

B.SC. SYLLABUS UNDER CREDIT SYSTEM

BOTANY ELECTIVE (GENERAL) COURSE

NORTH LAKHIMPUR COLLEGE (AUTONOMOUS)

COURSE STRUCTURE

There shall be 12 (Twelve) Papers , 06 (six) theory and 06 (six) Practical papers for B.Sc.Botany Elective (General) Programme. Distribution of Courses and credits will be as follows-

SEMESTER I	CREDIT 5			L-T-P
	ET-3-BOT-101	Algae Fungi, Lichen Bacteria, Virus, Plant Pathology	Cr.3	L-2, T-1, P-0
	EP-2-BOT-102	Based on ET-3-BOT-101	Cr.2	L-0, T-0, P-2
SEMESTER II	CREDIT 5			L-T-P
	ET-3-BOT-201	Bryophytes, Pteridophytes, Gymnosperm	Cr.3	L-2, T-1, P-0
	EP-2-BOT-202	Based on ET-3-BOT-201	Cr.2	L-0, T-0, P-2
SEMESTER III	CREDIT 5			L-T-P
	ET-3-BOT-301	Morphology, and taxonomy, Anatomy, Embryology	Cr.3	L-2, T-1, P-0
	EP-2-BOT-302	Based on ET-3-BOT-301	Cr.2	L-0, T-0, P-2
SEMESTER IV	CREDIT 5			L-T-P
	ET-3-BOT-401	Plant physiology and Economic Botany	Cr.3	L-2, T-1, P-0
	EP-2-BOT-402	Based on ET-3-BOT-401	Cr.2	L-0, T-0, P-2
SEMESTER V	CREDIT 5			L-T-P
	ET-3-BOT-501	Cytogenetics, Evolution , and Biostatistics	Cr.3	L-2, T-1, P-0
	EP-2-BOT-502	Based on ET-3-BOT-501	Cr.2	L-0, T-0, P-2
SEMESTER VI	CREDIT 5			L-T-P
	ET-3-BOT-601	Biochemistry, Ecology and Plant Geography	Cr.3	L-2, T-1, P-0
	EP-2-BOT-602	Based on ET-3-BOT-601	Cr.2	L-0, T-0, P-2

Botany
Elective (General)
SEMESTER-I
Total Marks :60

Code (Paper) : ET-3-BOT-101	Title: Algae Fungi, Lichen Bacteria, Virus, Plant Pathology	Credit:3	L-2, T-1, P-0
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Unit -1: Algae

Marks :15

A general account of different algal groups, their relationship basing on the structure, life histories of the types and the economic importance of algae.

- i) Myxophyceae: *Nostoc, Anabaena*
- ii) Chlorophyceae: *Chlamydomonas, Volvox, Oedogonium, Chara*
- iii). Phaeophyceae: *Ectocarpus, Fucus.*
- iv) Rhodophyceae: *Polysiphonia, Batrachospermum.*
- v) Bacillariophyceae: A general account.

Unit –II: Fungi

Marks :15

A general knowledge of the different fungal groups, their relationship based on the structure and life histories of the types-

- i. Mestigomycotina: *Synchytrium. Phytophthora,*
- ii. Zygomycotina: *Rhizopus*
- iii. Ascomycotina: *Peziza, Xylaria*
- iv. Basidiomycotina: *Ustilago, Psaliota, Cyathus.*
- v. Deuteromycotina : A general account

Unit- III : Bacteria and Virus. A General account

Marks:10

Unit- IV: Plant Pathology-

Marks:10

Rust of Wheat, Grey Blight of tea, Early Blight of potato.

Unit- V: Lichen -

Marks:10

Thallus structure and economic importance of lichen.

Botany
Elective (General)
SEMESTER-I
Total Marks :40

Code (Paper) : EP-2-BOT-102	Title : Based on ET-3-BOT-101	Credit : 2	L-0, T-0, P-2
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Study of vegetative morphology and reproductive structures of selected representative types of the groups.

SCHEME OF THE PRACTICAL EXAMINATION

Time: 4hrs.

