

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) :			
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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&scasv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn09vtizqRGwbvdx-p0sOZFXXGRnmfcw%3A1713546819943&ei=O6YiZvefOde5vr0PtMuvqAg&og=fossils&gs_l=Egxdn3Mtd2l6LXNlcnAiB2Zvc3NpbHMqAggAmg0QABiABBiAxBhDGIoFMgoQLhiABBBhDGIoFMgUQABiABDiFEAAyAgQyBRAAGIAEMgoQAABiABBBhDGIoFMgUQABiABDiFEAAyAgQyBRAAGIAEMgUQABiABBiEjhKIAAWPIUCAB4AJABAjgBwKqAYcLqgEFMC41LjK4AQHIAQD4AQGYAggAnkLwglKECMYgAQYJxiKBClCBBAjGCiCAhEQLhiABBBixAxjRaxiDARjHacICCBAAGIAEGLEDwgIKEAAyAgQYFBIHAggDAJIHBTauMv40oAfSWw&scient=gws-wiz-serp		
➤ https://www.google.com/search?q=fossils&scasv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn09vtizqRGwbvdx-p0sOZFXXGRnmfcw%3A1713546819943&ei=O6YiZvefOde5vr0PtMuvqAg&og=fossils&gs_l=Egxdn3Mtd2l6LXNlcnAiB2Zvc3NpbHMqAggAmg0QABiABBiAxBhDGIoFMgoQLhiABBBhDGIoFMgUQABiABDiFEAAyAgQyBRAAGIAEMgoQAABiABBBhDGIoFMgUQABiABDiFEAAyAgQyBRAAGIAEMgUQABiABBiEjhKIAAWPIUCAB4AJABAjgBwKqAYcLqgEFMC41LjK4AQHIAQD4AQGYAggAnkLwglKECMYgAQYJxiKBClCBBAjGCiCAhEQLhiABBBixAxjRaxiDARjHacICCBAAGIAEGLEDwgIKEAAyAgQYFBIHAggDAJIHBTauMv40oAfSWw&scient=gws-wiz-serp		
➤ https://www.google.com/search?q=pteridophytes&scasv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn0-V0lp75QZG3sbfKrflXB0GPdZvA%3A1713546628592&ei=hKUjZuvF19q-juMPkr-DkAy&og=pter&gs_l=Egxdn3Mtd2l6LXNlcnAiBHB0ZXIqAggAmg0QABiABBBhDGIoFMgoQABiABBBhDGIoFMgUQABiABDiFEAAyAgQyBRAAGIAEMgoQAABiABBBhDGIoFMgUQABiABDiFEAAyAgQyBRAAGIAEMgUQABiABBiEjhKIAAWPIUCAB4AJABAjgBwKqAYcLqgEFMC41LjK4AQHIAQD4AQGYAggAnkLwglKECMYgAQYJxiKBClCBBAjGCiCAhEQLhiABBBixAxjRaxiDARjHacICCBAAGIAEGLEDwgIKEAAyAgQYFBIHAggDAJIHBTauMv40oAfSWw&scient=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		

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 <i>Marchantia</i> , <i>Pellia</i> , <i>Anthoceros</i> , <i>Notothylus</i> , <i>Funaria</i> , <i>Polytrichum</i> . Pteridophyta: Comparative study of the anatomy of vegetative and reproductive parts of <i>Psilotum</i> , <i>Lycopodium</i> , <i>Selaginella</i> , <i>Equisetum</i> , <i>Gleichenia</i> , <i>Pteris</i> , <i>Ophioglossum</i> , <i>Isoetes</i> . Gymnosperms: Comparative study of the anatomy of vegetative and reproductive parts of <i>Cycas</i> , <i>Ginkgo</i> , <i>Cedrus</i> , <i>Abies</i> , <i>Picea</i> , <i>Cupressus</i> , <i>Araucaria</i> , <i>Cryptomeria</i> , <i>Taxodium</i> , <i>Podocarpus</i> , <i>Agathis</i> , <i>Taxus</i> , <i>Ephedra</i> and <i>Gnetum</i> . ▪ 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) :

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PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. The Practical Fossil Finder (Practical Handbook) Hardcover – 1 October 1991 by 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 Paleontology 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.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://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	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): 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:

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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 Periods
I	Plant taxonomy: Types of classification-artificial, natural and phylogenetic Bentham & Hooke (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, e 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 formula and 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 (<i>Dracaena</i> <i>Achyranthes</i> , <i>Nyctanthes</i> , <i>Boerhavia</i>)		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) :			

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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. I.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. I.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). Vayu Education 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-is-pollination>
<https://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	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10 Total Marks - 30	
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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