SACRED HEART COLLEGE (AUTONOMOUS)

Department of Botany

BSc Botany

Course plan

Academic Year 2016 – 17

Semester 6

COURSE PLAN
U6CRBOT09 - PLANT PHYSIOLOGY AND BIOCHEMISTRY

COURSE OBJECTIVES:

- This course will create knowledge and understanding of basic mechanisms of various physiological processes related to plant life.
- Insight in to the water relationships and effect of stress in plants.
- A thorough understanding of most vital plant physiological functions like photosynthesis and respiration.
- Ability to critical thinking and logical reasoning of various plant physiological mechanisms in real life situations.
- Knowledge on both theory and practical aspects of plant growth regulators.
- Acquaintance with basic skills and techniques related to plant physiology.
- Perception on structure and importance of the bio molecules associated with plant life.

Basic Reference

1. Datta, S.C.1989. Plant Physiology, Central Book Depot, Allahabad.
2. Dayananda, B. (1999). Experiments in Plant Physiology, Narosa Publishing House, New Delhi.
3. De Robertis, E.D.P. and De Robertis, E.M.F.Jr. 2002. Cell and Molecular Biology, Lipponcott Williams and Wilkins. USA.
4. Hopkins, W.G. 1999. Introduction to Plant Physiology. John Wiley and sons, New York.
5. Jain J.L. Sanjay Jain & Nitin Jain 2005. Fundamentals of Biochemistry. S. Chand & Company Ltd., New Delhi.
6. Jain,V. K. 1996. Fundamentals of Plant Physiology, S Chand and Company, Delhi .
7. Kochar, P.L. 1964. A Text Book of Plant Physiology, Atmaram & Sons, Delhi.
8. Lehninger A.L.1961. Biochemistry, Lalyan Publishers, Ludhiana.
9. Leopald, A.C. and Kriedemann, P.E. Plant Growth and Development. Tata McGraw Hill, New Delhi.
10. Malik, P.C. 1680. Plant Physiology, Kalyani Publishers, New Delhi.

No	Sessions	Topic	Method	Remarks/Reference
1	Session 1	Physical aspects of absorption- Diffusion, imbibition, osmosis, OP, DPD, TP, WP, Concept of Water potential, matrix potential, pressure potential.	Presentation/Chalk and Board Assignment	
2.	Session 2			
3	Session 3			
4	Session 4	Absorption of water-active & passive, Ascent of sap-cohesion adhesion theory, Transpiration-types-mechanism-theories-(starch-sugar, proton-K+ion exchange)-significance – antitranspirants, Guttation	Presentation/Chalk and Board	
5	Session 5			
6	Session 6			
7	Session 7	Essential and non-essential elements- macro& micro- role-deficiency symptoms. Absorption of minerals– active & passive-ion exchange, carrier concept.	Presentation/Chalk and Board	
8	Session 8			
9	Session 9			
10	Session 10	History - Photosynthetic pigments, photo exitation-Fluorescence, Phosphorescence - Absorbtion and action spectra, Red drop and Emerson enhancement effect	Presentation/Chalk and Board	
11	Session 11			
12	Session 12	Concept of photo systems, Cyclic & Non-Cyclic photophosphorylation	Presentation/Chalk and Board	
13	Session 13			
14	Session 14			

15	Session 15	Carbon assimilation pathways-C3, C4, CAM- Photorespiration –factors affecting photosynthesis.		
16	Session 16	Pathway-phloem transport-mechanism-pressure flow-phloem loading and unloading.	Presentation/Chalk and Board	
17	Session 17			
18	Session 18	Aerobic and Anaerobic, Glycolysis, Krebs cycle, Electron transport system & Oxidative phosphorylations,	Presentation/Chalk and Board	
19	Session 19			
20	Session 20			
21	Session 21			
22	Session 22	ATPases - chemi osmotic hypothesis-RQ –significance-factors affecting respiration.	Presentation/Chalk and Board	
23	Session 23			
24	Session 24			
25	Session 25			
26	Session 26	Allelochemicals- herbivory	Assignment	
27	Session 27	Physiological effects and practical application of hormones-Auxins, Giberillins, Cytokinins, ABA, ethylene.		
28	Session 28	Physiology of flowering–phytochrome-photoperiodism-vernalisation	Presentation/Chalk and Board	
29	Session 29	Abiotic - concept of plant responses to water, salt and temperature stresses; Biotic-pathogens	Assignment	
30	Session 30			
31	Session 31	Physical and chemical properties of water, Acid and bases, pH definition, significance, measurement,	Presentation/Chalk and Board/Assignment	
32	Session 32			