Marks 40

Algae	10
Fungi/ Plant pathology	10
Bacteria and Lichen (identification)	4+4= 8
Lab. Note Book	7
Viva Voce	5

Books Recommended:

- 1 A Text Book of Botany – Algae: Pandey, B.B; S. Chand & Co. (P) Ltd, New Delhi.
- 2 Botany for Degree students : Dutta, A.C.
- 3 An introduction of Fungi: Srivastava, J.P. ; Central Book Depot,Allahabad.
- 4 An Introduction to Mycology: Mehrotra R. and Aneja K.R; Wiley, Eastern Limited
- 5 Botany for degree students –Algae: Vashishta, B.R; S. Chand & Co. Ltd.
- 6 Botany for Degree students. Part II. Fungi.: Vashista, B.R. S.Chand and Co.
- 7 Text Book of Algae: Sharma. O.P, Tata Mc Graw Hill Publishing Co, Ltd.,
- 8 Text Book of Fungi: Sharma, O.P. Tata McGraw Hill Publishing Co.,New Delhi.
- 9 Cryptogamic Botany (Vol. I-Algae, Fungi & Lichens): Smith, G.M. ;Mc Graw Hill
- 10 Microbiology : Sharma P.D., Rastogi Publication.
- 11 Modern Concepts of Microbiology: Kumar H.D. & S. Kumar Tata McGraw Hill.
- 12 Plant Pathology (Pathogens & Plant disease) : Pandey B.P. ; S. Chand & Co.
- 13 Plant Pathology: Mehrotra, R.S. ;TMH, New Delhi.

Botany
Elective (General)
SEMESTER-II
Total Marks :60

Code (Paper) : ET-3-BOT-201	Title : Bryophytes, Pteridophytes, Gymnosperm	Credit : 3	L-2, T-1, P-0
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Unit –I Bryophytes: Marks 15

A general account of the structure and life histories of the following:

Riccia, Marchantia, Anthoceros and *Polytrichum*.

Unit–II. Pteridophytes: Marks 20

General Characters and stelar structure of Pteridophytes; life histories of *Lycopodium, Selaginella, Equisetum* and *Marsilea*.

Unit –III: Gymnosperm: Marks 25

- i) General characters and classification, affinity of Gymnosperm with Angiosperm and Pteridophytes
- ii) Morphology, reproduction and life cycles of *Cycas, Pinus* and *Gnetum*.

Botany
Elective (General) Practical
SEMESTER-II
Total Marks :40

Code (Paper) : EP-2-BOT-202	Title : Based on ET-3-BOT-201	Credit : 2	L-0, T-0, P-2
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Study of vegetative morphology and reproductive structures of selected representative types of the groups.

SCHEME OF PRACTICAL EXAMINATIONS:

Time: 4hrs.

Marks 40

i. Bryophyte	10
ii. Pteridophyte	10
iii. Gymnosperms	10
iv. Lab. Note Book	5
v. Viva Voce	5

Books Recommended :

1. An Introduction Embryophyta, Vol I – Bryophyta : Parihar, N.S. ,Central Book Depot
2. A Text Book of Bryophyta, Pteridophyta and Gymnosperms.: Pandey. B.P.; K.Nath and Co., Meerut.
3. An Introduction to Bryophyta: Parihar, N.S., Central Book Depot, Allhabad,
3. An Introduction to Pteridophyta : Rashid, A., Vikas publ. Co. New Delhi.
4. Botany for degree student –Bryophyta:Vashishta, B.R.; S. Chand & Co, New Delhi.
5. Botany for Degree Students, Vol IV – Vascular Cryptogams (Pteridophyta): Vashishta, P.C. ; S.Chand & Co.
6. Bryophyta : Vasishta B.R. S. Chand and Co. New Delhi.
7. College Botany Vol.1 : Gangulee Das and Dutta., Central Book Dept. Calcutta.
8. College Botany Vol.II : Gangulee, H.C. and Kar A.K. , New Central Book Agency

9. Cryptogamic Botany Vol. .II. Bryophytes and Pteridophytes : Smith G.M.; McGraw
10. Cryptogamic Botany. Vol-III: Smith, G.M.; Tata McGraw HillPublishing Co.
11. Morphology of Pteridophytes : Sporne, K.R. , Hutchi University Library, London.
- 12 Gymnosperms: Vashista. P.C. ; S.Chand & Co Pvt. Ltd.,
13. A Text Book of Bryophyta, Pteridophyta and Gymnosperms: Pandey, B.P.;
K.Nath and Co.,Meerut.
14. A Text Book of Gymnosperms: Sreevastava H.N. ; S. Chand and Co. Ltd.,
15. An introduction to Embryology. Vol-II.Pteridophyta and Gymnosperms:
Parihar, N.S.; K.Nath and Co.

