convener & Members of CBoS:

① Rishan
 ② Anurag
 ③ Mr. [Signature]
 ④ [Signature]
 ⑤ [Signature]
 ⑥ [Signature]

⑦ [Signature]
 ⑧ [Signature]
 ⑨ [Signature]
 ⑩ [Signature]

[Signature] [Signature]

FOUR YEAR UNDERGRADUATE PROGRAM (2024-2028)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

DSE-07

PART- A: Introduction		
Program: Bachelor in Science (<i>Honors with Research</i>)	Semester- VII	Session: 2025-26
Course Title	BOSE-07	
Course Type	Research Methodology and Ethics	
Pre-requisite (if, any)	As per program	
Course Learning Outcomes (CLO)	<p>Upon successful completion of the course "Research Methodology and Ethics", students will be able to:</p> <ul style="list-style-type: none"> ➤ Understand the fundamental concepts, types, and processes involved in research. ➤ Develop skills to formulate research problems and research design. ➤ Acquire knowledge on data collection techniques, sampling strategies, and statistical tools for data analysis. ➤ Prepare comprehensive research reports and critically analyze scientific literature using technological tools and referencing standards. <p>Learning outcome</p> <ul style="list-style-type: none"> ➤ Define and explain the meaning, need, and nature of research in the context of education. ➤ Identify the steps in the research process and criteria for good research. ➤ Formulate a research problem and develop research questions. ➤ Design research including sampling strategy and sample size calculation. ➤ Understand the role and significance of literature review in research design. ➤ Apply sampling techniques and calculate sampling errors. ➤ Know the data collection tools. ➤ Use descriptive statistics (mean, median, mode) and correlation techniques for data analysis. ➤ Understand and apply inferential statistics including chi-square, t-test.. ➤ Evaluate hypotheses through appropriate tests. ➤ Understand the structure and importance of report writing in research. ➤ Develop skills in citation, referencing, and bibliography compilation. ➤ Understand the writing of research report and research ethics. 	

Credit Value	4 Credits	Credit=15 Hours- Learning & Observation
Total Marks	Max. Marks:100	Min. Passing Marks:40
PART- B: Content of the Course		
Total no. of Teaching-Learning Periods (01 Hr. per periods) 60 Periods (60 Hours)		
UNIT	TOPICS (Course Contents)	No. of Periods
I	<p>Research: Meaning, Definition, Objectives, Significance; Types of Research; Difference between Research methods and Research methodology.</p> <p>Research Process, Steps of research process, Criteria for good research, Research problem: Definition, Components of research problem, Selection of the research problem.</p>	15
II	<p>Research Design: Meaning, Definition, Important concepts relation to research design. Developing a research plan.</p> <p>Sampling Design: Meaning, Steps in sample design, Criteria of selecting a sampling procedure, Sample size, sampling error, Characteristics of a good sample design, Literature search procedure. Sources of literature.</p> <p>Data Collection: Data Collection: Type of data, Primary and Secondary Data, Methods of data collection.</p>	15
III	<p>Data Analysis, Types of Analysis, Measures of central tendency: Mean, median, mode; Measures of Dispersion, Measures of Asymmetry (Skewness), Measures of relationship, Test of Hypothesis: What is Hypothesis, Characteristics of hypothesis, procedure for hypothesis testing, Tests of hypothesis: t-test and chi-squared test.</p>	15
IV	<p>Report writing, Significance of report, Steps of report writing, Concepts of Bibliography and References, Layout of research report, Mechanics of writing a research report. Ethics with respect to science and research, IPR, Plagiarism, Publication ethics: definition, introduction and importance.</p>	15

PART:- C- Learning Resources

Text books/ Reference Books-

- [1] Research methodology: Methods and techniques- By C.R. Kothari
- [2] Research methodology- By Dr. R.N. Trivedi and Dr. D.P. Shukla
- [3] An Introduction to Legal Arguments-By Edward Lewi
- [4] Methodology & Techniques-TS. Bodenkr & Milkinson.
- [5] Method in social Research- By William J. Goode & Paul K. Hatt.
- [6] Development of Research Tools- N.C.Gautewan.
- [7] Legal Research Methodology-S.R.Myneli.
- [8] Legal Research- William P. Statesky.
- [9] A Guide to Legal Research- Erwine Sursency.

