

**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)**

**DEPARTMENT OF BOTANY**

**COURSE CURRICULUM**

<b>PART- A: Introduction</b>			
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)	<ul style="list-style-type: none"> <li>➤ students will be familiar with amphibians and reptiles plants</li> <li>➤ progressive evolution in plants</li> <li>➤ relics of past plants</li> <li>➤ diversity in plants</li> <li>➤ development of seeds.</li> </ul>	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

<b>PART -B: Content of the Course</b>		
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)		
Unit	Topics (Course contents)	No. of Period
I	<b>Bryophyta:</b> 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	<b>Pteridophytes:</b> 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	<b>Gymnosperm :</b> 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	<b>Fossil:</b> Fossil and fossilization, types of fossils Geological time table <b>Brief account of the families of Pteridospermales –Rhynia, Calamites.</b> <b>General Account and Affinities - Cycadeoidales Pentoxylales and Cordaitales</b>	11

*Keywords* Archegonia, seedless, heterospory, fossils

*Signature of Convener & Members (CBoS) :*

- ① R. Sivas
- ② Suresh
- ③ M. Anil
- ④ M. Anil
- ⑤ S. Anil
- ⑥ S. Anil
- ⑦ K. Anil

⑧ S. Anil  
⑨ S. Anil  
⑩ S. Anil

## 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](http://www.swayam.ac.in)
- [www.ignou.ac.in](http://www.ignou.ac.in)
- [www.egyankosh.ac.in](http://www.egyankosh.ac.in)
- [www.iitm.ac.in](http://www.iitm.ac.in)
- [www.eskillindia.org](http://www.eskillindia.org)
- [www.eshiksha.mp.gov.in](http://www.eshiksha.mp.gov.in)
- [www.vlab.co.in](http://www.vlab.co.in)
- [www.internshala.com](http://www.internshala.com)
- [www.ndl.iitkgp.ac.in](http://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%3AGeneral\\_Biology\\_\(Boundless\)/26%3A\\_Seed\\_Plants/26.02%3A\\_Gymnosperms/26.2A%3A\\_Characteristics\\_of\\_Gymnosperms](https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3AGeneral_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\\_enIN10911N1093&sxsrf=ACQVn09ytizqRGwbydx-p0sOZFXGRnmfw%3A1713546819943&ei=Q6YiZvefOde5vr0PtMuvqAg&og=fossils&gs\\_l=EGxnd3Mtd216LXNlcnAiB2Zvc3NpbHMqAggAMg0QABiABbixAxDGIoFMgoQLhiABbHDGIoFMgUQABiABDIFEAAyGAQvBRAAGIAEMgoQABiABbHDGIoFMgUQABiABDIFEAAyGAQvBRAAGIAEMgoQABiABEjhKIAAWPIUCAB4AJABAjgBgwKgAYcLqgEFMC41LjK4AQHIAOD4AQGYAgegAukLwgIKECMYgAOYJxiKBclCBBAjGCICAhEQLhiABbixAxjRaxiDARjHAclCCBAAGIAEGLEDwgIKEAAyGAOYFBiHAgpDAJIHBTauMv40oAfsWw&scient=gws-wiz-serp](https://www.google.com/search?q=fossils&scasv=09379ecd0b6efd91&rlz=1C1CHBD_enIN10911N1093&sxsrf=ACQVn09ytizqRGwbydx-p0sOZFXGRnmfw%3A1713546819943&ei=Q6YiZvefOde5vr0PtMuvqAg&og=fossils&gs_l=EGxnd3Mtd216LXNlcnAiB2Zvc3NpbHMqAggAMg0QABiABbixAxDGIoFMgoQLhiABbHDGIoFMgUQABiABDIFEAAyGAQvBRAAGIAEMgoQABiABbHDGIoFMgUQABiABDIFEAAyGAQvBRAAGIAEMgoQABiABEjhKIAAWPIUCAB4AJABAjgBgwKgAYcLqgEFMC41LjK4AQHIAOD4AQGYAgegAukLwgIKECMYgAOYJxiKBclCBBAjGCICAhEQLhiABbixAxjRaxiDARjHAclCCBAAGIAEGLEDwgIKEAAyGAOYFBiHAgpDAJIHBTauMv40oAfsWw&scient=gws-wiz-serp)
