M.PHIL. SYLLABUS - 2013

BOTANY

DEPARTMENT OF BOTANY

St. JOSEPH'S COLLEGE (Autonomous)

Accredited at 'A' Grade (3rd Cycle) by NAAC
College with Potential for Excellence by UGC

TIRUCHIRAPPALLI – 620 002

GUIDELINES FOR FULL TIME M.Phil.

1. **Duration :** The programme runs for one year consisting of two semesters. The Semester- I is from August to February and the Semester- II runs from March to August, of the consecutive year.

2. Course Work :

Semester – I			Semester - II		
Course	**Title**	**Cr**	**Course**	**Title**	**Cr**
C1	General Skills for Teaching & Learning	3	C5	Dissertation (Topic selected should be relevant to the topic of the Guide Paper)	8
C2	Research Methodology	4			
C3	Core Subject	5			
C4	Guide Paper	5			
	Total	17		Total	8

2. a. Each Course should contain 5 units, covering the subject requirements of the courses offered.

Marks for CIA and SE are in the ratio 40 : 60.

The CIA components are **Mid Semester Test (25), End Semester Test (25), Seminar (15), Objective Type Assignment Test (15)**. The total mark 80 will be converted into 40 marks. **The tests and Semester Examination are centrally conducted by COE for 3 hours.**

CIA & SE	Tentatively on
Mid Semester Test	December 2nd Week
End Semester Test	February 2nd Week
Semester Examinations	February 4th Week

Scholar should acquire **a minimum of 20 marks from CIA to appear for SE.** He/She will be declared to have passed in the various courses in Semester I, provided he/she secures not less than 50 marks on an aggregate (CIA+SE).

2b(i). In course C1 on ' **General Skills for Teaching & Learning'** the first 3 units are common to all the departments of our college. The first three unit titles are **Soft Skills, E-teaching & E-learning, Elements of Technology of Teaching and Learning.** The remaining two units are department specific to make use of the above mentioned skills & techniques to teach the course subject at the Allied / UG level.

This paper is (to be) designed to exploit the various teaching-learning-research skills to be imbibed / cultivated to make the research scholars to be fit for the profession they would likely to acquire in the Education Industry. Thus

only for the course (C1) the written component is 60% and Practical component 40% both in CIA and SE.

2b(ii) **EVALUATION for C1:**

Theory Component: For both CIA & SE, there will be a 2 hour test only from the first THREE units. The CIA components are Mid Semester Test (35), End Semester Test (35) and Assignment (30). The total 100 will be converted into 25 marks.

Practical Component: The last TWO units are department specific. There is no Mid and End Semester Tests. But the CIA for the same are assessed continuously by the teacher(s) concerned totaling 15 marks. For SE, the Practical evaluation is done by an external examiner.

2. c. Question papers for C1, C2 & C3 are set by external examiner.

2. d. Question paper for C4 will be set and valued by the Research Advisor only.

3. CREDITS

	Courses	Title		Contact Hrs.	Library Hrs.	Total Hrs.	Cr	CIA Mk	SE Mk	Total Mk
SEMESTER-I	C1	General Skills for Teaching & Learning	T	3	2	5	2	25	35	60
			P	2	2	4	1	15	25	40
	C2	Research Methodology		5	4	9	4	40	60	100
	C3	Core Subject		5	5	10	5	40	60	100
	C4	Guide Paper		5	5	10	5	40	60	100
	Total			**20**	**18**	**38**	**17**	**160**	**240**	**400**

		INTERNAL			EXTERNAL		
			Cr	Mk		Cr	Mk
SEMESTER - II	C5 - DISSERTATION	Seminar & Review of Related Literature	2	15	Dissertation Evaluation	6	75
		Mid term review Presentation	2	15	*Viva-voce*	2	25
		Dissertation work	3	60			
		Viva-Voce	1	10			
		Total	**8**	**100**		**8**	**100**

4. Question Pattern

	Course	Mid & End Semester Tests and Semester Examinations		
Science	C1	Section A : Short Answers Section B : Either / Or – Essay Type	7/9 3	7 x 2 = 14 3 x 7 = 21
	C2	Section A : Short Answers Section B : Either / Or – Essay Type	10 5	10 x 2 = 20 5 x 8 = 40
	C3	Section A : Short Answers Section B : Either / Or – Essay Type	10 5	10 x 2 = 20 5 x 8 = 40
	C4	Open Choice : Comprehensive Type	5/8	5 x 12 = 60
Arts	Course	Mid & End Semester Tests and Semester Examinations		
	C1	Section A : Short Answers Section B : Either / Or – Essay Type	7/9 3	7 x 2 = 14 3 x 7 = 21
	C2	Open Choice : Comprehensive Type	5/8	5 x 12 = 60
	C3	Open Choice : Comprehensive Type	5/8	5 x 12 = 60
	C4	Open Choice : Comprehensive Type	5/8	5 x 12 = 60

