



Course Outline Form

ODD SEMESTER 2019

Dear Student: Course outlines are intended to provide students with an overall plan for a course to enable them to function efficiently and effectively in the course.

*Academic Programs
BSc Biochemistry
EMEA College
Kondotty*

Course Outline : BCH5B09 Plant Biochemistry (2019-2020)

Name of the Stream	Science
Name of the Programme	BSc Biochemistry
Name of the Course	BCH5B09 Plant Biochemistry
Nature of the Course	Core Course
Semester	Fifth
Lecturer(s)	N K Zaheera Banu
Name of the Coordinator	
Year	2019-2020
No of Credits	3
No of Contact Hours	3
Course Description	This course introduce basic structure of a plant cell and different primary metabolic pathways observed in plants. The course also outline biochemical aspects associated with phyto hormones, fruit ripening, senescence, seed dormancy and germination.
Course Objectives	<ol style="list-style-type: none"> 1. To provide detail knowledge on metabolism aspects of plants 2. To create awareness on physiological aspects of plants 3. To recognize importance of secondary metabolites produced by plants
Course Outcome	<p>Students will understand plant cell structure, organization, and apply specific biochemical functions to all compartments of the plant cell.</p> <p>They will learn the structure, function and biosynthetic pathways of essential biochemical molecules including their key chemical and physical properties.</p> <p>The Students understand how light energy is captured and used to provide chemical forms of energy to power the functions of cells and whole plants. The importance of plant hormones, minerals, secondary metabolites and basics of plant physiology will be understood.</p>
Assessment Method	<p>Assignments</p> <p>Homeworks</p> <p>Class Tests</p> <p>Unit Tests</p> <p>Term Exam</p> <p>Seminars</p>
Teaching Methods Used	<p>Lectures</p> <p>Cooperative Learning</p> <p>Collaborative Learning</p> <p>LMS</p> <p>Class Discussion</p>

Textbook

1. Anderson, J. W. and Beardall, J. Molecular activities of plant cell: An Introduction to Plant Biochemistry, Blackwell Science.
2. Bell, E.A. and Charlwood, B.V. (Editors). Encyclopedia of Plant Physiology. New Series. Vol. 8. Secondary Plant Products: Springer-Verlag Pub. (1980.)
3. Bonner, J. and Varner, J. E. Plant Biochemistry, Academic Press, New York
4. Buchanan B B and Gruissem W and Jones R L ,Biochemistry and Molecular biology of plants, Society of American Plant Physiologists
5. Conn, E.E. (Editor) The Biochemistry of Plants. A comprehensive Treatise. Vol. 7.
6. Secondary Plant Products.: Academic Press Pub. 1981.
7. Dennis, D. T., Turpin, D. H., Lefebvre. D.andLayzell, D. B. eds, Plant Metabolism, 2nd Edition. Addison Wesley Longman Ltd., 2nd Edition, 1997.
8. Dey, P.M. and Harborne, J.B. (Editors.) Plant Biochemistry: Harcourt Asia PTE Ltd. Academic Press. (Indian Edition, 2000)
9. Hopkins, W. G. and Norman. P.A. Hunger, Introduction to Plant physiology, 3rd edition
10. Kumar, H.D. and Singh, H.N. Plant Metabolism: Affiliated East-West Press Pvt. Ltd., New Delhi, Madras, Hyderabad and Bangalore. (1993; 2nd edition).
11. Lea, P. J. and Leegood, R. C. Plant Biochemistry and Molecular Biology 2nd Edition. Wiley, London, 1999.
12. Noggle, G.R. and Fritz,G.J. Introductory Plant Physiology, Prentice Hall of India Pvt Ltd,N. Delhi
13. Pandey, S. N. and. Sinha, B.K. Plant Physiology, Vikas Publishing House Pvt. Ltd, 3rd edition, 1999.
14. Ramawat, K.G. and Merillon, J.M. (Editors.) Biotechnology. Secondary metabolites: Oxford and IBH Publishing Company Pvt. Ltd., New Delhi and Calcutta. (1999).
15. Salisbury, F. B. and Ross, C. W. Plant Physiology, 4 th Ed. Wadsworth Publishing Company, California
16. Stumpf, P. K. and Conn, E. E (1980). The Biochemistry of Plants: A Comprehensive Treatise. Academic Press.
17. Taiz, L. and Zeiger E, Plant Physiology, 5th Ed.(2010), Sinauer Associates, Inc Publishers, Massachusetts
18. Verma, V. Plant physiology 7th Revised edition, Emkay Publications 2001.

