SYLLABUS FOR
FOUR-YEAR UNDERGRADUATE PROGRAMME
(FYUGP)

AS PER PROVISIONS OF NEP-2020

BOTANY

(MAJOR, MINOR FROM DISCPLINE, MINOR FROM VOCATIONAL AND MDC)

ELECTIVE FORM SESSION 2025-2029
AND 2024-2028 SEMESTER 3 ONWARDS

॥ तमसो मा ज्योतिर्गमय ॥

ALL CONSTITUENTS/ AFFLIATED COLLEGES UNDER

BINOD BIHARI MAHTO KOYLANCHAL UNIVERSITY,
DHANBAD, JHARKHAND

Members of Board of Studies for preparing Provisional Syllabus of Four- Year Undergraduate Programme (FYUGP)

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Table 7: **Semester-wise Course Code and Credit Points for Single Major during the First Three Years of FYUGP**

Semester	Common, Introductory, Major, Minor, Vocational & Internship Courses		Credits	
	Code	Papers	Paper	Semester
I	AEC-1	Language and Communication Skills (MIL-1; Modern Indian language Hindi/ English)	2	20
	VAC-1	Value Added Course-1	2	
	IKS-1	Indian Knowledge System-1/Social Awareness Activities	2	
	SEC-1	Skill Enhancement Course-1	3	
	MDC-1	Multi-disciplinary Course-1	3	
	AC-1	Associated core courses from discipline/ Interdisciplinary/ vocational	4	
	MJ-1	Major paper 1 (Disciplinary/ Interdisciplinary Major)	4	
II	AEC-2	Language and Communication Skills (MIL-1; Modern Indian language English/ Hindi)	2	20
	VAC-2	Value Added Course-2	2	
	IKS-2	Social Awareness Activities/ Indian Knowledge System-1	2	
	SEC-2	Skill Enhancement Course-2	3	
	MDC-2	Multi-disciplinary Course-2	3	
	AC-2	Associated core courses from discipline/ Interdisciplinary/ vocational	4	
	MJ-2	Major paper 2 (Disciplinary/ Interdisciplinary Major)	4	

Note: Abbreviations used in Tables-8A, & 8B & 8C:

AEC	Ability Enhancement Courses
SEC	Skill Enhancement Courses
IAP	Internship/Apprenticeship/ Project
IKS	Indian Knowledge System
MDC	Multidisciplinary Courses
ELC	Elective Courses
MJ	Major Disciplinary/Interdisciplinary Courses
AC	Associated core courses from discipline/ Interdisciplinary/ vocational
MN	Minor Disciplinary/Interdisciplinary/vocational Courses
AMJ	Advanced Major Disciplinary/Interdisciplinary Courses
RC	Research Courses
JOC	Skill based Job Oriented course

Table 3: Marks Distribution

(Pass Marks shown in bracket)

**There is no internal exam in practical*

Table No. 14: Marks distribution pattern

Subjects	Credits	FM		Semester Internal Examination	End Semester University Examination	
Ability Enhancement Courses	2	50		---	50	
Value Added Courses	2	50		---	50	
Skill Enhancement Courses	3	75		---	75	
Multidisciplinary Courses	3	75		---	75	
Minor Courses	4	100		25	75	
Major Courses	4	100		25	75	
Advanced Major	4	100		25	75	
Research Courses i. Research Methodology (Core course) (F.M.=100) ii. Research Proposal (Planning and Techniques) (F.M.=100) iii. Thesis & others (F.M.=200)	4 4 8	100 100 200		25 25 ---	75 100 200	
Internship	4	100		---	Grade points awarded by the concerned organisation and validated by the College/ University	
Non- Practical Subjects (MJ/MN)	4	100		25	75	
Practical Subjects (MJ/MN)	4	T	P	T	T	P
		75	25	15	60	25

Semester-I

MAJOR COURSE: MJ-01

PHYCOLOGY AND MYCOLOGY

[Credit: 04 (3+1), Theory=3, practical=1]

Course Objectives:

On completion of this course, the students will be able to understand

1. To gain knowledge of diversity, life forms, life cycles, morphology and importance of algae.
2. To gain knowledge of diversity, life forms, life cycles, morphology of fungi, symbiotic association and economic importance.

Course Learning Outcomes:

On successful completion of this course, the student should know:

1. Student would understand the general characteristics, morphology, life cycle under classification of Algae proposed by Fritsch.
2. Students would understand the associations and classification of fungus given by Ainsworth, Lichens as symbiotic.
3. Application of Algae and Fungi in different fields.