5. Dissertation

For carrying out the dissertation, it is mandatory to strictly adhering to the rules of the college as given below:

5.1 Requirement

Every student is expected to give two seminars one concerning Review of Related Literature within the four weeks from the beginning of the second semester and the other on Data Analysis/Result/Mid Term Review just before the submission of the final draft of the dissertation

5.2 Submission

Candidates shall submit the Dissertations to the Controller of Examination **not earlier than five months but within six months** from the date of the start of the Semester –II. The above said time limit shall start from 1st of the month which follows the month in which Semester - I examinations are conducted. If a candidate is not able to submit his/her Dissertation within the period stated above, he/she shall be given an extension time of **four** months in the first instance and another **four** months in the second instance with penalty fees. If a candidate does not submit his/her Dissertation even after the two extensions, his/her registration shall be treated as cancelled and he/she has to re-register for the course subject to the discretion of the Principal. However the candidate need not write once again the theory papers if he/she has already passed these papers.

At the time of Submission of Dissertation, the guide concerned should forward the mark for 90% as stated above to the COE in a sealed cover

5.3 Requirement

For the valuation of dissertation it is mandatory to have passed in all the four courses. One external examiner and the Research Adviser shall value the Dissertation. The external examiner should be selected only from outside the college and shall be within the colleges affiliated to Bharathidasan University. In case of non-availability, the panel can include examiners from the other university/colleges in Tamil Nadu. The external examiner shall be selected from a panel of 3 experts suggested by the Research Adviser. However, the Controller of Examination may ask for another panel if he deems it necessary. Both the internal and external examiner will evaluate the Dissertation and allot the marks separately. However the *viva-voce* will be done by both of them. The average marks will be considered.

5.4 *Viva-Voce*

The external examiner who valued the Dissertation and the Research Adviser shall conduct the *Viva-Voce* for the candidate for a maximum of 100 marks. A Candidate shall be declared to have passed in *viva-voce* if he/she secures not less than 50% of the marks prescribed for Dissertation and 50% of the marks in the aggregate of the marks secured in *viva-voce* and Dissertation valuation. *A student can undertake dissertation in the second semester whether or not he/she has passed the first semester*.

6. CLASSIFICATION OF SUCCESSFUL CANDIDATES

6.1 The candidates who pass the Semester– I and Sem ester – II examinations in their first attempt shall be classified as follows:

No.	Total Marks secured in Semester – I and Semester – II Examinations	Classification
1.	80% and above in the case of Science Subjects & 75% and above in the case of Arts and Social Science Subjects	I Class with Distinction
2.	60% to 79% in the case of Science Subjects & 60 % to 74% in the case of Arts and Social Science Subjects	I Class
3.	50% to 59% in all the subjects	II Class

Note : Mathematics, Statistics and Computer Science/ Application shall be treated as Science Subjects

6.2 Candidates who pass the courses in more than one attempt shall be declared to have completed the programme under II Class.

6.3 Candidates who have failed in the courses may take the supplementary exams conducted by the COE immediately. Even then if they could not complete the course(s), they will be given two more chances only to appear for those courses along with the next batch scholars. The maximum duration for the completion of the M.Phil. Programme is 2 Years.

7. ATTENDANCE

Daily attendance for 90 working days should be enforced for the students. Periodical report of a student to he guide concerned should be recorded in he register kept by the guide.

