



UNIVERSITY OF CALCUTTA

Notification No. CSR/13/2023

It is notified for information of all concerned that in terms of the provisions of Section 54 of the Calcutta University Act, 1979, (as amended), and, in exercise of his powers under 9(6) of the said Act, the Vice-Chancellor has, by an order dated 11.07.2023 approved the Syllabi of the under mentioned subjects for semester wise Four-year (Honours & Honours with Research) / Three-year (Multidisciplinary) programme of U.G. courses of studies, as applicable under CCF, 2022 . under this University, as laid down in the accompanying pamphlet.

Name of Subject:

1. Anthropology
2. BBA
3. Bengali
4. BFAD
5. Bio Chemistry
- ✓ 6. Botany
7. Chemistry
8. Commerce
9. Economics
10. Education
11. English
12. Geology
13. Hindi
14. History, Islamic History & Culture
15. Home Science
16. Human Rights
17. Journalism & Mass Communication
18. Mathematics
19. Microbiology (Honours)
20. Molecular Biology .
21. Philosophy
22. Physiology
23. Political Science
24. Psychology
25. Social Science
26. Sociology
27. Urdu
28. Women's Studies
29. Zoology

The above shall be effective from the academic session 2023-2024.

SENATE HOUSE

KOLKATA-700 073

 12/7/2023
Prof. (Dr.) Debasis Das

Registrar

UNIVERSITY OF CALCUTTA
Course Structure- 3 yr MDC (NEP 2020)
BOTANY

	CC1	CC2	Minor	IDC	AEC	SEC	CVAC	Summer Internship	Credit
Semester									
Level 100									
1	BOT-MD-CC1-1-Th BOT-MD-CC1-1-P Plant Diversity			Biostatistics* (Th+Pr)		BOT-MD-SEC-1-Th BOT-MD-SEC-1-P Mushroom Cultivation Technology*** (Th+Pr)	1.ENVS 2.CV		21
2	BOT-MD-CC2-2-Th BOT-MD-CC2-2-P Plant Systematics						1.ENVS 2.Central Pool	Summer Internship **	21
<i>Exit option</i>									
Level 200									
3	BOT-MD-CC3-3-Th BOT-MD-CC3-3-P Economic Botany		Plant Diversity (Th+Pr)						21
4	BOT-MD-CC4-4-Th BOT-MD-CC4-4-P Pharmacognosy & Ethnobotany		Plant Systematics (Th+Pr)					Summer Internship**	22

	BOT-MD-CC5-4-Th BOT-MD-CC5-4-P Plant Geography, Ecology & Evolution								
Exit option									
Level 300									
5	BOT-MD-CC6-5-Th BOT-MD-CC6-5-P Plant anatomy & Embryology BOT-MD-CC7-5-Th BOT-MD-CC7-5-P Cell Biology & Genetics		Economic Botany (Th+Pr) Pharmacognosy & Ethnobotany (Th+Pr)						20
6	BOT-MD-CC8-6-Th BOT-MD-CC8-6-P Plant Physiology & Biochemistry		Cell Biology & Genetics (Th+Pr) Plant Physiology & Biochemistry (Th+Pr)					Summer Internship**	20
Credits	8×4=32	8×4=32	6×4=24	3×3=9	4×2=8	3×4=12	4×2=8	1×3=3	128

Marks	8×100=800	8×100=800	6×100=600	3×75=225	4×50 =200	3×100=300	4×50=20 0		Total Marks = 3200
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Marks = 25 marks per credit.

Total credit = 125 + 3 (for summer internship) = 128

*** IDC offered from Botany to be opted in 1st or 2nd or 3rd Semester**

****Summer Internship once after 2nd or 4th or 6th Semester.**

*****SEC to be opted in 1st or 2nd or 3rd Semester.**

UNIVERSITY OF CALCUTTA
Course Structure- 3yr MDC (NEP 2020)

BOTANY SYLLABUS

Semester 1

Core

PLANT DIVERSITY (THEORY)

BOT-MD-CC1-1-Th

Total marks 75; Credits 3, Class 45 hours

1. Introduction to plant kingdom.

1.1 Origin of life and evolution of plant cells, 1.2 Importance of plants as source of food, fuel and their role in ecosystem services (as carbon sink, sequestering etc.)

(3 lectures)

2. Algae

2.1. Salient features of Cyanophyceae, Chlorophyceae, Charophyceae, Phaeophyceae, Rhodophyceae and Bacillariophyceae 2.2 Criteria and system of classification (Fritsch, 1935) 2.3. Economic importance of algae in environment, agriculture, biotechnology and industry.

(6 lectures)

3. Fungi

3.1 Salient features of Myxomycota, Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, Deuteromycotina. 3.2 System of classification up to Sub-division (Ainsworth, 1973), 3.3 Economic importance of fungi (food, medicine and agriculture), 3.4 Fungal symbioses: Mycorrhiza, Lichen and their importance.