		pH indicators, buffer action, pH and life		
33	Session 33	Carbohydrates- structure and role of mono-di & poly-saccharides-common sugars seen in plants Proteins-peptide bond-essential and non-essential amino acids-primary structure-physiologically important proteins.	Presentation/Chalk and Board/ Assignment	
34	Session 34			
35	Session 35			
36	Session 36			
37	Session 37			
38	Session 38	Lipids - general features and their roles - fatty acid types and structure - fatty acid derivatives- fats and oils, structure and functions - compound lipids	Presentation/Chalk and Board	
39	Session 39			
40	Session 40			
41	Session 41	Nomenclature, characteristics mechanism and regulation of enzyme action, enzyme kinetics, factors affecting enzyme action	Presentation/Chalk and Board	
42	Session 42			
43	Session 43			
44	44 – 49	Seminar		
45	50 – 54	Revision		

COURSE PAN

U6CRBOT10 - Perspectives of Science, Methodology and General Informatics

COURSE OBJECTIVES:

- This enables the student a detailed basic understanding on principles of science and research methodology.
- Students will be able to understand different steps involved in research methodology.
- It also enables the student to understand the basics in general informatics.
- They will be equipped with using different application in computer related to education.
- They will be able to prepare a dissertation using MS office.
- They will be able to prepare power point presentations of research works.

Basic Reference

1. 1. Agarwal SK, 2008,*Foundation course in Biology* , Ane Books Pvt.Ltd., New Delhi.
2. *Collins H.and T Pinch 1993 The Golem: What every one should know about science,* University Press, Cambridge.
3. ColRuxton R, S N. Colegrave.2006. *Experimental Design for the life Science*, Oxford University Press
4. Cotteril R, 2002. *Biophysics an Introduction* .John Wiley and Sons.
5. Dany Spencer Adams, 2004. *Lab Math* I.K. International Pvt. Ltd. New Delhi.
6. David A Micklos, Greg A Freyer 2003.*DNA science*: A first course. Cold Spring Harbor Laboratory Press.
7. Day R.A, 1998. *How to Write and Publish a ScientificPaper*, University Press Cambridge.
8. Dwivedi J .N and R.B Singh (1990*) Essentials of Plant Techniques* – Scientific Publishers, Jodhpur.
9. GW Stout, DJ Taylor,2008. *Biological Sciences*. NPO Green, University Press, Cambridge.
10. Harold C Bold, 1999.*The Plant Kingdom*. Prentice Hall of India Pvt. Ltd.
11. Holmes D Moody P and D.Dine 2006 , *Research Methods for the Biosciences* Oxford University Press
12. Holmes D Moody P and D.Dine 2006, *Research Methods for the Biosciences* Oxford University Press
13. Jeffrey A. Lee 2009; *The Scientific Endeavor Methodology and Perspectives of sciences,* Pearson
14. Johnson DA, 1940. *Plant Microtechnique*, McGraw Hill Co., New York.
15. Judson HF, 1979. *The eighth day of creation*. Simon Schuster, New York.
16. Krishnamurthy K.V (2004) *Advanced text book on biodiversity, principles and practice* IBH Pub Oxford.

Sessions	Topic	Method	Remarks
Session 1	Introduction to science	Presentation/Chalk and Board	
Session 2	-Steps in scientific methods - observation and thoughts - formulation of a hypothesis - designing of experiments - testing of hypothesis - formulation of theories		
Session 3	- Selection of a problem - Searching the literature - Selection of variables, study area, and a suitable design Necessity of units and dimensions	Presentation/Chalk and Board	
Session 4			
Session 5			
Session 6	Units of length, volume, area, concentration, temperature, pressure - Setting of hypothesis, Null- hypothesis and alternative hypothesis - Need of control, treatments and replication - Analysis, presentation and interpretation of data - Testing of hypothesis, need of statistical tools - Examples of great experiments in life sciences	Presentation/Chalk and Board	
Session 7			
Session 8	-An example of moving from a question to hypothesis and then to an experimental design -Contributions and the great experiments of Louis Pasteur, and Robert Koch -Ethics in science		
Session 9	- Introduction	Presentation/Chalk and Board	
Session 10	- Microscopy:- simple, compound, phase contrast, fluorescent, confocal and electron microscopes (working principle and application only)		