- [https://www.google.com/search?q=fossils&scasv=09379ecd0b6efd91&rlz=1C1CHBD\\_enIN10911N1093&sxsrf=ACQVn09ytizqRGwbydx-p0sOZFXGRnmfw%3A1713546819943&ei=Q6YiZvefOde5vr0PtMuvqAg&og=fossils&gs\\_l=EGxnd3Mtd216LXNlcnAiB2Zvc3NpbHMqAggAMg0QABiABbixAxDGIoFMgoQLhiABbHDGIoFMgUQABiABDIFEAAyGAQvBRAAGIAEMgoQABiABbHDGIoFMgUQABiABDIFEAAyGAQvBRAAGIAEMgoQABiABEjhKIAAWPIUCAB4AJABAjgBgwKgAYcLqgEFMC41LjK4AQHIAOD4AQGYAgegAukLwgIKECMYgAOYJxiKBclCBBAjGCICAhEQLhiABbixAxjRaxiDARjHAclCCBAAGIAEGLEDwgIKEAAyGAOYFBiHAgpDAJIHBTauMv40oAfsWw&scient=gws-wiz-serp](https://www.google.com/search?q=fossils&scasv=09379ecd0b6efd91&rlz=1C1CHBD_enIN10911N1093&sxsrf=ACQVn09ytizqRGwbydx-p0sOZFXGRnmfw%3A1713546819943&ei=Q6YiZvefOde5vr0PtMuvqAg&og=fossils&gs_l=EGxnd3Mtd216LXNlcnAiB2Zvc3NpbHMqAggAMg0QABiABbixAxDGIoFMgoQLhiABbHDGIoFMgUQABiABDIFEAAyGAQvBRAAGIAEMgoQABiABbHDGIoFMgUQABiABDIFEAAyGAQvBRAAGIAEMgoQABiABEjhKIAAWPIUCAB4AJABAjgBgwKgAYcLqgEFMC41LjK4AQHIAOD4AQGYAgegAukLwgIKECMYgAOYJxiKBclCBBAjGCICAhEQLhiABbixAxjRaxiDARjHAclCCBAAGIAEGLEDwgIKEAAyGAOYFBiHAgpDAJIHBTauMv40oAfsWw&scient=gws-wiz-serp)
- [https://www.google.com/search?q=pteridophytes&scasv=09379ecd0b6efd91&rlz=1C1CHBD\\_enIN10911N1093&sxsrf=ACQVn0-V0lp75QZG3sbfKrfitXB0GPdZvA%3A1713546628592&ei=hKUiZuvFI9q-juMPkr-DkAY&og=pter&gs\\_l=EGxnd3Mtd216LXNlcnAiBHB0ZXIqAggAMg0QABiABbixAxDGIoFMgoQABiABbHDGIoFMgUQABiABDIFEAAyGAOYQxiKBTINEC4YgAOYsQMYQxiKBTIFEC4YgAOvChAAGIAEGEMYigUvChAAGIAEGEMYigVIihQAFixCnAAeACQAQCYAIFQBoAGIBqoBBTAMi4yuAEBvAEA-AEBmAIeOALgBsiCChAjGIAEGCcYigXCAgQQIxnwgIKEC4YgAOYQxiKBZgDAJIHBTauMi4voAfOSg&scient=gws-wiz-serp](https://www.google.com/search?q=pteridophytes&scasv=09379ecd0b6efd91&rlz=1C1CHBD_enIN10911N1093&sxsrf=ACQVn0-V0lp75QZG3sbfKrfitXB0GPdZvA%3A1713546628592&ei=hKUiZuvFI9q-juMPkr-DkAY&og=pter&gs_l=EGxnd3Mtd216LXNlcnAiBHB0ZXIqAggAMg0QABiABbixAxDGIoFMgoQABiABbHDGIoFMgUQABiABDIFEAAyGAOYQxiKBTINEC4YgAOYsQMYQxiKBTIFEC4YgAOvChAAGIAEGEMYigUvChAAGIAEGEMYigVIihQAFixCnAAeACQAQCYAIFQBoAGIBqoBBTAMi4yuAEBvAEA-AEBmAIeOALgBsiCChAjGIAEGCcYigXCAgQQIxnwgIKEC4YgAOYQxiKBZgDAJIHBTauMi4voAfOSg&scient=gws-wiz-serp)
- [https://bio.libretexts.org/Bookshelves/Introductory\\_and\\_General\\_Biology/Book%3AGeneral\\_Biology\\_\(Boundless\)/26%3A\\_Seed\\_Plants/26.02%3A\\_Gymnosperms/26.2A%3A\\_Characteristics\\_of\\_Gymnosperms](https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3AGeneral_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	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): 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:

