ANDHRA KESARI UNIVERSITY ::ONGOLE

Model Syllabus for Botany (Minor) in consonance with Curriculum framework

w.e.f. AY 2025-26

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
II	III	1	Non-vascular Plants	3	3
			Non-vascular Plants-Practical	2	1
	IV	2	Vascular Plants	3	3
			Vascular Plants-Practical	2	1
III	V	3	Anatomy and Embryology of Angiosperms	3	3
			Anatomy and Embryology of Angiosperms-Practical	2	1
		4	Plant Ecology, Biodiversity and Phytogeography	3	3
			Plant Ecology, Biodiversity and Phytogeography-Practical	2	1
	VI	5	Cell Biology and Genetics	3	3
			Cell Biology and Genetics-Practical	2	1
		6	Plant Physiology and Metabolism	3	3
			Plant Physiology and Metabolism-Practical	2	1

10/09/2025

SEMESTER-III

COURSE 1: NON-VASCULAR PLANTS

(ALGAE, FUNGI, LICHENS AND BRYOPHYTES)

Theory **Credits: 3** **3 hrs/week**

I. Learning Objectives: By the end of this course the learner has:
1. To realize the characteristics and diversity of non-vascular plants.
2. To recognize the ecological and economic value of algae, fungi, lichens and bryophytes.
3. To inquire the habit, habitat, morphological features and life cycles of selected genera of non-vascular plants.

II. Learning Outcomes: On completion of this course students will be able to:
1. Compile the general characteristics of algae and their significance in nature.
2. Compare and contrast the characteristics of different groups of algae.
3. Summarize the important features of fungi and their economic value.
4. Distinguish the characteristics of different groups of fungi.
5. Elaborate the features and significance of amphibians of plant kingdom
6. Explain the diversity among non-vascular plants.

III. Syllabus of Theory:

Unit-1: Introduction to Algae **8Hrs.**
1. General Characteristics of algae: Occurrence and distribution, cell structure, pigments, flagella and reserve food material.
2. Classification of algae: F.E.Fritsch (1935) and Lee (2008)
3. Thallus organization and life cycles in algae.
4. Ecological and economic importance of algae.

Unit-2: Biology of selected Algae **10Hrs.**
1. Occurrence, structure, reproduction and life cycle of:
(a) Chlorophyceae: *Spirogyra* (b) Phaeophyceae: *Ectocarpus*
(c) Xanthophyceae: *Vaucheria* (d) Rhodophyceae: *Polysiphonia*
2. A brief account of Bacillariophyceae
3. Culture and cultivation of *Chlorella*

Unit-3: Introduction to Fungi **8Hrs.**
1. General characteristics of fungi and Ainsworth (1973) classification.
2. Thallus organization and nutrition in fungi.
3. Reproduction in fungi (asexual and sexual); Heterothallism and parasexuality.
4. Ecological and economic importance of fungi.

Unit-4: Biology of selected Fungi **10Hrs.**
1. Occurrence, structure, reproduction and life cycle of:
(a) Mastigomycotina: *Phytophthora* (b) Zygomycotina: *Rhizopus*
(c) Ascomycotina: *Penicillium* (d) Basidiomycotina: *Puccinia*
2. Occurrence, structure and reproduction of lichens; ecological and economic importance of lichens.

Unit-5: Biology of Bryophytes **9Hrs.**

1. General characteristics of Bryophytes; Rothmaler (1951) classification.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life cycle of (a) Hepaticopsida: *Marchantia* (b) Anthoceratopsida: *Anthoceros* (c) Bryopsida: *Funaria*
3. General account on the evolution of sporophytes in Bryophyta.

IV. Text Books:

1. Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi
2. Hait,G., K.Bhattacharya & A.K.Ghosh (2011) A Text Book of Botany, Volume-I, New Central Book Agency Pvt. Ltd., Kolkata

V. Reference Books:

1. Fritsch, F.E. (1945) The Structure□& Reproduction of Algae (Vol. I & Vol. II) Cambridge University Press Cambridge, U.K.
2. Bold, H.C.& M. J. Wynne (1984) Introduction to the Algae, Prentice-Hall Inc., New Jersey
3. Robert Edward Lee (2008) Phycology. Cambridge University Press, New York
4. Van Den Hoek, C., D.G.Mann & H.M.Jahns (1996)Algae : An Introduction to Phycology. Cambridge University Press, New York.
5. Alexopoulos, C.J., C.W.Mims & M.Blackwell (2007) Introductory Mycology, Wiley& Sons, Inc., New York
6. Mehrotra, R.S.& K. R. Aneja (1990) An Introduction to Mycology. New Age International Publishers, New Delhi.
7. Kevin Kavanagh (2005) Fungi; Biology and Applications John Wiley& Sons, Ltd., West Sussex, England.
8. John Webster & R. W. S. Weber (2007) Introduction to Fungi, Cambridge University Press, New York.
9. Shaw, A.J.& B.Goffinet (2000) Bryophyte Biology .Cambridge University Press, New York.