	- Microtome:- rotary, sledge, cryotome (application only)		
Session 11	- Sectioning:- Hand sections, microtomy	Presentation/Chalk and Board	
Session 12	- Staining technique:- Principle of staining Stains:- Safranin, Hematoxylin, Acetocarmine Vital stains: Purpose, Examples: Neutral red and Evan's blue Mordents : Purpose and examples Single staining and Double staining		
Session 13	- Mounting and Mounting Media, Purpose of mounting media, Glycerin, DPX, Canada balsam - Use of permanent whole mounts, permanent sections - Maceration - Smear and squash preparation	Presentation/Chalk and Board	
Session 14			
Session 15	- Principles and applications of colorimeter, spectrophotometer and centrifuge, Beer-Lambert's Law,	Presentation/Chalk and Board	
Session 16			
Session 17	- Separation methods :- chromatography; thin layer, paper, column (principle and applications only), electrophoresis; PAGE, Agarose gel electrophoresis(Principle and applications only)	Presentation/Chalk and Board	
Session 18			
Session 19	- pH:- concept of pH, methods to measure pH ; pH paper and pH meter,	Presentation/Chalk and Board	
Session 20			
Session 21	- Buffers:- definition, functions of buffers in biological systems, use of buffers in biological research, examples of commonly used buffers	Presentation/Chalk and Board	
Session 22			

Session 23	- Introduction, statistical terms and symbols	Presentation/Chalk and Board	
Session 24	- Sample:- concept of sample, sampling methods		
Session 25	- Collection and representation of data, graphic representation of data(Line graph, bar diagram, Pie diagram & Histogram) - Measures of central tendency:- mean, mode, median	Presentation/Chalk and Board	
Session 26			
Session 27	- Measures of dispersion:- standard deviation, standard error - Distribution patterns:- normal distribution, binomial distribution	Presentation/Chalk and Board	
Session 28			
Session 29	- t-test :- introduction, uses, procedure - chi-squire test:- introduction, uses, procedure	Presentation/Chalk and Board	
Session 30			
Session 31	- Need for research - Types of research - Scientific literature, Books, Research Journals, Reputed National and International journals in life sciences, Research paper - INSDOC services - Laboratory Etiquette - Laboratory Hygiene	Presentation/Chalk and Board	
Session 32			
Session 33	Features of the modern personal computers and peripherals. -Internet as a knowledge repository, e-mail, search engines (Google,), study of educational sites related to life sciences (DNAi, Scitable) , academic search techniques, (Science direct and INFLIBNET) -Introduction to the use of information technology in teaching and learning	Presentation/Chalk and Board	
Session 34			
Session 35			
Session 36	DOS – The basic concept of operating systems (Study of commands not required)	Presentation/Chalk and Board	
Session 37	MS-WINDOWS:- logging to windows, organizing files and folders, copying, moving, deleting and saving documents, installing software, installing hardware	Presentation/Chalk and Board	

Session 38	MS-WORD:- word processing using WORD, editing tools (cut , copy, paste,) formatting tools (font, paragraph) use of spell check, inserting tables (draw), inserting graphs and pictures	Presentation/Chalk and Board	
Session 39	MS-EXCEl:- Creating a worksheet, data entry, sorting (ascending and descending), use of statistical tools in EXCEL (SUM, MEAN, MODE, MEDIAN), preparation of graphs (bar diagram, pie chart and line graph)	Presentation/Chalk and Board	
Session 40	MS-POWERPOINT:- Creating a presentation, Inserting tables, charts and pictures into slides, Use of animation tools	Presentation/Chalk and Board	
41 – 47	Seminar		
48 – 54	Revision		

COURSE PLAN

U6CRBOT11 - BIOTECHNOLOGY AND BIOINFORMATICS

COURSE OBJECTIVES:

- This enables the student a detailed basic understanding on the fundamentals of Biotechnology and Bioinformatics.

- Students will be able to understand various developments in biotechnology and potential applications.

- It also enables the student to understand the basics in bioinformatics.