8. Scholar must obtain 80% of attendance per semester in order to appear for the Semester Examinations/*Viva-Voce*

M.Phil. Botany Course Pattern – 2013

Sem	Code	Title of the paper
I	13 MBO 101	Course – C1 : General Skills On Teaching And Learning
	13 MBO 102	Course – C2 : Research Methodology
	13 MBO 103	Course – C3 : Biotechnology
	13 MBO 104A	Course – C4 : Biogenic Nanoparticles
	13 MBO 104B	Course – C4 : Plant Tissue Culture
	13 MBO 104C	Course – C4: Soil Microbiology
	13 MBO 104D	Course – C4: Molecular Systematics
	13 MBO 104E	Course – C4: Invitro Studies of Bryophytes
	13 MBO 104F	Course – C4: Plant- Pest Control Strategies
	13 MBO 104G	Course – C4: Mycorrhizal Symbiosis
	13 MBO 104H	Course – C4: Floristic Studies Of Angiosperms
II	13 MBO 205	Course – C5 : Dissertation

13MBO 101

C1 : GENERAL SKILLS FOR TEACHING & LEARNING

Objectives

1. *To impart soft skills with more emphasis on communication which would enhance the employability of the students and the teaching skill as well.*
2. *To provide students a theoretical background of educational psychology and students psychology which is essential to perform teaching more effectively.*
3. *To enable them to understand the nature of growth and development, learning, motivation and its various educational implications.*
4. *To learn the basic computer capabilities so as to prepare the students to acquaint themselves to prepare their lessons with appropriate soft ware.*
5. *To acquire practical skills (in subject) aiming at gaining confidence to handle practical classes.*
6. *To develop teaching skills and gain confidence in teaching.*

Unit I: SOFT SKILLS

Communication skills – oral – written – verbal – N onverbal; Aids & Blocks. Intrapersonal communication – Effective communicati on. Behavioral skills – Attitude – Time management – Leadership – Team Building. Late ral thinking – Conventional teacher & Lateral teacher – creativity and innovation. Fac ing interviews – Different types of interviews – Dress code – Do's and Don'ts – Frequen tly asked questions – Preparing a resume – Mock interviews. Group dynamics – Knowled ge – Leadership – Thinking – Listening – Mock GDs.

Unit II: e-LEARNING & e-TEACHING

An overview of Microsoft Office 2007: MS word, Excel & Power Point 2007. Concepts in e- resources and e-design: World Wide Web concepts – Making use of web resources – website creation concepts – Creating we b pages using web page editors – creating web graphics – creating web audio files.

Unit III: ELEMENTS OF TECHNOLOGY OF TEACHING AND LEARNING

Psychology – Meaning, branches, Scope and Methods – Emerging areas of Educational Psychology – Kinds & levels of learning – Different theories of Learning – Factors affecting learning – Intrinsic and extrinsi c motivation. Motivation – memory and forgetting –Approaches to learning-Pavlov, Skinner) – Creative thinking – theories of intelligence.

Unit IV:

Buffer preparation and related experiments – Prepa ration of standard curves and absorption spectra – Electrophoresis: PAGE – Chroma tography: Separation and identification of amino acids. Hand sectioning Double staining and permanent slide preparation – submission of 10 slides for evaluation – Biostatist ics: Random Sampling (50 samples) using Random number table, Data collection – both discret e and continuous data from the sample – Preparation of frequency distribution – preparation of discrete, continuous and cumulative frequency curves, bar charts – Estimation of variou s measures of central values and dispersion to the classified data – Bibilometry.

Unit V:

Preparation of teaching aids – preparation of Pow er points, animated and text lecture materials for teaching the lessons – Teaching 15 ho urs theory both for UG & PG .classes and assisting 15 hours practical classes both for UG & PG.

References:

1. Ravindran, G., Elango SPB and Arockiam L. Success through soft skills.
2. Alex K. 2009. Soft Skills., S. Chand and Co., New Delhi.
3. Edward De Bono: Lateral Thinking.
3. Joyce Cox, Curtis Frye. 2007. Step by 2007 Microsoft Office system, Prentice Hall of India Private Ltd., New Delhi, 2007, Chapters: 1-8, 13-16.
5. Margaret Levine Young, Internet: The Complete Reference, Tata McGraw-Hall Publishing Company Ltd., New Delhi, 2007, Chapters: 18, 25-30.
6. Educational Psychology in class room – Lindaren Henry – Asia Publishing Home.
7. Psychology of class room learning – Holt Richar d.

13MBO 102

C2: RESEARCH METHODOLOGY

Objectives

- *To initiate the students into Research activities and to learn to handle various instruments, their principle and applications.*

Unit-I

Buffers: Characteristics and preparation. pH meter – principles, measurement of pH and pKa. Electrometric determination- glass and reference electrodes. Gas-measuring electrodes – basic principles, applications of Clar k electrode. Centrifuges – principles, types and operation. Microscopy – Fluorescence, confocal and flow cytometry, Electron Microscopy (TEM, SEM) Fluorescence Microscopy.