VI. Suggested activities and evaluation methods:

Unit-1: Activity: Algae specimen collection from any water bodies in their locality, recording the characteristics, identification and classifying them according to Fritsch system.
Evaluation method: Evaluating the presentation or report summarizing findings.

Unit-2: Activity: Microscopic observations and recording distinguishing characters of any six algal forms excluding the genera in the syllabus.
Evaluation method: Conducting a Quiz or an exam/ evaluating the chart or drawings or summarized data on similarities and differences.

Unit-3: Activity: Collection or laboratory culture of fungi and reporting the important features.
Evaluation method: Evaluating the report/conducting JAM/Quiz/Group discussion.

Unit-4: Activity: Microscopic observations and summarizing the salient features of the fungal genera and lichen forms in the syllabus.
Evaluation method: Conducting a Quiz or an exam/ evaluating the chart or drawings or concise data on similarities and differences.

Unit-5: Activity: Collection, characterization, identification and classification of any four bryophytes from their native locality or college campus.
Evaluation method: Assessment of observations and documentation accuracy/presentation or report summarizing findings based on a rubric.

SEMESTER-III

COURSE 1: NON-VASCULAR PLANTS

(ALGAE, FUNGI, LICHENS AND BRYOPHYTES)

Practical **Credits: 1** **2 hrs/week**

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Identify some algal and fungal species based on the structure of thalli and reproductive organs.
2. Decipher the lichens and Bryophytes based on morphological, anatomical and reproductive features.

II. Laboratory/field exercises:

Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/ specimens/ mounts:

1. **Algae:** *Spirogyra, Ectocarpus, Vaucheria* and *Polysiphonia*; a centric and a pennate diatom.
2. Demonstration of culture and cultivation of *Chlorella*
3. Identification of some algal products available in local market.
4. **Fungi:** *Phytophthora, Rhizopus, Penicillium* and *Puccinia*
5. Identification of some fungal products available in the local market.
6. **Lichens:** Crustose, foliose and fruiticose
7. **Bryophyta:** *Marchantia, Anthoceros* and *Funaria.*

SEMESTER-IV

COURSE 2: VASCULAR PLANTS

(PTERIDOPHYTES, GYMNOSPERMS AND TAXONOMY OF ANGIOSPERMS)

Theory **Credits: 3** **3 hrs/week**

I. Learning Objectives: By the end of this course the learner has:

1. To recognize the morphology, anatomy, and reproduction in two groups of archegoniates.
2. To acquire knowledge of the taxonomic aids and classification systems.
3. To read the vegetative and floral characteristics of some forms of angiospermic families and their economic value.
4. To study the significance of other branches of botany with plant taxonomy.

II. Learning Outcomes: On completion of this course students will be able to:

1. Infer the evolution of vasculature, heterospory, and seed habit in Pteridophytes.
2. Illustrate the general characteristics of Gymnosperms along with their uses
3. Discuss about some Taxonomic aids and their applications in plant systematics.
4. Compare and contrast the vegetative and floral characteristics of some angiospermic families
5. Evaluate the economic value of plant species from the families under the study.
6. Defend the utility of evidences from different branches of botany in solving the taxonomic lineages of some species.

III. Syllabus of Theory:

Unit-1: Pteridophytes **10Hrs.**

1. General characteristics of Pteridophyta; Smith (1955) classification.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of: (a) Lycopsida: *Lycopodium* and (b) Filicopsida: *Marsilea*
3. Stelar evolution in Pteridophytes; Heterospory and seed habit.
4. Ecological and economic importance of Pteridophytes.

Unit-2: Gymnosperms **10Hrs.**

1. General characteristics of Gymnosperms; Sporne (1965) classification.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of:(a) Cycadopsida: *Cycas* and (b) Gnetopsida: *Gnetum*
3. Ecological and economic importance of Gymnosperms.

Unit-3: Principles of Plant Taxonomy 10 Hrs.

1. Aim and scope of taxonomy, species concept, taxonomic hierarchy-major and minor categories.
2. Plant nomenclature: Binomial system, ICBN- rules for nomenclature.
3. Herbarium and its techniques, BSI herbarium and Kew herbarium; concept of digital herbaria.
4. Bentham and Hooker system of classification; Brief account of APG-IV classification.