Botany
Elective (General)
SEMESTER-III
Total Marks :60

Code (Paper) : ET-3-BOT-301	Title : Morphology, and taxonomy, Anatomy, Embryology	Credit : 3	L-2, T-1, P-0
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Morphology and Taxonomy:

Marks: 30

Unit –1. Principles, aims and objectives of plant classification , outline of the classification system of Linnaeus, Bentham and Hooker and Engler and Prantl.

Unit –2. Rules of binomial nomenclature; morphological details with floral diagram and floral formula of the following families citing common and economically plants.

Ranunculaceae, Brassicaceae, Malvaceae, Fabaceae, Apiaceae, Solanaceae, Lamiaceae, Euphobiaceae, Asteraceae, Orchidaceae, Musaceae, Arecaceae, and Poaceae.

Anatomy:

Marks: 15

Unit –4. Meristems and organization of root and shoot apices.

Unit –5. Tissues and tissue systems, the primary body, stelar structures.

Unit –6. Secondary growth in thickness: cambium and its activities in relation to climatic conditions ; periderm- cork cambium, secondary cortex and cork.

Embryology :

Marks: 15

Unit -7: Microsporangium and development of male gametophyte.

Unit – 8:. Megasporangium and development of female gametophyte.

Unit – 9: Fertilization, development of embryo and endosperm .

Botany
Elective (General)
SEMESTER-III
Total Marks :40

Code (Paper) : EP-2-BOT-302	Title : Based on ET-3-BOT-301	Credit : 2	L-0, T-0, P-2
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Study of vegetative morphology, reproductive structures of selected species, tissue differentiation by double staining technique, permanent slides of embryology.

SCHEME OF PRACTICAL EXAMINATIONS:

Time: 4hrs.

Marks 40

Morphology and taxonomy	15
Anatomy	10
Embryology	5
Lab. Note Book	5
Viva Voce	5

Books Recommended:

1. Plant Anatomy: Pandey, B.P. S. Chand and Co., New Delhi.
2. A text Book of plant Anatomy: Vashista, P.C.
3. Introduction to Embryology of Angiosperms : Maheswari P. ; Mac Graw Hill
4. Plant Anatomy: Esau, K. ; Wiley Eastern Private Limited. New Delhi.
5. Plant Anatomy: Pandey B.P S. Chand & Co. Delhi.
6. Plant Anatomy: Vasishta P.C. ; Pradeep Publication, Jalandhar
7. The Embryology of Angiosperms: Bhojwani, S..S and Bhatnagar, S.P. ;
Vikas Publishing House Pvt. Ltd.,
8. College Botany : Gangulee, H.C., J.S. Das & C. Dutta ; New Central Book Agency
9. College Botany –Vol. I : Gangulee, H.C., Das, K.S & Datta, C.T ;Basant Panchami,
Calcutta.
10. Introductory Botany Vol. IV- Taxonomy, Embryology and Economic Botany: Gupta,
S.K; Kedar Nath Ram Nath, Meerut.
11. Taxonomy of angiosperms (Systematic Botany): Pandey, P.B, S.Chand & Co. Ltd.,
Ram Nager, New Delhi.
12. Taxonomy of Angiosperms : Naik, V.N , Tata McGraw Hill Publishing Co., (P) Ltd.
13. Taxonomy of Angiosperms: Singh, V. & Singh, D.K, Rastogi Publication, Meerut.
14. Taxonomy of Angiosperms: Vashista, P.C, S. Chand & Co., New Delhi.

SEMESTER IV

Course : ET-3-BOT-401

Plant Physiology and Economic Botany

Total Marks -60, Credit 3, 5 Classes/Week

Plant Physiology:

Marks: 40

Unit –1: Plant water relationship; importance of water to plant life, diffusion, imbibition, osmosis and plasmolysis; absorption of water.

Unit –2: Mineral nutrition: essential macro and micro elements and their role, ascent of sap, transpiration and guttation, and translocation of mineral elements.