Unit-II

Chromatography - basic principles – Detailed stud y of HPLC, principles of ion exchange; molecular sieve and affinity chromatography of TLC. Electrophoresis – basic principles – its types, electrophoretic mobility an d factors influencing electrophoretic mobility, isoelectric foucusing, application, PAGE.

Unit-III

Tracer techniques - nature of radioactivity, pattern of decay, half life autoradiography – detection of radiation and measur ements by GM counter, Scintillation counter and applications of isotope in Biology – pr inciples, instrumentation – Spectrophotometer UV/Vis. Flame photometer, atomic absorption spectrophotometer Fluorimeter, NMR and ESR. Biosensors.

Unit-IV

Measures of Central Values and Dispersion – Probab ility, Binomial, Poisson and Normal – Correlation and Regression for simple and linear data – Testing of significance – large sample test, t-test and chi-square test. Analysis of variance; One and Two way ANOVA. Principles of experimental design; CRD, RBS.

Unit-V

Research – Types, objective and approaches. Sample – types; Sampling Techniques Hypothesis: Definition, characteristics, types, significance. Literature collection, Web Browsing. Writing review of Literature and Journal article. Structure of thesis. Manuscript for publication and proof correction.

Text Books

1. Gupta S P., 1990, Statistical Methods, Sultan Chand & Sons.
2. Kothari C R., 1992, Research Methodology – Meth ods & Techniques, Wishwa Prakashan.

References

1. Block R J., Durrm E L., Zweign G., 1958, A manual of Paper Chromatography and Paper Electrophoresis, Academic Press Inc., New York.
2. David T. Plummer, 1988, An Introduction to Practical Biochemistry, Tata McCraw-Hill Publishing Co. Ltd., New Delhi.
3. Harborne J B., 1973, Phytochemical methods – A guide to Modern Techniques of Plant Analysis, Chapman and Hall Ltd., London.
4. Jayaraman J., 1972, Techniques in Biology, Higginbothoms P Ltd., Chennai.
5. Heith Wilson & John Walker, Practical Biochemistry – Principles and Techniques, 2000 (5^{th} Edn.), Cambridge University Press.
6. Ragava Rao D., 1983, Statistical Techniques in Agricultural and Biological Research, Oxford & IBH Publishing Co., New Delhi.
7. Ralph R., 1975, Methods in Experimental Biology, Blackie Publ., London.
8. Stock R., & Rice C B E., 1977, Chromatographic Methods, Chapman and Hall Ltd., London.
9. Umbreit W W., 1972, Manometric and Biochemical Techniques Burgess Publishing Co., Minnesota.

Sem-I **Hours / Week: 12**
13MBO103 **Credit: 4**

C3 : BIOTECHNOLOGY

Objectives

To study the techniques used in Genetic Engineering.

To explore the possible applications and future potentiality of Biotechnology.

Unit I : Basic principles – mechanism of natural gene transf er by Agrobacterium, Ti plasmids. Generation of foreign DNA molecules – En zymes used in Genetic Engineering – restriction enzymes – their types and target sites; cutting and joining of DNA molecules – linkers, adapters, homopolymers; cloning vehicles and their properties – natural plasmids, in vitro vectors, phages, Cosmids and T-DNA based hybrid vectors. Cloning with sstr. DNA vectors.

Unit II : Cloning strategies – cDNA and genomic libraries; re combinant selection and screening methods. Expression of cloned genes – pr oblems and solutions, shuttle vectors; DNA sequencing strategies – Scanger's and Maxam-Gil bert's methods. Applications of PCR and DNA hybridization – Southern, Northern and West ern blotting.

Unit III : Techniques of tissue culture – culturing explants a nd haploids, protoplasts fusion and embryoids. Methods of gene transfer to plants, animals and bacteria – Ca transfection, electroporation, shot gun, micro injection, biolistics and lipofection. Transgenic plants, GM foods and Biopesticides. Gene knockouts and transgenic animals – animal pharming and xenografting. Biodegradation stimulation and sits applications. Bioleaching.

Unit IV : GMOs and GM foods biosafety – Genetic use Restricti on Technology (GURT); patenting of genes, cell and life forms; TRIP rights; Genomics – Arabidopsis, E. Coli, Human. Gene therapy – types, principles and applic ations. Gene drain – the tangled genes – uniformity and genetic loss; directed recombination and recombinant DNA technology.