Part: D- Assessment and Evsluation**Suggested Continuous Evaluation Methods:****Maximum Marks: 100 Marks****Continuous Internal Assessment (CIA): 20 Marks****End Semester Exam (ESE): 80 Marks****Continuous Internal Assessment (CIA):
20 Marks
(By Course Teacher)****Internal test/ Quiz: 10 Marks
Assignment/ Seminar: 10 Marks
Total Marks: 20 Marks****End Semester Exam(ESE): 80 Marks****Two section-A & B
Section A:
Q1 Objective- 10x2= 20 Marks;
Q2 Short answer type- 5x4=20 Marks
Section B:
Q3 Descriptive answer types questions-
4x10= 40 Marks**

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Honors)		Semester - VII	Session: 2024-2025 2025-26
1	Course Code	BOSE-08T BOGE-03T	
2	Course Title	Growth and Stress Physiology	
3	Course Type	Discipline specific Elective (DSE) Generic Elective	
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 the role of Physiological and metabolic processes for plant growth and development under stress. 2. Assimilate about biochemical constitution of plant diversity. 3. Get acquired the students with complex interaction between organism and environment 4. Understand about the role of hormones in plant development.	
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 Growth and Phytohormone ➤ Plant growth curve, sigmoid and J shaped growth. Lag, Log and steady stage. Developmental roles of phytohormones ➤ Auxins, ➤ Gibberellins, ➤ Cytokinins, ➤ ABA, ➤ Ethylene,		12
II	Movements, Dormancy & Responses ➤ Photoperiodism (SDP, LDP, Day neutral plants); ➤ Phytochrome (discovery, structure and functions), ➤ Seed and bud Dormancy causes and breaking, ➤ Vernalization ➤ Senescence, ➤ Plant movements		11
III	Plant eco-physiology and Stress Physiology: ➤ Concept of Plant eco-physiology. ➤ Plant perception, ➤ physiology of ecological considerations. ❖ Hydrophytic, xerophytic morphological and anatomical adaptations in plants		11
IV	Stress Physiology: Plant responses to biotic and abiotic stress, mechanism of biotic and abiotic tolerance, HR (Hypersensitive Response) and SAR Systemic Acquired Resistance), water deficit and ❖ Drought resistance, ❖ Salinity stress, ❖ metal toxicity, ❖ freezing and heat stress, ❖ oxidative stress.		11
Keywords	Growth, Phytohormone, Eco-physiology, Vernalization.		
Signature of Convener & Members (CBoS) :			

① R. Sivas
② S. Suresh
③ M. Suresh

④ S. Suresh
⑤ S. Suresh
⑥ S. Suresh
⑦ S. Suresh

⑧ S. Suresh
⑨ S. Suresh
⑩ S. Suresh
⑪ S. Suresh

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended-

1. Galston, A.W., (1989) Life Processes in Plants, Scientific American Library, Springer-Verlag, New York, USA.
2. Hopkins, W.G., (1995) Introduction to Plant Physiology, John Wiley and Sons, Inc. New York, USA.
3. Salisbury, F.B. and Ross, C.W., (1992) Plant Physiology, Wadsworth Publishing Co., California, USA.
4. Denis, D.T., Turpin, D.H. Lefebvre, D.D. & Layzell, D.B. (1997) Plant Metabolism, Longman, Essex, England.

