SYLLABUS

MANONMANIAM SUNDARANAR UNIVERISTY, TIRUNELVELI-12

UG - COURSES – AFFILIATED COLLEGES

Course Structure for **B.Sc BOTANY**

(Choice Based Credit System)

(with effect from the academic year 2017- 2018 onwards)

Semester-V				
Part	Subject Status	Subject Title	Subject Code	Credit
III	Core Paper VII	Morphology & Taxonomy of Angiosperms	SMCA61	4
	Core Paper VIII	Biochemistry & Biophysics	SMCA62	4
	Major Elective-1	Environmental Biotechnology	SMCA63	4
	Major Elective - 2	Horticulture and Plant Breeding/	SMCAP6	4
	Major Practical V	Morphology and Taxonomy of Angiosperms	SECA6B	2
	Major Practical VI	Biochemistry, Biophysics and Elective I	SMCA6P	2
IV	Skill Based	Personality Development	SCSB5A	2

Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
Maximum marks for written test: **20 marks**
3 internal tests, each of **I hour** duration shall be conducted every semester.
To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:
Written test- 20 marks; Assignment -5 marks Total - 25 marks

B. Scheme of External Examination
3 hrs. examination at the end of the semester
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

- **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

- **Cumulative Grade Point Average (CGPA)**

$$\mathbf{CGPA} = \frac{\mathbf{\Sigma\,(GP \times C)}}{\mathbf{\Sigma C}}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

- **Classification**
  a) First Class with Distinction : CGPA $\geq$ 7.5*****
  b) First Class : CGPA $\geq$ 6.0
  c) Second Class : CGPA $\geq$ 5.0 and $<$ 6.0
  d) Third Class : CGPA $<$ 5.0

MORPHOLOGY AND TAXONOMY OF ANGIOSPERMS

Preamble:

This enrichthe students to have a broad knowledge about various families, local floraand classification plants based on natural system. It will equip the learners with skills to identify angiospermsand economical use of local plants.

UNIT I

ModificationsPhyllotaxy& Inflorescence:

Modifications:Root, stem and leaf; Phyllotaxy: Types; Inflorescence: Types; Description of floral parts;Herbarium preparation and its importance.

UNIT II

Principles of taxonomic hierarchy,**classification**&**Key**:

Species, Genus and Family concept; Systems of classification- (with merits and demerits) Natural- Benthem and Hooker system, Phylogenetic- Engler and PrantlSystem.Binomial nomenclature, Dichotomous key preparation.

UNIT III

Detailed study of the following families and their economic importance:

Annonaceae, Sterculiaceae, Rutaceae, Caesalpiniaceae, Cucurbitaceae, Apiaceae.

UNIT IV

Rubiaceae, Sapotaceae, Convolvulaceae, Asclepiadaceae, Oleaceae, Lamiaceae.

UNIT V

Euphorbiaceae, Amaranthaceae, Liliaceae, Cannaceae, Arecaceae and Poaceae.

REFERENCES:

1. Lawrence, G. H. M (1953) – Taxonomy of Vascular Plants, Oxford & IBH Publishes, New Delhi.
2. Narayanaswamy, R.V &Rao, K. N (1976) – Outlines of Botany, S. Viswanathan Printers & Publishers, Madras.
3. Ashok Bendre and Ashok Kumar (1984) – A Text Book of Practical Botany – Vol. II, Rastogi Publications, Shivaji Road, Meerut.
4. Mathews, K.M, (1987 – 90) – Flora of Tamil Nadu and Carnatic (1 – 4 Vols.)Rapinat Herbarium, Trichy – 1.
5. Davis P. H. and Heywood V.H. (1993) – Principles of Angiosperms Taxonomy Vashista, P.C (1997) – Taxonomy of Angiosperms, S. Chand & Co., (P) Ltd., New Delhi.
6. Singh, V & Singh, D.K (1983) – Taxonomy of Angiosperms, Rastogi Publications, Meerut.

7. Naik, V. N. 2000. Taxonomy of Angiosperms. Tata McGraw – Hill Publishing Company Limited. New Delhi.
8. Singh, G. 2005. Plant Systematics – Theory and Practice.Oxford & IBH, New Delhi. Verma, V (1974) – A Text Book of Economic Botany, Emkay Publications, New Delhi. 28

PRACTICALS:

1. Morphological identification of plant parts and their modifications.
2. Technical description of plant parts and dissection of floral parts of plants with reference to the families prescribed in the syllabus.
3. Field trips (minimum 2 days) to places under the guidance of teachers to study plants in their natural habitat and submit a report.
4. Preparation of dichotomous key.