INSTRUCTIONS FOR QUESTION SETTER

Mid Semester Examination (MSE): 1 Hrs.

The semester exam shall have two components.

a. One semester internal assessment test (SIA): 10 marks.
   There will be three questions of 05 marks each, out of which two are to be answered. Each question may be subdivided into two or more parts.
b. Class attendance score (CAS) & Day to day activities (DDA): 05 marks.
   (Attendance: Up to 45%=1 marks; 45.01-55%=2 marks; 55.01-65%=3 marks; 65.01-75%=4 marks; >75%=5 marks)

End semester examination (ESE): 3Hrs.

There will be **two** groups of questions

Group-A is compulsory and will contain two questions. Q. No. 1 (B) will contain two sort answer type questions (max. 50 words) each of 5 marks.

Group B will contain descriptive type five questions of 15 marks each, out of which any three are to be answered.

PHYCOLOGY AND MYCOLOGY Sem I

MI – 01

Theory

Unit 1: Introduction to Algae

General characteristics; Ecology and distribution; range of thallus organization; Cell structure and Components; cell wall, pigment system, reserve food (of only groups represented in the syllabus), Flagella; methods of reproduction; Classification; criteria, system of Fritsch, (only upto groups)Role of algae in the environment, agriculture, biotechnology and industry.

Unit 2: Cyanophyta and Xanthophyta

Ecology and occurrence; Range of thallus organization; Cell structure; Reproduction, Morphology and life-cycle of *Nostoc* and *Vaucheria.*

Unit 3: Chlorophyta and Charophyta

General characteristics; Occurrence; Range of thallus organization; Cell structure; Reproduction. Morphology and life-cycles of *Chlamydomonas*, *Oedogonium* and *Chara.*

Unit 4: Phaeophyta and Rhodophyta

Characteristics; Occurrence; Range of thallus organization; Cell structure; Reproduction; Morphology and life cycles of *Ectocarpus*, *Sargassum* and *Polysiphonia.*

Unit 5: Introduction to true fungi

General characteristics; Affinities with plants and animals; Thallus organization; Cell wall Composition; Nutrition; Types of fruiting bodies. Heterokaryosis and parasexuality; Classification (G. C. Ainsworth)

Unit 6: Chytridiomycota ,Ascomycota and Oomycota

Characteristic features; Ecology and significance; Thallus organisation; Reproduction; Life cycle With reference to *Synchytrium*, *Penicillium* and *Phytophthora*

Unit 7: Basidiomycota and Deutromycota

General characteristics; Ecology; Life cycle and Classification with reference to black stem rust On wheat *Puccinia, Agaricus*; *Alternaria*

Unit 8: Symbiotic associations

Lichen – Occurrence; General characteristics; Growth forms and range of thallus organization; Nature of associations of algal and fungal partners; Reproduction; Mycorrhiza-Ectomycorrhiza, Endomycorrhiza and their significance.

Unit 9: Applied Mycology
Role of fungi in biotechnology; Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Agriculture (Biofertilizers); Mycotoxins; Bioluminescence, Mushroom Cultivation.; Medical mycology.

P Praveen

Practical

1. Study of vegetative and reproductive structures of *Nostoc* (electron Micrographs), *Chlamydomonas*, *Oedogonium*, *Chara*, *Vaucheria*, *Ectocarpus*, *Sargassum* and *Polysiphonia*, through electron micrographs, temporary preparations and permanent slides

2. Study of vegetative and reproductive structures of *Synchytrium*, *Penicillium* *Phytophthora*, *Puccinia*, *Agaricus* and *Alternaria*

3. Study of growth forms of lichens (crustose, foliose and fruticose). Permanent slides. Mycorrhizae: ectomycorrhiza and endomycorrhiza (Photographs)

Suggested Readings

- Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
- Wiley JM, Sherwood LM and Woolverton CJ. (2013) Prescott's Microbiology. 9th Edition. McGraw Hill International.
- Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.
- Sahoo, D. (2000). Farming the ocean: seaweeds cultivation and utilization. Aravali International, New Delhi.
- Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson
- R.B. (2008). Biology, Pearson Benjamin Cummings, USA. 8th edition.
- Pelczar, M.J. (2001) Microbiology, 5th edition, Tata McGraw-Hill Co, New Delhi.
- Agrios, G.N. (1997) Plant Pathology, 4th edition, Academic Press, U.K
- Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley &Sons (Asia) Singapore. 4th edition.
- Webster, J. and Weber, R. (2007). Introduction to Fungi, Cambridge University Press, Cambridge. 3rd edition.
- Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies, Macmillan Publishers India Ltd.
- Sharma, P.D. (2011). Plant Pathology, Rastogi Publication, Meerut, India.