Unit V Methodology and protocol in the development and production of plantibodies, plantigens, food vaccines and Bioplastics. Production of plants transgenic to tolerance to herbicides, drought, salt and diseases. Anti-sense RNA technology – its mechanism and application. Golden rice technology and biotransformation of high value metabolites through cell culture. RNA interference and silencing of selective genes – their application in gene regulation.

References

1. Freifeider D., 1993, Molecular Biology, Jones and Bartiett Publishers, London.
2. Glick BR and Pasternak JJ. 1998. Molecular biotechnology: Principles and applications of recombinant DNA, 2en Ed. ASM Press, Washington, USA.
3. Old RW and Primrose SB, 1989, Principles of Gene Manipulation, Blackwell Scientific Publication, London.
4. Primrose SB, 1993, Animal Biotechnology, Blackwell Scientific Publication, London.
5. Watson JD et al., 2007. Recombinant DNA: Genes and Genomes – a short course. 3rd Ed. Cold Spring Harbor Laboratory Press, CSHL, New York, USA.

Sem-I **13MBO104A**

C4 : BIOGENIC NANOPARTICLES

Dr G Melchias

Unit I

Nanoparticles – definition and historical backgroun d. Principles and properties of nanoparticles: quantization effects – inverse relat ionship between size and reactive surface area.

Unit II

Biogenic synthesis of nanomaterials - the essentials of Nanostructure Generation: Top-Down vs. Bottom-Up Chemical and Physical Self Assembly. Biological synthesis – biomimetics, green plants, and microorganisms. Role of biomolecules - reducing and/or capping agents: proteins, viruses and carbohydrates.

Unit III

Interactions between nanoparticles and living systems, interaction with cells, exposure of living systems to nanomaterials - the surface effects, the effects of size, shape, surface and bulk composition, and solubility and persistence. Particle characteristics: Distribution, organ system effects, including effects on immune and inflammatory systems.

Unit IV

Toxicity effects of nanomaterials. Mediators of the Toxicity of Particles. Factors influencing the interaction of nanomaterials over mammalian cells: uptake, transport and biodistribution of nanoparticles in living system, toxicity on cellular processes. Strategies that can mitigate nanoparticle toxicity in biological systems. Risk Assessment Methodologies. EU regulatory aspects related to risk assessment

Unit V

Detection and Measurement of Nanoparticles – physic al characterization by UV, FTIR, SEM, FESEM, DLS, X-ray diffraction, Zeta potential. Nanomaterials and their applications. Engineering safer and more biocompatible nanoparticles.

References

1. European Commission, SCENIHR, 2006. Modified opinion on the appropriateness of existing methodologies to assess the potential risks associated with engineered and adventitious products of nanotechnologies, European Union.
2. Barbara Panessa Warren, 2006 Understanding cell-nanoparticle interactions making nanoparticles more biocompatible. Brookhaven National Laboratory
3. Volker Mailander and Katharina Landfester 2009 Interaction of Nanoparticles with Cells Biomacromolecules, 10 (9): 2379 – 2400 DOI: 10.1021/bm900266r Iseult Lynch, Anna Salvati & Kenneth A. Dawson, 2009 Protein-nanoparticle interactions: What does the cell see? Nature Nanotechnology 4, 546 - 547 doi:10.1038/nnano.2009.248
4. Orr GA, et al. 2010. Cellular recognition and trafficking of amorphous silica nanoparticles by macrophage scavenger receptor a. Nanotoxicology. Published online September 17, 2010. DOI:10.3109/17435390.2010.513836
5. Gysell Mortimer (2011). The Interaction of Synthetic Nanoparticles with Biological Systems PhD Thesis, School of Biomedical Sciences, University of Queensland.

Sem-I **13MBO104B**

C4 : PLANT TISSUE CULTURE

Dr R Jeyachandran

Objectives

To know the basic techniques for in vitro culture of plants.

To understand the latest techniques in tissue culture of plants.

Unit-I

Laboratory organization and Techniques in Plant Tissue Culture. Methods of sterilization. Organ culture, root, shoot tip or meristem, ovary, flower and ovule culture and their importance. Integration of plant tissue culture into plant transformation protocols.

Unit-II

Callus and multiple shoot induction – principle, p rotocol and significance. Cell suspension cultures – Principle, protocol and its i mportance. Totipotency, cytodifferentiation and organogenesis – Principle, factors influencing organogenesis and applications.