BIOCHEMISTRY AND BIOPHYSICS

Preamble:

This enable the studentsregarding the basic knowledge on atom, bonds, bio-molecules, enzymes and proteins; to understand the fundamentals of biochemistry and biophysics, and the structure of various bio-molecules.Know the working principle of instruments like pH meter, colorimeter and centrifuge.

UNIT 1

Basic concepts of Biochemistry:

Brief account of atom, bonds – ionic, covalent and hydrogen bonds; pH meter, Colorimeter, Centrifuge, Chromatography – Principles, techniques and their application in Biological studies.

UNIT 11

Biomolecules:

Carbohydrates- structure and Properties of monosaccharides – Glucose and fructose; disaccharides – Sucrose, Maltose and Lactose; polysaccharides – Starch, Cellulose, Lignin and Chitin.

UNIT 111

Aminoacids:

Basic Structure, Classification, Essential and Non-essential amino acids; Proteins- Primary, Secondary, Tertiary and Quaternary structure and properties; Monomeric and oligomeric proteins (Myoglobin and Hemoglobin)

UNIT IV

Lipids&Enzymes:

Lipids:General characters, Types, Basic structure and properties**;**Enzymes: General classification, Nomenclature, Mechanism of enzyme action, Enzyme kinetics, Enzyme inhibition, Enzyme immobilization, Application of enzymes in industry and medicine

UNIT V

Bioenergetics:

Bioenergetics of Chloroplast and Mitochondria, Structure and role of ATP in biological systems, ATP as energy rich compound.Biological energy conversion, Electromagnetic spectrum, Absorption spectrum - chlorophylls, Emission spectrum - Phosphorescence, Fluorescence.

REFERENCES:

1. Jain, J.L. (1998). Fundamentals of Biochemistry. S. Chand & Co., New Delhi. Jayaraman, J. (1981). Laboratory Manual of Biochemistry. Wiley Eastern Ltd., New Delhi.
2. John Webster , (2004). Bioinstrumentation.Johnweily& sons.

3. Lehninger, A.L. (1984). Biochemistry (2nd Edition).Kalyani Publishers, Ludhiana, New Delhi.
4. Plummer, D.T. (1988). An Introduction to Practical Biochemistry (3rd Edn.,). Tata McGraw Hill Publishing Co., Ltd., New Delhi.
5. Srivastava, H.S. (1990). Elements of Biochemistry.Rastogi Publications, Meerut, India.
6. Arora.(2004) Biophysics.First edn.Himalaya Publishers, New Delhi.
7. Salil Bose, S. (1982). Elementary Biophysics.Vijaya Printers, Madura

PRACTICALS

1. Colorimetric estimation of starch in plant tissues
2. Colorimetric estimation of sugar in plant tissues
3. Colorimetric estimation of proteins
4. Verification of Beer‟s Law
5. Preparation of acetate buffer
6. Separation of dyes by paper chromatography
7. Determination of complimentary color

BIOTECHNOLOGY AND GENETIC ENGINEERING

Preamble:

The syllabus helps to understand the totipotency of the cells and the tissue culture techniques, tolearn the fundamental principles in gene cloning, various methods of gene transfer, screening and the use of vectors in gene transfer technology for the desired characteristics.

UNIT1

Tissue Culture:

Introduction, definition, history, scope and importance of plant tissue culture, Totipotency of cells, Tissue culture laboratory- organization and requirements, Sterilization techniques, Nutrient media- composition and preparation.

UNIT 11

Types of tissue culture:

Callus culture and apical meristem culture. **Protoplast culture:** Protoplast isolation, fusion, selection of hybrids and regeneration.**Cybrids**– production and applications, **Artificial seed**: production, advantages and disadvantages.

UNIT 111

Techniques of genetic engineering:

Isolation of specific genes, enzymes used in gene cloning, **Cloning Vectors** - Plasmids,Cosmids and Phagemids,cDNALibraries,Agrobacterium mediated gene transfer in plants,**GM plants** – *Bt*Brinjal, *Bt* Cotton, Golden rice. Bioethical issues.

UNIT 1V

Identification of Recombinants:

Insertional inactivation, Immunochemical Method and Colony Hybridization Technique.Selection of Recombinant using Selective Medium and reporter genes, **Blotting Techniques** – Southern, Northern and Western Blotting.

UNIT V

Mutagenesis& DNA transfer techniques:

Site directed mutagenesis and random mutagenesis;DNA transfer techniques: Physical method-Microinjection, Chemical method-Calcium phosphate method, Electrical method-Electroporation,Natural-Conjugation and bacterial transformation.