(6 lectures)

4. Bryophytes

4.1 Salient features of Hepaticopsida, Anthocerotopsida and Bryopsida, 4.2. System of classification up to Class (Proskauer 1957), 4.3 Amphibian nature of bryophytes, 4.4 Economic and ecological importance.

(6 lectures)

5. Pteridophytes

5.1 Salient features of Psilophyta, Lycophyta, Sphenophyta and Filicophyta, 5.2 System of classification up to Division (Gifford & Foster 1989), 5.3 Economic importance (food, medicine & agriculture).

(6 lectures)

6. Gymnosperms

6.1 Salient features of Cycadophyta, Coniferophyta and Gnetophyta, 6.2 Outline classification up to Division: Progymnospermophyta to Gnetophyta (Gifford & Foster 1989), 6.3 Economic importance (wood, resin, essential oil & drugs).

(6 lectures)

7. Angiosperms

7.1 Types and morphology of leaf, stem and root, 7.2 Inflorescence types with examples, 7.3 Flower: Different parts and forms of calyx, corolla, androecium and gynoecium; aestivation and placentation, 7.4 Types with examples-fruits and seeds.

(12 lectures)

PLANT DIVERSITY (PRACTICAL)
BOT-MD-CC1-1-P
Total marks 25; Credit 1, Class 30 hours

- | | |
|---|-----------------|
| 1. Work out: Morphology | 10 marks |
| 2. Identification with reasons (other groups except angiosperms) | 5 marks |
| 3. Class room performance (Practical notebook) | 3 marks |
| 4. Field notebook | 2 marks |
| 5. Viva-voce | 5 marks |

1. Flower- dissection, drawing and study
 - a) Different parts, b) Adhesion and cohesion, c) Placentation, d) Aestivation
2. Study of ovules: types (Fresh specimens/ permanent slides/ photographs)
3. Fruits:different types- study from fresh/ preserved specimens
4. Inflorescence types: study from fresh/ preserved specimens
5. Identification on the basis of reproductive and structural features from preserved specimens/ permanent slides: Algae (*Nostoc*, *Oedogonium* and *Ectocarpus*), Fungi (*Rhizopus*, *Ascobolus* and *Agaricus*), Bryophytes (*Marchantia*, *Anthoceros* and *Funaria*), Pteridophytes (*Selaginella*, *Equisetum* and *Pteris*), Gymnosperms (male cone and female cone/ megasporophyll of *Cycas*, *Pinus* and *Gnetum*).
6. A field notebook supported with photographs taken during field study to be submitted giving comprehensive idea about different types of inflorescence, flowers and fruits.

Textbook Reference:

1. Ganguli,H.C., Das, K.S.K. & Dutta, C.T. College Botany, Vol. I, latest Ed., New Central Book Agency
2. Ganguli,H.C. and Kar, A.K. College Botany, Vol. II, latest Ed., New Central Book Agency
3. Mukherjee, S. College Botany, Vol. III, latest Ed., New Central Book Agency
4. Uno, Storey& Moore, Principles of Botany, 2001, McGraw Hill.
5. Kenrick,P. & Crane, P. The Origin & early diversification of land plants (1997), Smithsonian Institute Press.
6. Bell, P.R. & Hensley, A.R. Green plants; their Origin & Diversity (2nd ed.), 2000, Cambridge University Press

7. Frenchel, T. The origin & early Evolution of life, 2002, Oxford University Press.
8. Hait, G., Ghosh, A. and Bhattacharya, K. A Text Book of Botany (Vols. I, II & III), 2007, New Central Book Agency
9. Lock, A.J., & Evans, D.E., Plant Biology, 2001, Viva Books
10. Mitra, D., Guha, J. & Chowdhuri, S.K. Studies in Botany (Vols. I & II), Latest Ed., Das Printers
11. Chatterjee, T., Santra, S.C. and Das, A. Practical College Botany, New Central Book Agency

IDC (To be opted in 1st or 2nd or 3rd Semester)
BIostatISTICS (Theory)
Total marks- 75, Credits 3, Class 45 hours

1. **Biostatistics and Biometry:** Basics- Definition, statistical methods, basic principles, variables-measurements, functions, limitations and uses of statistics; Data, Sample, Population, Random sampling, Frequency distribution: Normal, Binomial and Poisson distribution.

(8 lectures)

2. **Central tendency:** Arithmetic Mean, Mode and Median; Measurement of dispersion- Coefficient of variation, Standard Deviation, Standard error of Mean.

(10 lectures)

3. **Test of significance:** Chi-square test for goodness of fit and Students' t test, Calculation of 'F' value and finding out the probability value for the 'F' value.

(12 lectures)

4. **Correlation coefficient:** Calculations of 'r' values and finding out the probability.

(3 lectures)

5. **Probability:** multiplicative and additive rules of probability: application and importance.

(5 lectures)

6. **Measurement of gene frequency:** Hardy-Weinberg equilibrium- conditions applied for its implications (simple numerical problems to calculate genotypic and allelic frequencies).