Reference Books Recommended -

1. Taiz, L. and Zeiger, E. (1998) Plant Physiology, Sinauer Associates, Inc. Pub., Massachusetts, USA.
2. 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://link.springer.com/book/10.1007/978-3-030-78420-1>
<https://uou.ac.in/sites/default/files/slm/MSCBOT-601.pdf>
<https://www.researchgate.net/publication/347908867> Stress Physiology in Plants
https://www.esalq.usp.br/lepse/imgs/conteudo_thumb/Plant-stress-physiology.pdf

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 20

End Semester Exam (ESE): ~~70~~ Marks 80

Continuous Internal Assessment (CIA): 70 20 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20/10 Assignment / Seminar - 10 Total Marks - 20 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks 20
End Semester Exam (ESE): 30 80	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., 1 out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

① Rajeev
 ② Renuka
 ③ Mr. Ravi
 ④ Dr. Ravi
 ⑤ Dr. Ravi
 ⑥ Dr. Ravi

⑦ Dr. Ravi
 ⑧ Dr. Ravi
 ⑨ Dr. Ravi
 ⑩ Dr. Ravi

Dr. Ravi

Dr. Ravi

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Honors)		Semester - VII	Session: 2024-2025 2025-26
1	Course Code	BOSE-08 P BOGE-03 P	
2	Course Title	Lab. Course -08 (Growth and stress physiology)	
3	Course Type	Laboratory course <i>Generic Elective</i>	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	After the completion of the course the students will be able to: 1. Understand the role of Physiological and metabolic processes for plant growth and development under stress. 2. Assimilate about biochemical constitution of plant diversity 3. Effect of phytohormones on plants. 4. Understand different physiological processes of 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	1. <i>Avena</i> curvature test of Auxin. 2. Expression of bolting in cabbage. 3. Induction of lateral branches by cytokinin. 4. Demonstration of plasmolysis and deplasmolysis in plant cell. 5. Potato osmoscope for osmosis. 6. Demonstration of transpiration. 7. Measurement of transpiration rate by Farmers/ Ganong's potometer. 8. Extraction of seed proteins depending upon solubility. 9. Fractionation of proteins using gel filtration chromatography 10. Principle of colorimetry, spectrophotometry and fluorimetry.		30
Keywords	Bolting, chlorophyll, osmosis, chromatography.		

Signature of Convener & Members (CBoS) :

① *RD*
 ② *Devi*
 ③ *...*
 ④ *...*
 ⑤ *...*
 ⑥ *...*

⑦ *Jadlin*
 ⑧ *...*
 ⑨ *...*
 ⑩ *...*

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PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Practical Plant Physiology Hardcover – 1 January 2015 by R. Sivakumar, Narendra Publishing
2. PRACTICALS IN PLANT PHYSIOLOGY AND BIOCHEMISTRY MANJU BALA, SUNITA GUPTA, N.K GUPTA & M.K. SANGHA Scientific Publishers
3. A Practical Manual on Fundamentals of Plant Physiology Paperback – 16 September 2022 by R. K. Samaiya Subrata Sharma, Gyanendra Tiwari, R. Shivraj krishnan, Sunil Pandey, Preeti Sagar Nayak (Author) BFC PUBLICATIONS PVT LTD

Reference Books Recommended –

1. Practical Manual Experimental Plant Physiology and Biochemistry Manual Paperback – 1 January 2023 by Rajesh Kumar Asok Kumar Bera, Bandana Bose (Author) Publisher- Science Technology

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://www.britannica.com/science/transpiration>
- <https://www.frontiersin.org/articles/10.3389/fagro.2022.765068/full>
- <https://www.sciencedirect.com/science/article/abs/pii/S0176161796802872>

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.cshiksha.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 10

End Semester Exam (ESE): 35 Marks 40

Continuous Internal Assessment (CIA): 35 (By Course Teacher) 10	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 10 15	5 Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks 10
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End Semester

Exam (ESE): ~~15~~
40

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

D. ~~Sessimal~~

- 05 marks

Name and Signature of Convener & Members of CBoS:

① R. P. S.
② R. P. S.
③ R. P. S.
④ R. P. S.
⑤ R. P. S.
⑥ R. P. S.

⑦ R. P. S.
⑧ R. P. S.
⑨ R. P. S.
⑩ R. P. S.

G. S.

R. P.