Unit-4: Descriptive Plant Taxonomy **8 Hrs.**

Systematic description and economic importance of the following families:

1. Polypetalae: (a) Annonaceae (b) Fabaceae (c) Curcurbitaceae
2. Gamopetalae: (a) Asteraceae (b) Asclepiadaceae

3. Monochlamydae: (a) Amaranthaceae (b) Euphorbiaceae
4. Monocotyledonae: (a) Orchidaceae (b) Poaceae

Unit-5: Evidences for Plant systematics **7Hrs.**

1. Anatomy and embryology in relation to plant systematics.
2. Cytology and cytogenetics in relation to plant systematics.
3. Phytochemistry in relation to plant systematics.
4. Numerical taxonomy; Origin and evolution of angiosperms.

IV. Text Books:

1. Acharya, B.C., (2019) Archchegoniates, Kalyani Publishers, New Delhi
2. Bhattacharya, K., G. Hait&Ghosh, A. K., (2011) A Text Book of Botany, VolumeII, New Central Book Agency Pvt. Ltd., Kolkata
3. Hait,G., K.Bhattacharya&A.K.Ghosh (2011) A Text Book of Botany, Volume-I,New Central Book Agency Pvt. Ltd., Kolkata
4. Pandey, B.P. (2013) College Botany, Volumes-I&II, S. Chand Publishing, New Delhi

V. Reference Books:

1. Smith, G.M. (1971) CryptogamicBotanyVol. II., Tata McGraw Hill, New Delhi
2. Sharma,O.P.(2012) Pteridophyta. Tata McGraw-Hill, New Delhi
3. Sporne, K.R. (1971) The Morphology of Gymnosperms.Hutchinsons Co. Ltd.,London
4. Coulter, J.M. & C.J.Chamberlain(1910) Morphology of Gymnosperms,The University of Chicago Press, Chicago, Illinois
5. Bhatnagar, S.P. & Alok Moitra (1996) Gymnosperms. New Age International, New Delhi
6. Sambamurty, A.V.S.S. (2005) Taxonomy of Angiosperms I.K. International Pvt. Ltd., New Delhi
7. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt.Ltd., NewDelhi.
8. Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, San Diego, CA, U.S.A.

VI. Suggested activities and evaluation methods:

Unit-1: Activity: Making temporary slides/models/drawings of Pteridophytes in the syllabus.
Evaluation method: Assessment of the temporary slides/model/drawing.

Unit-2: Activity: Study of wood elements in locally available Gymnosperms and making temporary slides.
Evaluation method: Validation of prepared slides submitted by the learner.

Unit-3: Activity: Botanical field trip and collecting plant specimens for herbarium.
Evaluation method: Attendance in field trip and submission of field note book and herbarium sheets with filled in labels.
Unit-4: Activity: Making good models or drawings or collection of photographs of some important plant species from the families included in the syllabus.
Evaluation method: Authorize the quality of the work and conferring reward.

Unit-5: Activity: Collection of scientific literature on solving taxonomic problems by taking evidences from other branches of Botany.
Evaluation method: Validation of the collection submitted along with summary.

SEMESTER-IV

COURSE 2: VASCULAR PLANTS

(PTERIDOPHYTES, GYMNOSPERMS AND TAXONOMY OF ANGIOSPERMS)

Practical **Credits: 1** **2 hrs/week**

I. **Course Outcomes:** On successful completion of this practical course, the student shall be able to:

1. Distinguish the Pteridophytes and Gymnosperms based on their morphological, anatomical and reproductive structures.
2. Make systematic classification of plant species using vegetative and floral characters.
3. Identify angiosperm plant species and make herbarium specimens.

II **Laboratory/field exercises:**

I. Study/ microscopic observation of vegetative, sectional/anatomical, and reproductive structures of the following using temporary or permanent slides/specimens/ mounts:

1. Pteridophyta: *Lycopodium* and *Marselia*
2. Gymnosperms: *Cycas* and *Gnetum*

II. Technical description of locally available plant species from the following angiosperm families:

1. Annonacae 2.Fabaceae 3. Cucurbitaceae 4. Asteraceae 5. Asclepiadaceae
6. Amaranthaceae 7. Euphorbiaceae 8. Orchidaceae 9. Poaceae

III. Demonstration of herbarium techniques.

IV. Field trip to a local floristic area/forest (Submission of 30 number of Herbarium sheets of wild plants with the standard system are mandatory).