① Rishu  
② Sunde  
③ Anshu  
④ [Signature]  
⑤ [Signature]  
⑥ [Signature]  
⑦ [Signature]  
⑧ [Signature]  
⑨ [Signature]  
⑩ [Signature]

**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)**

**DEPARTMENT OF BOTANY  
COURSE CURRICULUM**

<b>PART- A: Introduction</b>			
<b>Program: Bachelor in Life Sciences</b> <i>(Diploma / Degree/Honors)</i>		<b>Semester - III</b>	<b>Session: 2024-2025</b>
1	<b>Course Code</b>	<b>BOSC-03</b>	
2	<b>Course Title</b>	<b>Lab. Course-03 (Archegoniate and Fossils)</b>	
3	<b>Course Type</b>	<b>Laboratory course</b>	
4	<b>Pre-requisite (if, any)</b>	<b>As per program</b>	
5	<b>Course Learning Outcomes (CLO)</b>	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	<b>Credit Value</b>	<b>1 Credits</b>	<b>Credit =30 Hours Laboratory or Field learning/Training</b>
7	<b>Total Marks</b>	<b>Max. Marks: 50</b>	<b>Min Passing Marks: 20</b>
<b>PART -B: Content of the Course</b>			
<b>Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)</b>			
<b>Module</b>	<b>Topics (Course contents)</b>		<b>No. of Period</b>
<b>Lab./Field Training/ Experiment Contents of Course</b>	<b>Bryophyta:</b> Comparative study of the anatomy of vegetative and reproductive parts of <i>Marchantia, Pellia, Anthoceros, Notothylus, Funaria, Polytrichum.</i> <b>Pteridophyta:</b> Comparative study of the anatomy of vegetative and reproductive parts of <i>Psilotum, Lycopodium, Selaginella, Equisetum, Gleichenia, Pteris, Ophioglossum, Isoetes.</i> <b>Gymnosperms:</b> Comparative study of the anatomy of vegetative and reproductive parts of <i>Cycas, Ginkgo, Cedrus, Abies, Picea, Cupressus, Araucaria, Cryptomeria, Taxodium, Podocarpus, Agathis, Taxus, Ephedra</i> and <i>Gnetum.</i> <ul style="list-style-type: none"> <li>▪ Collection of various gymnospermic plant materials.</li> <li>▪ Field work – as far practicable conveniently.</li> </ul> <b>Fossil:</b> Study of important fossil gymnosperms from prepared photographs, slides and specimens.		<b>30</b>
<b>Keywords</b>	<b>Archegonia, venter, bryophytes, pteridophytes</b>		

**Signature of Convener & Members (CBoS) :**

- ① *Rohar*
- ② *handa*
- ③ *Arshin*
- ④ *Ms*
- ⑤ *Arora*
- ⑥ *Arora*
- ⑦ *h*
- ⑧ *Arora*
- ⑨ *Arora*
- ⑩ *Arora*

## 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](http://www.swayam.ac.in)
- [www.ignou.ac.in](http://www.ignou.ac.in)
- [www.egvankosh.ac.in](http://www.egvankosh.ac.in)
- [www.iitm.ac.in](http://www.iitm.ac.in)
- [www.eskillindia.org](http://www.eskillindia.org)
- [www.eshiksha.mp.gov.in](http://www.eshiksha.mp.gov.in)
- [www.vlab.co.in](http://www.vlab.co.in)
- [www.internshala.com](http://www.internshala.com)
- [www.ndl.iitkgp.ac.in](http://www.ndl.iitkgp.ac.in)

#### Online Resources–

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

1. <https://efaidnbmnnnibpcajpcglclefindmkaj/https://egvankosh.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	Managed by Course teacher as per lab. status
	B. Spotting based on tools & technology (written) – 10 Marks	
C. Viva-voce (based on principle/technology) - 05 Marks		

Name and Signature of Convener & Members of CBoS:

① R. Purohit  
② S. K. Pandey  
③ M. Singhvi  
④ M. Singhvi  
⑤ M. Singhvi  
⑥ M. Singhvi  
⑦ M. Singhvi  
⑧ M. Singhvi  
⑨ M. Singhvi  
⑩ M. Singhvi