- They will be equipped with use of computer in handling experimental data.

Basic Reference

1. Attwood TK & Parry, Smith DJ. 2003. *Introduction to Bioinformatics*. Pearson Education.
2. Balasubramanian, D. – Bryce CFA , Dharmalingam K. Green J, Kunthala Jayaraman, 2007. *Concepts in Biotechnology* – University Press India Pvt. Ltd.
3. Becker JM, Coldwell GA and Zachgo EA. 2007. *Biotechnology* – A Laboratory Course Academic Press.
4. Bhojwnis abd Razdan Mk 2000 *Plant Tissue Culture* – Theory and practice Elsevier India Pvt. Ltd.
5. Brown T.A. *Gene cloning and DNA analysis*. Black Well publishing.
6. Colin Ratledge and Bjorn Krishansen, 2008. *Basic Biotechnology*, Cambridge University Press.
7. Dixon R.A, 2003. *Plant Cell Culture*, IRC Press
8. Dubey R.C 2006. *A Text Book of Biotechnology* S.Chand and Company, New Delhi
9. Gupta PK. ,2006. *Biotechnology and Genomics*. Rastogi Publications.
10. Jogdand S.N. 1999. *Advances in Biotechnology*, Himalaya Publishers, Mumbai.
11. John E Smith 2006. *Biotechnology*, Cambridge University Press
12. Lewin. B. 2008 *Gene* IX. Jones and Barlett Publications.

1.	Date	Topic	Method	Remarks
1	Session 1	Introduction – The concept of biotechnology, landmarks in biotechnology.	Presentation/Chalk and Board	
2.	Session 2			
3	Session 3	Plant tissue culture – Principles and techniques. Cellular totipotency, in vitro differentiation –de differentiation and re-differentiation , callus induction, organogenesis and somatic embryogenesis	Presentation/Chalk and Board	
4	Session 4			
5	Session 5			
6	Session 6	Tissue culture medium – Basic components in tissue culture medium – Solid and liquid medium – suspension culture. Murashige and Skoog medium – composition and preparation.	Presentation/Chalk and Board	
7	Session 7			
8	Session 8	Aseptic techniques in tissue culture – sterilization – different methods – sterilization of instruments and glass wares, medium, explants	Assignment	
9	Session 9	Working principle of laminar air flow and autoclave; preparation of explants – surface sterilization. Inoculation, incubation, subculturing.	Presentation/Chalk and Board	
10	Session 10			
11	Session 11	4. Micropropagation - Different methods – axillary bud proliferation, direct and indirect organogenesis and somatic embryogenesis. Different phases of micropropagation – hardening, transplantation and field evaluation Advantages and disadvantages of micropropogation. Somaclonal variation		
12	Session 12			
13	Session 13			
14	Session 14			
15	Session 15	5. Methods and Applications of tissue culture - Shoot tip and meristem culure Synthetic seed production, embryo culture, In vitro mutagenesis, Protoplast isolation culture and regeneration – transformation and transgenics, Somatic cell hybridization- cybrids. In vitro secondary metabolite production — cell immobilization, bioreactors In vitro production of haploids – anther and pollen culture, In vitro preservation of germplasm.	Presentation/Chalk and Board Presentation/Chalk and Board	
16	Session 16			
17	Session 17			
18	Session 18			

19	Session 19	Recombinant DNA Technology Gene cloning strategies – recombinant DNA construction – cloning vectors – plasmids pBR322, bacteriophage based vectors, Ti plasmids. Restriction endonucleases and ligases – Ligation techniques, transformation and selection of transformants – using antibiotic resistances markers, southern blotting; PCR.	Presentation/Chalk and Board	
20	Session 20			
21	Session 21			
22	Session 22			
23	Session 23	Different methods of gene transfer – chemically stimulated DNA uptake by protoplast, transduction, electroporation, microinjection, microprojectiles, Agrobacterium mediated gene transfer gene library, gene banks.	Presentation/Chalk and Board	
24	Session 24			
25	Session 25			
26	Session 26			
27	Session 27	Important achievements in Biotechnology: Production of human insulin, Bt Brinjal and Bt cotton, Golden rice, Flavr Savr tomato, Shikonin pigments	Assignment	
28	Session 28			
29	Session 29	Current trends in Biotechnolgy: Tissue Engineering, Stem cell cuture, Nanobiotechnology	Presentation/Chalk and Board	
30	Session 30			
31	Session 31	Strategic Applications of Biotechnology: Production of disease/ stress resistant plants, Gene therapy, DNA fingerprinting	Presentation/Chalk and Board	
32	Session 32			
33	Session 33	Social and ethical issues, biosafety, biowar, patenting and IPR issues.	Presentation/Chalk and Board	
34	Session 34			
35	Session 35			
36	Session 36	1. Introduction to Bioinformatics, scope and relevance, genome, transcriptome, proteome. 2. Biological data bases – Nucleotide sequence database – EMBL, Gen Bank, DDBJ. Protein sequence database – PDB, SWISS PROT	Presentation/Chalk and Board	
37	Session 37			
38	Session 38			