References

Internet Resources

Internal Exam Pattern

Items	Marks/20	Marks/15
Assignment	4	3
Test Paper(s)/Viva voce	8	6
Seminar/Presentation	4	3
Class Room Participation based on Attendance	4	3
Total	20	15

External Exam Pattern

Question Type	No of Question	Marks/Question	Total Marks
Short Questions(2-3 Sentences)	15	2	Ceiling 25
Paragraph / Problem Type	8	5	Ceiling 35
Essay Type	2 out of 4	10	20
Total			80
Time			2.5 hrs

Course Schedule

Unit I

An over view of plant cell and sub cellular components of the plant cell. Brief account of separation of plant sub cellular constituents. Structure and organization of primary cell wall. Structure and chemical composition of plant cell membranes; membranes of nucleus, endoplasmic reticulum, plasmalemma, plastid, vacuole and Golgi body. Structural features of organelles of plant cell: chloroplast, microbody, vacuole, and plant microtubule. Unique functional roles of the plant organelles. Importance of sucrose as transport form of sugar in plants.

Week 1

Week 2

Week 3

Unit II

Autotrophy and metabolic pathways in plants:

Week 4

Photosynthesis: Plant pigments: structure, properties and functions of chlorophylls, xanthophylls and carotenoids and other plant pigments. Phytochromes, cryptochromes and phototropins: general account of structure and chemistry. Functions and mechanism of action of photoreceptor proteins in plants Photosynthesis and pathway of carbon dioxide fixation: Light reactions, cyclic and non cyclic phosphorylation; Calvin cycle, C4 pathway, Crassulacean acid metabolism; regulation of photosynthesis; photorespiration and the glycolate pathway.

Week 5

Week 6

Unit III

Mineral and other metabolisms

Week 7

Mineral metabolism: Essentiality and functions- magnesium, iron, manganese, zinc, copper, molybdenum, calcium, potassium, chlorine and boron. potassium,

Week 8

Sulfate metabolism: Sulfate reduction and assimilation. Pathway of cysteine and methionine synthesis.

Week 9

Nitrate metabolism: Nitrate reduction- nitrate reductase- physiology and regulation; nitrite metabolism (nitrite reductatase).

Unit IV

Week 10

Nitrogen fixation: Nitrogen cycle; symbiotic and non-symbiotic nitrogen fixation. Biochemistry of nitrogen fixation

Week 11

Unit V

Week 12

Plant growth substances

Plant growth regulators :Auxins, cytokinins, abscisic acid and related compounds, gibberllins, and ethylene; chemical nature, physiological roles, distribution in plants, mode of action,

Week 13

Unit VI

Fruit ripening, senescence, seed dormancy and germination:

A brief account of the biochemical aspects associated with the above in relation to plant development and growth.

Week 14

Week 15

Unit VII

Secondary metabolism in plants

A brief account of the following major chemical classes of secondary metabolites: Alkaloids, terpenoids, flavonoids, phenolics and phenolic acids, steroids, coumarins, quinines, acetylenes, cyanogenic glycosides, amines and non-protein amino acids, gums, mucilages, resins etc.

Importance of secondary metabolites: To the producer plant: protection of the plant from predators and insects (give examples). To man: as biologically active compounds in mammalian metabolism (examples). Also as drugs, precursors of drugs in pharmaceutical industry, as natural pesticides/insecticides; other uses. Allelopathy: detrimental biochemical effects of phytotoxic compounds of producer plant to other plants; inhibition of germination, growth and development. (Give examples for the above). Xenobiotic and plant metabolism (A brief study)

Week 16

Week 17

Week 18

Contact Details

Name	N K Zaheera Banu
Phone	8136829049
Email	zahrabanimn@gmail.com
Website	