Unit-III

Plant regeneration – Somatic embryogenesis and syn thetic seeds – Principle, protocol and importance. Single cell culture, embryo culture – Principle, protocol and applications. Somaclonal variations – Basis and applications.

Unit-IV

Anther and Pollen cultures – Principle, protocol a nd its significance. Protoplast, isolation, fusion and culture somatic hybridization, chemofusion, electrofusion important properties of protoplast, somatic hybrids, Cybrids – Principles, protocol and importance.

Unit-V

Hairy root culture – Role of plant tissue culture in forestry, micropropagation, clonal propagation, production of useful biochemicals – Ge ne conservation bank – Role of plant tissue culture in biotechnology.

References

1. Edwin F, George and Paul Sherington D., 1984, Plant Propagation by Tissue Culture, Exegetics Ltd., Edington, Westbury England.
2. Indra K. Vasil, 1980, Cell Culture and Somatic Cell Genetics of Plants Academic Press inc., New Yourk.
3. Kalyanakumar D, 1997, An Introduction to Plant Tissue Culture, New Central Book Agency, Calcutta.
4. R.L.M. Pierik, 1987, In vitro culture in higher plants. Martinus Nijhoff Publishers, Boston.

Sem-I **13MBO104C**

C4 : SOIL MICROBIOLOGY

Dr J John

Objectives

- To learn the diversity of microbes in soils.
- To understand the various biochemical transformation occur in soil environment mediated by soil microbes.

Unit-I

Soil as a habitat for micro organisms, physio-chemical properties of soil-soil organic matter, soil water, soil air and soil microbes.

Unit-II

Microbial decomposition of soil organic matter – C ellulose, hemi cellulose, lignin. Water soluble components and proteins.

Unit-III

Factors affecting organic matter decomposition, litter quality, temperature, aeration, soil pH, soil moisture and inorganic chemicals.

Unit-IV

Bio geo chemical cycling – Carbon, Nitrogen, Phosp horus and Sulphur – Role of soil microbes in bio geo chemical cycling – study on Rhi zophere microflora.

Unit-V

Phosphate Solubilizing Microbes (PSM) isolation and characterization mass production of phosphate solubilizing microbes – Mec hanism of phosphate solubilization.

References

1. Debey R. C and Maheswari D.K., 2000, Text book of Microbiology, S. Chand & Co. Ltd., New Delhi.
2. Martin Alexander, 1969, Introduction to Soil Microbiology. Wiley International Edition, New York.
3. Peiczar et al., 1998, Microbiology, Tata McGraw Hill Publishing Co. Ltd., New Delhi.

Sem-I **13MBO104D**

C4 : MOLECULAR SYSTEMATICS

Dr S R Senthilkumar

Objectives

- To impart new outlook in Plant Systematics.
- To understand the Plant Systematic at Molecular level.

Unit-I

Chloroplast DNA – Mitochondrial DNA in Plant Syst emtatics – Ribsomal RNA as a phylogenetic tool – Polymorphism – Hybridization an d variable evolutionary rate in molecular phylogenies – Molecular systematics and c rop evolution – Applications of molecular systematics.

Unit-II

Plant Genomes: Generating Molecular Data – Gene M apping and Gene Sequencing; Types of Molecular Data, Analysis of Molecular Data – Alignment of Sequences, Homoplasy, Phylogeny Reconstruction, Gene Trees and Species Trees; Molecular characters – Genome size variations – Plant genome statistics.

Unit-III

Phenetic methods: Principles of Taxometrics, Operational Taxonomic units, Taxonomic characters, Measuring Resemblance – simpl e matching coefficient. Yulein coefficient, coefficient of association, Taxonomic distance; Cluster Analysis – Agglomerative methods, Divisive methods, Hierarchical classifications; Ordination technique Application of Numerical Taxonomy in Angiosperms.

Unit-IV

Phylogenetic methods: Cladistics-Pleiomorphic and apomorphic characters, Homology and analogy, Parallelism and convergence, Monophyly, Paraphyly and polyphyly; Cladistic Methodology – operational evolutionary un its, characters and coding, Measure of similarity and construction of trees.

Unit-V

Chemosystematics: Secondary metabolites, Polysaccharides, Sugars and their derivatives, Hydrocarbons, Fatty acids and lipids. Applications of chemistry at intraspecific. Specific, Generic, Intergeneric and Familial levels. Current trends in biosystematics.