39	Session 39	Organismal database – Saccharomyces genome database Biodiversity database – Species 2000 3. Information retrieval from Biological database, sequence alignment types and tools: pair wise sequence alignment multiple sequence alignment, use of BLAST, FASTA.	Presentation/Chalk and Board	
40	Session 40	Genomics : DNA sequencing Sangers procedure-automation of DNA sequencing, genome sequence assembly, Genome projects – Major findings of the following genome projects – Human, Arabidopsis thaliana, Rice, Haemophilus influenza, Application of genome projects.	Assignments and Discission	
41	Session 41			
42	Session 42			
43	Session 43			
44	Session 44	Proteomics : Protein sequencing- Edman degradation method, automation of sequencing, protein structure prediction and modelling (Brief account only)	Presentation/Chalk and Board	
45	Session 45			
46	Session 46			
47	Session 47	A brief account on 1. Molecular phylogeny and phylogenetic trees. 2. Molecular visualization – use of Rasmol. 3. Molecular docking and computer aided drug design	Presentation/Chalk and Board	
48	Session 48			
49	Session 49			
50	Session 50			
51	51 – 54	Revision		

COURSE PLAN

U6CRBOT12 - HORTICULTURE, NURSERY MANAGEMENT, EMBRYOLOGY AND REPRODUCTIVE BIOLOGY

COURSE OBJECTIVES:

- This enables the student a detailed basic understanding Horticulture and Nursery Management.
- Students will be able to understand the importance of horticulture in human welfare.
- It also enables the student to understand the basics in embryology.
- They will have a clear knowledge on the development of fruit and seed.

Basic Reference

1. Adams C.R., Early M.P. 2004. *Principles of Horticulture*. Elsevier, N. Delhi.
2. Barton West R. 1999. *Practical Gardening in India*. Discovery Pub. House, New Delhi.
3. Edmond J.B., Senn T.L., Andrews F.S., Halfacre P.G. 1975. *Fundamentals of Horticulture*. 4th Edn.TMH N.Delhi.
4. John J. (2012). *Elements of Agribased Microenterprises*. Bulbul Scintific Publishers, Kottayam.
5. John Weathers. 1993. *Encyclopaedia of Horticulture*. Discovery Pub. House. New Delhi
6. Jules Janick. 1979 *Horticultural Science*. Surjeet publications, Delhi
7. Kumar N. 1994. *Introduction to Horticulture*. Rajalakshmi Pub. Nagarcoil
8. Manibhushan Rao K. 1991. *Text Book of Horticulture*. Macmillan India Ltd.
9. Randhawa G.S., Mukhopadhyay A. 1986. *Floriculture in India*. Allied Publishers Pvt. Ltd. Ahamedabad
10. Sadhu M.K. ,1996. *Plant Propagation*. New age International publishers, N. Delhi
11. Schilletter J.C., Richey H.W. 1999. *Text Book of General Horticulture*. Biotech Books, New Delhi.
12. Mazundar B.C. and P.M. Mukhopadhyay 2006, *Principles & Practices of Herbal Garden.* Daya Publishing House – Delhi.