(7 lectures)

BIOSTATISTICS (Practical)
Total marks-25, Credit 1, Class 30 hours

1. Workout	15 marks
2. Classroom performance	5 marks
3. Viva	5 marks

1. Univariate analysis of statistical data: Statistical tables, mean, mode, median, standard deviation and standard error (using seedling population/ leaflet size), graphical representation of the data (frequency polygon, bar diagram, histogram).
2. Calculation of correlation coefficient values and finding out the probability.
3. Determination of goodness of fit in Mendelian mono-and dihybrid ratios (3:1, 1:1, 9:3:3:1, 1:1:1:1) by Chi-square analysis and comment on the nature of inheritance.
4. Calculation of 'F' value and finding out the probability for the F value.

Textbook references

1. Chap, T. Le. Introductory Biostatistics, Wiley Publications.
2. Barley, N.T.J. Statistical Methods in Biology, Latest Ed., Cambridge University Press
3. Zar, J.H. Biostatistical Analysis (3rd ed.), 1996, Prentice Hall.
4. Kar, D.K. and Halder, S. Plant Breeding & Biometry, 2006, New Central Book Agency.
5. Prasad, S. Elements of Biostatistics, Rastogi Publications (Current Ed.)
6. Datta, A.K. Basic Biostatistics and its applications, New Central Book Agency (P) Ltd.
7. Banerjee, P.K. Introduction to Biostatistics, S. Chand and Company Pvt. Ltd.
8. Singh, B.D. Plant breeding, Principles and methods (7th Ed.) 2005. Kalyani Publishers.

SEC (To be opted in 1st or 2nd or 3rd Semester)
MUSHROOM CULTIVATION TECHNOLOGY (THEORY)

BOT-MD-SEC-1-Th

Total marks 75; Credits 3, Class 45 hours

1. 1.1 Introduction, History of mushroom cultivation, 1.2 Current overview of mushroom production in the world, 1.3 Mushroom biology-classification of mushrooms, edible mushrooms in India, poisonous mushrooms, mushroom poisoning.

(6 lectures)

2. 2.1 Infrastructure-structural design and layout of mushroom farm, substrates (locally available), 2.2 Appliances- weighing balance, autoclave, laminar air flow, incubator, hot air oven, spirit lamp, Bunsen burner, pH meter, laboratory heater, low-cost stoves, water bath, humidifier, water sprayer, vessels, inoculation hook and inoculation loop, sieves, culture racks, tray, polythene bags, 2.3 Methods of sterilization.

(9 lectures)

3. 3.1 Cultivation technology-overview of cultivation strategies, composting technology in mushroom production, mushroom bed preparation, culture media, pure culture, maintenance and preservation of pure culture, 3.2 Production of spawn- cultivation of oyster mushroom, paddy-straw mushroom, milky mushroom and white button mushroom, 3.3 Cultivation of medicinal mushroom (Cordyceps and Ganoderma).

(12 lectures)

4. 4.1 Mushroom diseases and management strategies, 4.2 Post-harvest technology-short-term storage (Refrigeration- up to 24 hours), long-term storage (canning, pickles, papads etc.), drying, storage in salt solutions, 4.3 Food preparations from mushrooms.

(9 lectures)

5. 5.1 Uses of spent mushroom substrate, 5.2 Strain improvements in cultivated mushroom; Nutritional and medicinal value of edible mushrooms, 5.3 Research centres- National level and regional level, 5.4 Cost-benefit ratio, 5.5 Mushroom based Industry, 5.6 Mushroom market in India and abroad.

(9 lectures)

MUSHROOM CULTIVATION TECHNOLOGY (PRACTICAL)

BOT-MD-SEC-1-P

Total marks 25; Credits 1, Class 30 hours

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|----|---|----------|
| 1. | Work out: | 15 marks |
| 2. | Class room performance (Practical notebook) | 5 marks |
| 3. | Viva-voce | 5 marks |

1. Macro and microscopic identification of some common edible mushrooms (*Agaricus*, *Pleurotus*)
2. Media preparation
3. Fungal tissue culture
4. Sub-culturing for maintenance of culture
5. Spawn production
6. Cultivation of *Pleurotus/Calocybe*

Textbook Reference:

1. Acharya, K., Roy, A. & Sarkar, J. Mushroom Cultivation Technology, 2020, Techno World, Kolkata.
2. Marimuthu, T., Krishnamoorthy, A. S., Sivaprakasam, K. & Jayarajan, R. Oyster Mushrooms, 1991, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
3. Swaminathan, M. Food and Nutrition, 1990, Bappco, The Bangalore Printing & Publishing Co. Ltd.
4. Tewari, P. & Kapoor, S.C. Mushroom Cultivation, 1988, Mittal Publications, Delhi
5. Bahl, N. Handbook of Mushrooms, Ed. II, Vol I & Vol II