Unit –3: Photosynthesis: mechanism and limiting factor, types of carbon fixation (C₃, C₄, and C₂ cycle)

Unit –4: Respiration: Mechanism - Glycolysis, Krebs's cycle and ETS ; its significance and fermentation.

Unit- 5: Growth and development: definitions, phases of growth , factors affecting growth; seed germination and dormancy

Unit –6: Hormones: auxin, gibberellin, cytokinin, florigen; concept of photoperiodism and vernalisation; tropic and nastic movement.

Economic botany

Marks: 20

Unit –1: Economic importance of the following plants with special reference to their local names, scientific names, family and parts used.

- a. Cereals- Rice and wheat
- b. Pulses – Pea and Soyabean.
- c. Oil seeds – Mustard, ground nut, coconut and sunflower .
- d. Fibre plants – Jute, Cotton, Ramie
- e. Medicinal Plants – Rauwolfia, Cinchona, Ocimum and Neem.
- f. Timber yielding – Sal, Sisso, Teak, Holokh, Nahor
- g. Non alcoholic beverages – Tea and Coffee.

SEMESTER-IV

Course : EP-2-BOT-402

(Based on Course : ET-3-BOT-401)

Total Marks -40, Credit 2, 2 Classes/Week

Physiology

Marks: 30

Performance of simple physiological experiments from the prescribed course.

1. Phenomenon of Imbibition.
2. Phenomenon of Plasmolysis.
3. Phenomenon of Transpiration – 3 expts. (minimum).
4. Phenomenon of Photosynthesis – 1 expts.(minimum).

Economic botany

Marks: 10

Candidates have to submit some specimens of economically important plants with proper specifications.

SCHEME OF PRACTICAL EXAMINATIONS:

Time: 4hrs.

Marks: 40

Plant Physiology	20
Economic botany (including collection)	10
Lab. Note Book	5
Viva Voce	5

Books Recommended:

- 1 A Text Book of Plant Physiology: Verma, V., Emkay Publications, NewDelhi.
- 2 Plant Physiology: Gill, D.S.; S.Chand and co., New Delhi.
- 3 Plant Physiology: Malik, C.P. ;Kalyani Publishers, Ludhiyana.
- 4 Plant Physiology: Pandey,. S.N. ; Tata McGraw Hill Publishers (P)Ltd., New Delhi.
- 5 Introductory Economic Botany: Govind Prakash and Sharma, S.K ; Jai Prakash Nath & Co., Meerut.
- 6 Economic Botany: Hill, A.W ; McGraw Hill Book Co., New York.
- 7 Economic Botany: Pandey, B.P. ; S.Chand and Co., New Delhi.
- 8 Economic Botany: Sen, S. ; New Central Book Agency, Calcutta.

SEMESTER V

Course : ET-3-BOT-501

Cytology, Genetics, Biotechnology, Evolution and Biostatistics

Total Marks -60, Credit 3, 5 Classes/Week

Cytology

Marks:15

Unit –1. Cell theory and its exception

Unit –2. Prokaryotic and eukaryotic cell structure, structure and function of cell organelles (nucleus, mitochondria, ribosome, golgi body and chloroplast).

Unit – 3. Chromosome- structure and function

Genetics and plant breeding

Marks: 15

Unit –1. Mendel's Laws, Linkage, Crossing over and chromosome mapping, concept of gene and allele.

Unit –2. Concept of polyploidy and its application, mutation, chromosomal aberration

Unit--3: Plant breeding and crop improvement

Biotechnology

Marks:10

Unit –1 Biotechnology- scope and utility .

Unit –2 Tissue culture techniques and its importance, protoplast fusion and somatic hybridization

Evolution

Marks: 10

Unit –1: Origin of life, Evidences, theories and mechanism of organic evolution.

Unit –2: Modern concept of evolution (Molecular basis of evolution).

Biostatistics

Marks: 10

Unit –1: Importance of biostatistics, mean, median, and mode; mean deviation and standard deviation, standard error, test of significance.

Course : EP-2-BOT-502

(Based on Course : ET-3-BOT-501)

Total Marks -40, Credit 2, 2 Classes/Week

Study of chromosomes by squashing the root tips using aceto-orchien stains.