No.	Date	Topic	Method	Remarks
1	Session 1	Introduction to horticulture - definition, history, classification of horticultural plants, disciplines of horticulture; Garden tools and implements. Irrigation methods- surface, sub, drip and spray irrigations, mist chambers - advantages and disadvantages	Presentation/Chalk and Board	
2.	Session 2			
3	Session 3	Propagation of horticultural plants- by seeds- Seed viability, seed dormancy, seed testing and certification, seed bed preparation, seedling transplanting, hardening of seedling; advantages and disadvantages of seed propagation.	Presentation/Chalk and Board/Assignment	
4	Session 4			
5	Session 5			
6	Session 6	Vegetative propagation- organs used in propagation- natural and artificial vegetative propagation; methods- cutting, layering, grafting and budding;	Presentation/Chalk and Board	
7	Session 7			
8	Session 8	Advantages and disadvantages of vegetative propagation.	Assignment	
9	Session 9	Gardening- ornamental gardens, indoor gardens, home gardens- terrestrial and aquatic gardens- garden adornments; garden designing- garden components- lawns, preparation of lawns by seeds, seedling, turfing.	Presentation/Chalk and Board	
10	Session 10			
11	Session 11	Shrubs and trees, borders, hedges, edges, walks, drives- famous gardens of India; Landscape architecture- home landscape design, parks. Physical control of plant growth- training and pruning; repotting; disease and pest control selection of plant for bonsai, bonsai containers and method of bonsai formation	Presentation/Chalk and Board	
12	Session 12			
13	Session 13			

14	Session 14	General account and interdisciplinary relevance of embryology, embryology in relation to taxonomy; experimental embryology.	Presentation/Chalk and Board	
15	Session 15	Structure and development of anther, microsporogenesis, development of male gametophyte, anthesis and anther dehiscence	Presentation/Chalk and Board	
16	Session 16			
17	Session 17	Structure of pollen, pollen germination, pollen tube growth and pollen viability	Presentation/Chalk and Board/Assignment	
18	Session 18			
19	Session 19	Structure and development of ovule, megasporogenesis, embryosacs-monosporic (polygonum type), bisporic (Allium type) and tetrasporic (Peperomia type)	Presentation/Chalk and Board	
20	Session 20			
21	Session 21	Structure of mature embryo sac	Presentation/Chalk and Board	
22	Session 22			
23	Session 23	Breeding/Reproductive systems and pollination syndromes (with examples for each syndrome) in angiosperms	Presentation/Chalk and Board	
24	Session 24			
25	Session 25	Pollen stigma interaction; self-compatibility and incompatibility; syngamy and fusion; apomixis.	Presentation/Chalk and Board	
26	Session 26			
27	Session 27	Development of endosperm and embryo in Dicots and Monocots; Poly-embryony; Development and general structure of fruits (dry and fleshy) and seed	Presentation/Chalk and Board	
28	Session 28			
29	Session 29	Any Indian example from a reputed journal to study the pollination mechanisms and methods (eg. Adathoda vasica, Strobilanthes kunthianus	Presentation/Chalk and Board/Assignment	
30	Session 30			

31	Session 31	Preparation of potting mixtures, polybags. Plant Growth structures – green houses, shaded houses, polyshed, mist chamber, sprinkling system, drip irrigation. Modern strategies in propagation by root initiation of cutting, layering technique, budding and grafting technique	Presentation/Chalk and Board	
32	Session 32			
33	Session 33	Micropropagation; Planting, Transplanting and Hardening of seedlings, After care of seedlings. Packing and transporting of seedlings	Presentation/Chalk and Board	
34	Session 34			
35	Session 35			
36	Session 36	Organic manures and fertilizers, Composition of fertilizers. NPK content of various fertilizers and preparation of fertilizer mixtures.Common organic manures – bone meal, cow dung, poultry waste, oil cakes, organic mixtures and compost	Presentation/Chalk and Board	
37	Session 37			
38	Session 38	Preparation of compost –aerobic and anaerobic- advantages and limitations. Vermicompost – preparation - Vermiwash. – preparation. Biofertilizers – Definition and preparation of different types – Trichoderma, Rhizobium, PGPR, PSB, mycorrhiza. Application of Biofertilizers. Biopesticides – Tobacco and Neem decoction.	Presentation/Chalk and Board	
39	Session 39			
40	Session 40	Biological control of disease and pests. Organic traps – Natural dyes	Assignment	
41	Session 41	Types–Home gardening, Market gardening and Truck gardening. Packing and Transporting of Vegetables. Organic farming of fruit crops – Packing and Transporting of fruits.	Presentation/Chalk and Board	
42	Session 42			
43	Session 43			
44	Session 44			
45	Session 45	Induction of flowering and weed control. Cultivation of Medicinal and Aromatic plants of common use and great demand. Traditional production techniques and Post-harvest techniques		
46	Session 46			
47	Session 47			
48	Session 48	Problems and prospects of Floriculture in Kerala.		
49	Session 49			