Semester-II

MAJOR COURSE: MJ-02

Archegoniates and Palaeobotany

[Credit: 04 (3+1), Theory=3, practical=1]

INSTRUCTIONS FOR QUESTION SETTER

Mid Semester Examination (MSE): 1 Hrs.

The semester exam shall have two components.

a. One semester internal assessment test (SIA): 10 marks.
   There will be three questions of 05 marks each, out of which two are to be answered. Each question may be subdivided into two or more parts.
b. Class attendance score (CAS) & Day to day activities (DDA): 05 marks.
   (Attendance: Up to 45%=1 marks; 45.01-55%=2 marks; 55.01-65%=3 marks; 65.01-75%=4 marks; >75%=5 marks)

End semester examination (ESE): 3Hrs.

There will be **two** groups of questions

Group-A is compulsory and will contain two questions. Q. No. 1 (B) will contain two sort answer type questions (max. 50 words) each of 5 marks.

Group B will contain descriptive type five questions of 15 marks each, out of which any three are to be answered.

Sem II

THEORY MJ-II

Unit 1: Introduction

Unifying features of archegoniates; Transition to land habit; Alternation of generations.

Unit 2: Bryophytes

General characteristics; Adaptations to land habit; Classification (up to family), morphology, anatomy and reproduction of *Marchantia*, *Anthoceros*, *Sphagnum* (developmental stages not included). Ecological and Economic importance of bryophytes with special reference to Sphagnum.

Unit 3: Pteridophytes

General characteristics, Classification (up to family), morphology, anatomy and reproduction of *Selaginella*, *Equisetum* and *Pteris* (Developmental details not to be included). Apogamy and apospory, Heterospory and seed habit, telome theory, stelar evolution; Ecological and economic importance.

Unit 4: Gymnosperms

General characteristics, classification (up to family), morphology, anatomy and reproduction of *Pinus, Ginkgo* and *Gnetum* (Developmental details not to be included); Ecological and economic importance.

Unit 5: Paleobotany

Introduction, Definition and objectives of Palaeobotanical studies, Nomenclature of Fossils, Process and types of Fossilization, trace Fossil, chemical Fossil, index fossil, different modes of preservation (Schopf 1975), conditions favouring fossilization, principles of fossil dating and absolute dating- ^{238}U,^{206}Pb, ^{14}C method, importance of fossil study; Geological Time-Scale; General characteristics features of *Rhynia*.

Practical

1. Study the vegetative and reproductive structures slide preparations or by permanent slide of *Marchantia* , *Anthoceros, Sphagnum, Selaginella, Equisetum* ,*Pinus, Ginkgo* and *Gnetum*
2. Study of fossil plant *Rhynia* by permanent slides, photographs or Rock specimen.
3. Visit to Palaeo-Botanical laboratories /institutes /museum.

Suggested Reading

1. Parihar, N.S, (1991), An introduction to Embryophyta : Vol. 1. Bryophyta, Central Book Deposit, Allahabad.
2. Raven, P.H., Johnson, G.B.Losos, J.B.,Singer, S.R. (2005), Biology, TataMc Graw Hill, Delhi.
3. Vander – poorteri 2009 Introduction to Bryophyta, COP.
4. Vashistha, P.C., Sinha, A.K.Kumar, A.(2010), Pteridophyta. S.Chand, Delhi,India
5. Prasad, C. (2013) An Introduction to Pteridophyta, Emkay Publication, NewDelhi, India.
6. Bhatnagar, S.P. &Moitra, A.(1996), Gymnosperms, New Age International (P) Ltd Publishers, New Delhi, India.
7. Stewart, N.W. and Roothwell, G.W. (2020): Palaeobotany and the evolution of Plants, 2nd Edition
8. Arnold, C.A., (2020): An Introduction to Palaeobotany, Surjeet Publications

SEMESTER I/II

Associated Core Course (AC-1/ AC-2)

Credit – 4 (3+1), Theory=3, Practical=1
Hours Full Marks = 100 [Theory = 75 + Practical = 25]
Theory [End Semester = **60**] + [Internal Examination = **15** (Written Examination = **10** + Class Performance & Attendance = **05**)]
Pass Marks = Theory [End Semester = **24**] [Internal Examination = **6**]