References

1. Michael G. Simpson, Plant Systematics, 2006, Elsevier Academic Press, Burlington.
2. Hills D.M., Mortiz C & Mable B K. (eds.), 1996, Molecular Systematics, Sinaver Associates, Sunderland, USA.
3. Gurucharan Singh, Plant Systematics (II Edn), 2004, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Harborne J. B. & Turner B. L., 1984, Plant Chemosystematics, Academic Press, London.

Sem-I **13MBO104E**

C4 : INVITRO STUDIES OF BRYOPHYTES

Dr S Sahaya Sathish

OBJECTIVES:

1. To acquire the knowledge of Bryophytes and their characteristics.
2. To be familiar with the ecology and distribution pattern of bryophytes in India and other regions of the world.
3. To learn the techniques of collection, preservation and identification of bryoflora.

Unit I

Diversity of bryophytes - Life and growth forms- Origin and Classification of Bryophytes. Thallus organization, Reproduction and life cycle of bryophytes. Characteristic features and inter relationship between different orders of bryophytes. Economic importance of Bryophytes.

Unit II

Ecology of bryophyte; Habitats - Epiphytes, Epiphylls, Rotten wood, Tree ferns and unusual substrates. Phytogeography - General tropical bryogeography, Endemism, Relics, Disjunctions and Human influence. Bryophytes as indicators of pollution.

Unit III

Bryophytes as the source of bioactive compounds- phytochemistry of bryophytes- Selection and Purification of Solvents for Extraction- Methods of isolation,(including industrial methods) purification and characterization of Bryophytes. Introduction, definition, classifications, general principles of different chromatographic techniques, and applications of: TLC, HPTLC, Column, Paper, HPLC, GC in the isolation, separation and purification of Bryophytes. Spectroscopy: General principles & applications of UV, IR, HNMR, C13 NMR, Mass.

Unit IV

General Characteristics of Microorganisms- Bacteria, Fungi, Virus and Protozoan. Pure culture of the isolate- Agar Well Diffusion Method, Disc Diffusion Method; Factors affecting antimicrobial activity: Environment, organisms, physiological status of the organisms, inoculums concentration, intensity of concentration of the antimicrobial agent, temperature and time of action.

Unit V

Explants used in plant tissue culture; Collection and Storage of plant material in vitro; sterilization methods (Physical and chemical methods) with a special emphasis to bryophytes- Types of cultures, Laboratory Equipment and composition of nutrient medium for plant tissue culture MS and B5, Phytohormones, Medium for micro-propagation- hurdles in the tissue culture of bryophytes and special techniques required to overcome them.

REFERENCES:

1. Rashid. A, 1998. An Introduction to Bryophyta. Vikas Publishing House, New Delhi.
2. Vashista. B.R. 1992. Bryophyta. S. Chand & Company Ltd., New Delhi.
3. Jonathan Shaw. A. and Bernard Goffinet. 2000, Bryophyte Biology, Cambridge University Press, U.K.
4. Alain Vanderpoorten and Bernard Goffinet, 2009. Introduction to Bryophytes, Cambridge University Press, New York.
5. Schofield. W.B. 2001. Introduction to Bryology, Blackburn Press.
6. Nancy G. Slack and Lloyd R. Stark, 2001. Bryophyte Ecology and Climate Change, Cambridge University Press, New York.
7. Manju C.Nair, Rajesh K.P and Madhusoodanan, 2005. Bryophytes of Wayanad in Western Ghats, Malabar Natural History Society (MNHS), Calicut, Kerala.
8. Howard Alvin Crum, 2001. Structural Diversity of Bryophytes, University of Michigan Herbarium.
9. Chopra. R.N and Kumar. P.K, 1988. Biology of Bryophytes, New Age International Publishers.

Sem-I **13MBO104F**

C4 : PLANT- PEST CONTROL STRATEGIES

Dr K Rajan

Objectives

To understand the nature of pest damage and their control.

To understand the interactions between the insects and plants.

Unit-I

Type of pests and their damages: Pests of crops in paddy, groundnut, cotton, potato and sugarcane. Methods of pest controls – biologic al, chemical hormonal and uses of genetic manipulation in insect control.

Unit-II

Allelochemical interaction among plants. Herbivores and their predators. Allomones – plant produced, predator, herbivore released allo mones. Kairomones – plant produced, predator, herbivore kairomones. Synomones – plant produced, predator, herbivore released synomones. Antimones – plant compounds as precurso rs of semiochemicals.