50	Session 50	Scope of growing Anthurium, Orchids and Jasmine in Kerala. Common cut flowers – Rose, Gerbera, Gladiolus, Aster, Chrysanthemum, Daisys, Carnation, Golden rod, Anthurium, Orchids, Lilium and Limolium. Common leaves used in flower arrangement – Cyprus, Podocarpus, Asparagus, Palms, Cycads, Ferns and Eucalyptus. Floral arrangement: Types - Western, Eastern (Japanese/ Ikebana) and Modern. Wases, Flower Holders and Floral Foam. Wase life of flowers and leaves. After care of flower arrangements – Bouquets. Packing and Maintenance of flowers and leaves.		
51	Session 51			
52	Session 52			
53	Session 53			
54	Session 54			
55	Session 55			
56	Session 56			
57	Session 57			
58	Session 58			
59	Session 59			
60	Session 60			
61	Session 61			
62	Session 62	Funding Agencies and self employment schemes, Procedure to get financial support, special scheme for women empowerment	Presentation/Chalk and Board	
63	Session 63			
64	Session 64			
PRACTICALS				
65	Session 65	Tongue grafting, budding ('T' and patch), air layering 2. Identification of different garden tools and their uses 3. List out the garden components in the photograph of the garden given 4. Preparation of potting mixture in the given proportion.	Laboratory/Demonstration	
66	Session 66			
67	Session 67			
68	Session 68	1. Identification of C.S. of anther, embryo sac and embryo. 2. Identification of various anther types- monothecous, dithecous 3. Identification of placentation types. 4. Observation of pollen and locating pollen pore 5. Pollen germination study	Laboratory/Demonstration	
69	Session 69			
70	Session 70			

71	Session 71	1. Preparation of potting mixture 2. Preparation of Tobacco/ Neem decoction 3. Familiarization of common fertilizers and manures 4. Familiarization of common cut flowers and leaves used in flower arrangements 5. Different flower arrangement types (demonstration)	Laboratory/Demonstration	
72	Session 72			

COURSE PLAN

U6CRBOT13 - PHYTOCHEMISTRY AND PHARMACOGNOSY

COURSE OBJECTIVES:

- This enables the student a detailed basic understanding Horticulture and Nursery Management.
- Students will be able to understand the importance of horticulture in human welfare.
- It also enables the student to understand the basics in embryology.
- They will have a clear knowledge on the development of fruit and seed.

Basic Reference

1. Ashutosh Kar, 2006, *Pharmacognosy and Pharmacobiotechnology*, New Age International, New Delhi
2. Atal.C.K. and Kapur, B.M. 1982. *Cultivation and Utilization of Medicinal Plants*.
3. Bhattacharjee S K, 2003, *Hand Book of Medicinal Plants*, Pointer Publishers, Jaipur
4. Daniel, M.,1991. , *Methods in Plant Chemistry and Economic Botany*, Kalyani publishers ,New Delhi.
5. Glossary *of Indian Medicinal Plants with Active Principles* Part I & II, 1980. CSIR ,New Delhi.
6. *Indian Medicinal Plants* (5Vols) 1994. Arya Vaidya Sala Kottackal, Orient longoman New Delhi.
7. Irfan Ali Khan, 2008, *Medicinal and Aromatic plants of India*, Ukaaz Publishers, Hyderabad
8. Jain S K 2004, *A Manual Of Ethnobotany*, Scientific Publishers, India
9. Jain S.K. 1981. *Glimpses of Indian Ethnobotany*, Oxford and IBH, New Delhi
10. Khory R N 1999 *Materia Medica of India and their Therapeutics*, Komal Prakashan, Delhi