Instructions:

- In all **8 questions** to be set there shall be two groups – **Group A and Group B.**
- **Group A** is compulsory which shall contain **three** questions.
- **Question no. 1** will be **very short answer type/Objective** types consisting of **five questions** of **1 mark** each.
- **Question no. 2 & 3** will be of short answer type carrying **5 marks** each.
- **Group B** will contain **descriptive** type **five questions** of **15 marks** each, out of which any **three** to be answer.
  ***Question no. 8** will be short answer type. There will be **four options** of which any two to be answer each carrying equal marks covering the whole syllabus

PLANT DIVERSITY

THEORY (Lectures – 45)

UNIT-01- ALGAE

General characteristics, Morphology and life-cycles of the following:
Nostoc, *Chlamydomonas, Batrachospermum.*

UNIT-02- FUNGI
General characteristics , morphology and life cycle of *Albugo, Pucinia, Alternaria* , lichens-general account.

UNIT-03- BRYOPHYTA
General characteristics , morphology , anatomy and reproduction of *Marchantia.*

UNIT-04- PTERIDOPHYTES
General characteristics, morphology, anatomy and reproduction of *Selaginella*,and *Pteris.*

UNIT-05- GYMNOSPERMS

General characteristics; morphology, anatomy and reproduction of *Pinus*. Ecological andeconomical importance

Associated Core Course Practical (AC-1/ AC-2)

PLANT DIVERSITY

1. Study of vegetative and reproductive structures (Slide preparation) of algae included in the syllabus by temporary and permanent slides.
2. Study of vegetative and reproductive structures (Slide preparation) of fungi included in the syllabus by temporary and permanent slides.
3. Study of different forms of lichen by photographs.
4. Study of vegetative and reproductive structures (Slide preparation) of bryophytes included in the syllabus by temporary and permanent slides.
5. Study of vegetative and reproductive structures (Slide preparation) of Pteridophytes included in the syllabus by temporary and permanent slides.
6. Study of vegetative and reproductive structures (Slide preparation) of Gymnosperms included in the syllabus by temporary and permanent slides.

Credit – 1 Lectures – 15 Hours

Full Marks = 25 [End Semester = **25**] [No Internal Examination]

Pass Marks = [End Semester = **10**] Time: 3 Hours

Practical Marks Distribution

1. Study of vegetative and reproductive structures by preparation of temporary slides from unit-1,2 &3 (algae , fungi , & bryophyte)	- 06
2. Study of vegetative and reproductive structures by preparation of temporary slides fromunit-4&5 (Pteridophytes & Gymnosperm)	-06
3. Spotting	- 05
4. Record & Project	-05
5. Viva	-03
	Total = 25 Marks

04.07.25 P. Saravanan 04/07/25 04/7/25 4/7/25

FYUGP-NEP 2020
Multi-disciplinary Course
(MDC) Subject: Botany
Semester I/II/III

Minor-2D (MN-2D): Botany
Credit – 3
Full Marks = 75 [End Semester = **75**] [No Internal Examination and No Practical] **Lectures – 45 Hours**
Pass Marks = [End Semester = **30**]

Instructions:

- In all **9 questions** to be set there shall be two groups – **Group A and Group B**.
- **Group A** is compulsory which shall contain **three** questions.
- **Question no. 1** will be **very short answer type/Objective** types consisting of **five questions** of **1 mark** each.
- **Question no. 2 & 3** will be of **short answer type** carrying **5 marks** each.
- **Group B** will contain **descriptive** type, **six questions*** of **15 marks** each, out of which **any three** are to be answer.
  ***Question no. 9** will be short answer type. There will be **four options** of which **any two** to be answer each carrying equal marks covering the whole syllabus.

1. **Plant diversity and Human welfare:** Genetic, species and ecosystem level, importance of plants and their uses, conservation of plants diversity.
2. **Nursery and Gardening:** Nursery raising, gardening practices, plant propagation.
3. **Organic Farming:** Methods and types.
4. **Pollution:** Air, Water, Soil, Noise Pollution- causes, effect, and remedial measures.
5. **Biofertilizers:** General account of microbes used as Biofertilizer, Vermicompost
6. **Herbal medicine:** History and scope.
7. **Biofuels:** Definition types, and uses.
8. **Mushroom cultivation:** Process and nutraceuticals value of edible mushrooms.