Biostatistics Two to three suitable problem

SCHEME OF PRACTICAL EXAMINATIONS:

Time: 4hrs.	Marks: 40
Cytogenetics	20
Biostatistics	10
Lab. Note Book	5
Viva Voce	5

Books Recommended:

1. Cell biology : Rastogi, S.C. ; TATA McGraw Hill publishing Co, New Delhi.
2. Cell biology : Singh S.P& Tomar B.S; Rastogi Publication, Meerut.
3. A Text book of Cell Biology : Nair, P.G.K & Prabhakara, K.; Konark publishers.
4. Elementary Principles of Plant Breeding: Chauduri, H.K. ; Oxford and IBH Co..
5. Plant Breeding: Singh, B.D. Kalyani Publishers, Ludhiana.
6. Plant Breeding: Singh, S.P. Lakhi Ram Singh, Srivastava, J.P.; Aman Publishing House, Meerut.
7. Principles of Plant Breeding : Allard, R.W. ; John Willey and Sons, Inc.
8. Text Book of Genetics: Gupta, P.K. ; Rastogi Publications, Meerut.
9. Text book of Genetics: Verma, P.S. & Agarwal S. Chand & Co., New Delhi.
10. A text book of Biotechnology: Dubey R.C; S. Chand & Co., Ltd., New Delhi.
11. An Introduction to plant tissue culture: Kalyan Kr. Dey ; New Central Book Agency.
12. Basic biotechnology: Ignachimuthu, S. ; Tata McGraw Hill Publishing Co Ltd.
13. Elements of Biostatistics: Prasad, S. Rastogi Publ.
14. Fundamentals of Biostatistics: Rastogi, V.B.; Ane Book India.
15. Fundamentals of Biostatistics: T.J. Bailey; Wraaz Publ. Hyderabad.

Course : ET-3-BOT-601

Biochemistry, Ecology and Plant Geography

Total Marks -60, Credit 3, 5 Classes/Week

Biochemistry

Marks: 20

Unit –1. Basic principles of biochemistry, acid, base, pH and buffer solution.

Unit –2. General account of carbohydrate, lipid, protein, and nucleic acid with special reference to their structure and function.

Unit- 3: Enzyme, properties, classification, mechanism of enzyme action. co-enzyme, Vitamins and their importance

Ecology

Marks: 30

Unit –1. Definition and scope of ecology; ecological factors.

Unit- 2. An overview on different types of ecosystem. Structure and function of ecosystem, energy flow through ecosystem.

Unit -3. Plant communities: definition, classification, characteristics and function; plant succession definition, cause and types, the climax concept

Unit- 4. Natural resources: Renewable and non- renewable resources with special reference to N.E. India, conservation of natural resources, forest resources, causes and consequence of deforestation; biodiversity : value and conservation strategies

Unit- 5. Environmental pollution: air, water and soil; global warming and green house effect, ozone depletion.

Plant Geography

Marks 10

Unit -6. General account on the Phytogeographical regions of India with special reference to the Eastern Himalayas

Unit –7. Endemic flora of N.E. India – a general account.

Course : EP-2-BOT-602

(Based on Course : ET-3-BOT-601)

Total Marks -40, Credit 2, 2 Classes/Week

Preparation of buffer, test for soluble sugar, starch, cellulose and proteins.

Floristic composition study of different habitats, Study of producer, consumer and decomposer (if possible) and preparation of food chain and food web to show the probable path of energy transformation through the ecosystem, collection of representative plant samples of different habitats.

SCHEME OF PRACTICAL EXAMINATIONS

Time: 4hrs.

Marks: 40

Biochemistry	15
Ecology	15
Lab. Note Book	5
Viva Voce	5

Books Recommended :

- 1 Elements of Ecology : Gopal, B and Bhardwaj, Vikas Publishing House Pvt. Ltd.
- 2 Modern Concepts of Ecology : Kumar H.D. Vikas Publications. New Delhi.
- 3 Plant Ecology : Vasishta, P.C, Vishal Publication.
- 4 Plant Ecology and Soli Science : Shukla, R.S and Chandel.P.S S. Chand Co.
- 5 Text Book of plant Ecology: Verma, V,A; Emkay Publication.
- 6 The Book of Plant Ecology : Ambasht R.S.; Students friends Co.,.
- 7 Fundamentals of Biochemistry: Jain,J.L.; S.Chand and Co., New Delhi.
- 8 Introduction to Plant Biochemistry : Goodwin Y.W., and Mercer E.I. ;
CBS Publishers and distributors

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