No	Date	Topic	Method	Remarks
1	Session 1	Introduction to phytochemical approaches – morphological-organoleptic-microscopic- to study drug and aromatic plants	Presentation/Chalk and Board	
2.	Session 2			
3	Session 3	Cold extraction- hot extraction—soxhlet-clevenger apparatus; Solvents - petroleum ether, chloroform, ethanol, water. Separation technique-TLC, Column, HPLC.	Presentation/Chalk and Board/Assignment	
4	Session 4			
5	Session 5	Characterization technique-GC/MS, HPTLC, UV Spectra, IR Spectra.		
6	Session 6	Alkaloids – introduction, properties, occurrence, structure, classification, functions, and pharmacological uses.	Presentation/Chalk and Board	
7	Session 7			
8	Session 8		Assignment	
9	Session 9	B. Triterpenoids. Introduction, properties, occurrence, classification, functions and pharmacological uses.	Presentation/Chalk and Board	
10	Session 10			
11	Session 11		Presentation/Chalk and Board	
12	Session 12			
13	Session 13	C. Phenolics. Quinines- benzoquinones, napthoquinones, anthraquinone, and coumarins.	Presentation/Chalk and Board	
14	Session 14			
15	Session 15	Habit, habitat and systematic position and morphology of the useful part. (2) Organoleptic, anatomical and chemical evaluation of the officinal part. (3) Phytochemistry and major pharmacological action of plant drugs. (4) Ayurvedic formulations using the plant Tinospora cordifolia, Papaver somniferum, Aegle marmelos ,	Presentation/Chalk and Board	
16	Session 16			
17	Session 17	Habit, habitat and systematic position and morphology of the useful part. (2) Organoleptic, anatomical and chemical evaluation of the officinal part.	Presentation/Chalk and Board/Assignment	
18	Session 18			

		(3) Phytochemistry and major pharmacological action of plant drugs. (4) Ayurvedic formulations using the plant Punica granatum, Plumbago rosea, Adhatoda vasica, Withania somnifera,		
19	Session 19	Habit, habitat and systematic position and morphology of the useful part. (2) Organoleptic, anatomical and chemical evaluation of the officinal part. (3) Phytochemistry and major pharmacological action of plant drugs. (4) Ayurvedic formulations using the plant Achyranthes aspera, Asparagus racemosus, Kaempheria galanga, , Sida acuta, Carica papaya,	Presentation/Chalk and Board	
20	Session 20			
21	Session 21	Habit, habitat and systematic position and morphology of the useful part. (2) Organoleptic, anatomical and chemical evaluation of the officinal part. (3) Phytochemistry and major pharmacological action of plant drugs. (4) Ayurvedic formulations using the plant Azadirachta indica, Glycirrhiza glabra, Phyllanthus neruri, Datura stramonium, ,	Presentation/Chalk and Board	
22	Session 22			
23	Session 23	Habit, habitat and systematic position and morphology of the useful part. (2) Organoleptic, anatomical and chemical evaluation of the officinal part. (3) Phytochemistry and major pharmacological action of plant drugs. (4) Ayurvedic formulations using the plant Hemidesmus indicus, Aloe veera, Tylophora indica, Acorus calamus	Presentation/Chalk and Board	
24	Session 24			
25	Session 25			

26	Session 26	Study of the following aromatic plants - volatile oils and methods of extraction Vetiveria zizanoides, Cinnamomum zeylanica,.	Presentation/Chalk and Board	
27	Session 27	Study of the following aromatic plants - volatile oils and methods of extraction Sysygium aromaticum, Santalum album	Presentation/Chalk and Board	
28	Session 28			
29	Session 29	Study of the following aromatic plants - volatile oils and methods of extraction Eucalyptus, Ocimum bacilicum,	Presentation/Chalk and Board/Assignment	
30	Session 30			
31	Session 31	Study of the following aromatic plants - volatile oils and methods of extraction Rosa, Mentha piperita, Cympopogon, Cananga, Pelargonium	Presentation/Chalk and Board	
32	Session 32			
33	Session 33	Introduction, tools for identifying adulteration; methods in pharmocognosy- microscopy,	Presentation/Chalk and Board	
34	Session 34			
35	Session 35			
36	Session 36	phytochemical methods- study of starch grains of maize, wheat, rice, potato, curcuma	Presentation/Chalk and Board	
37	Session 37			
38	Session 38	Traditonal plant medicines as a source of new drugs – The process of modern drug discovery using ethnopharmacology – Taxol, Artemisinin, Galathamine and Flavopyridole as examples of drug discovery based on ethanopharmacological approach.	Presentation/Chalk and Board	
39	Session 39			
40	41 – 47	Seminar		
41	48 – 54	Revision		