Unit-III

Influence of plant produced allelochemical on the host/pest selection behavior of entomophagous insects. Plant produced allelochemicals and host/prey habitat location. The role of allelochemicals synomones. The role of allelochemicals resistance. Implications for the use of entomophagous insects in applied biological control.

Unit-IV

Development of insect resistant plants through application of phytochemicals/genes. Phytochemicals as pesticides. Principles of hormones involved in insect resistance. Insect attractants and repellents. Plant protection methods.

Unit-V

Role of enzyme in plant disease – general toxins (tab toxin, cercosporin) – host specific toxins – HV toxin, T-toxin, HC toxin. Ins ect antifeedants in plants. Growth regulators in plant diseases.

References

1. Pedro Barbosa and Debrorah K. Letourneau (Eds.) 1988. Novel aspects of insect-plant interactions. A Wiley-interscience Publication, New Yourk.
2. Ananthakrishnan, TN. 2002. Insects, Plants and Molecular interactions. Madras Science Foundation, Chennai.
3. Vasantharaj David B and Kumarasami T., 1998. Elements of Economic Entomology. Popular Book Depot, Chennai.
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Sem-I **13MBO104G**

C4 : MYCORRHIZAL SYMBIOSIS

Dr A Egbert Selwin Rose

UNIT I

Introduction: Association types, Host plants, Mycorrhizal fungi. Structure and development of mycorrhizal roots -Root systems, Tissues, Cells , Fungal reactions to plants prior to mycorrhizal formation, influence of the plant root on mycorrhizal formation, cellular basis of plant-fungus interchanges in mycorrhizal associations, mycorrhizal mycelium.

UNIT II

Types of mycorrhizal association – Endomycorrhiza, Ectomycorrhiza and Ericoid mycorrhizal.Vasicular Arbuscular Mycorrhizas: The symbionts forming VA mycorrhizas-colonization of roots and anatomy of VA mycorrhizas – genetic, cellular and molecular interaction in the establishment of VA mycorrhizas.

UNIT III

Ectomycorrhizas: Structural diversity and development of ectomycorrhizal roots – nitrogen and phosphorus nutrition of ectomycorrhizal plants. Ectendomycorrhizas- characteristics and functions.

UNIT IV

Mycorrhizas in Ericales: Arbutoid and Monotropoid mycorrhzas – Ericoid mycorrhizas. Orchid mycorrhizas- Biology of orchids, fungi forming orchid mycorrhizas, mycorrhizal interactions, pathogenic and symbiotic considerations, rationale and significance.

UNIT V

Functions of mycorrhzas: Uptake, translocation and transfer of nutrients in mycorrhizal symbiosis – the roles of mycorrhizas in ecosystems – VA mycorrhizas in agriculture and horticulture – mycorrhizas in managed environments.

REFERENCES:

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Sem-I **13MBO104H**

C4 : FLORISTIC STUDIES OF ANGIOSPERMS

Dr S Soosairaj

Objectives

To study the classical taxonomy with reference to different parameters.
To understand the relevance of techniques in plant systematics.

Unit-I

Concept of taxonomic characters and various character states. Taxonomic hierarchy. Plant nomenclature – basis, ICBH rules and typification. Taxonomic key. Taxonomic literature – flora, monograph and revisions.

Unit-II

Comprehensive view of various approaches to plant classification – natural, artificial, phylogenetic, general and special purpose, their advantages and disadvantages. Phenetic and numerical taxonomy – OUT, weighting, cluster analys is. Digital taxonomy – need and application, various data base in taxonomy.

Unit-III

Taxonomic evidences from morphology, anatomy, karyology, embryology, palynology, paleobotany, ecology and physiology. Phytogeography – definition, various geographic regions proposed by Grisebuch, Drude and Good. Speciation.

Unit-IV

Plant genome as source of taxonomic evidence – gene mapping, sequencing, base ratio, hybridization. Application of PCR, RFLP, RAPD in plant systematics. Proteins – amino acids sequencing, storage proteins, serology and isoenzymes.

Unit-V

Application of secondary metabolites as sources of taxonomic evidence – alkaloids, flavonoids, terpenoids, sugars, polysaccharides. Hydrocarbons, Fatty acids, lipids and pigments – betalains, anthocyanins and betacyanin.

References

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7. Hills D.M., Mortiz C & Mable B K. (eds.), 1996, Molecular Systematics, Sinaver Associates, Sunderland, USA.
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