REFERENCES:

1. Bhojwani, S.S and M.K.razdan. 2004. Tissue Culture Theory and Practice.
2. Davis J.A. and W.S.Roznikolf (1992) Milestones in Biotechnology.Classic papers on genetic Engineering, Butterworth-Helnemann, Boston.
3. Glick, B Pasternak, J.J.(2007) Molecular Biotechnology ASM Press, Washington Benjamin Lewin. Genes-VIII.Oxford university press. Glover, D.M and B.D Hames.DNA Cloning 1-4.(2006). Oxford University Press.

4. Guptha, P.K. 1996. Elements of Biotechnology.Rastogi and Co. Meerut,.
5. Hammond, J., P.McGarvey and V.Yusibov(Eds.) 2000.Plant Biotechnology. Springer verlag, 2000.
6. James D. Watson. Recombinant DNA (2001).Scientific American Books. USA
7. Kingsman S.M. and A.J.Kingsman, (1998) Genetic Engineering.An Introduction to gene analysis and exploitation in eukaryotes.Blackwell Scientific Publications, Oxford. Satyanarayanan, U. 2005. Biotechnology, Books and allied (p) Ltd.,

PRACTICALS:

Spotters/Photographs

i. Callus culture from Carrot Explant.
ii. Protoplast Isolation.
iii. Plasmids – Ti plasmids
iv. Gene cloning in E. Coli.
v. Agrobacterium mediated gene transfer.
vi. Blotting Techniques.
vii. Colony Hybridization technique.
viii. Transgenic Plants prescribed in the syllabus.To maintain a record note book.

ENVIRONMENTAL BIOTECHNOLOGY

Preamble: LTPC

The paper presents an objective view of the application of biotechnological know-hows in tackling environmental problems. It starts with basic knowledge about molecular biology and later links to application based processes and techniques which also address the socio-economical challenges.

UNIT I

Environmental Spheres :

Hydrosphere, Geosphere, Biosphere and Anthrosphere. Aims and Scope of Environmental Biotechnology, **Pollution Measurement** : Biotechnological Methods, Criteria for Biomonitoringof Pollution, Molecular biology in Environmental Monitoring and Role of Biosensors in Pollution monitoring, Biotechnological methods for management of Metal Pollution.

UNIT II

Biofuels:

Biogas – Production of Biogas, stages of Methanogenesis, Methane production from Hydrocarbons, Uses of Biogas, Hydrogen production – Importance of Biological Production of Hydrogen, Microbial production of Hydrogen, Uses of Hydrogen Production Technology. **Petroleum Plants** – *Calotropis, Euphorbiatirucalli, Jatrophacurcas*

UNIT III

Sewage Treatment:

Biotechnological Methods for Sewage and Waste Water Treatment -Primary, Secondary (Aerobic – Trickling filterand Activated Sludge Process, Anaerobic – Anaerobic digestion and Anaerobic Filter) and Tertiary Treatment (Ion Exchange Method), Water Recycling, Soil Conservation and Restoration, Sustainable Agricultural Management.

UNIT IV

Biodegradation:

Solid Waste Treatment and Disposal, Biodegradation of Hydrocarbons, Pesticides and Herbicides. **Bioremediation:**Types of Bioremediation: *in situ* and *ex situ*, Phytoremediation, Biosensors and Bioindicators,Bioleaching,Types of Reactions in Bioremediation, Genetically Engineered Microorganisms in Bioremediation.

UNIT V

Global Environmental Problems:

Green House Effect and Global Warming; measures to Control Green House Effect;Ozone Depletion -Effects and Control Measures; Acid rains -– Causes, Effects and Control Measures; Remote Sensing and its applications in ecology.

References:

1. Chatterji, A.K. (2011). *Introduction to Environmental Biotechnology*. Prentice Hall India Pvt., Ltd., New Delhi.
2. Dubey, R.C. (2013). A Textbook of Biotechnology. S. Chand & Company Ltd., New Delhi. Gupta, P.K. (1994). *Elements of Biotechnology*.Restogi Publications, Meerut. Ignacimuthu, S. (1997).*Plant Biotechnology*.Oxford & IBM Publishing Co., New Delhi.
3. Kumar, H.D. (1991). *A Textbook on Biotechnology*.East west press, New Delhi.
4. Parihar, P. (2014). A Textbook of Biotechnology.Argobios Publications, Jodhpur Purohit, S.S. (2003). *Agricultural Biotechnology*.Agrobios Publications, Joshpur.
5. Sharma, P.D. (1994). *Environmental Biology*.Rastogi Publications.

PRACTICALS:

Photographs/Model

1. Biosensor
2. Biogas Plant
3. Sewage Treatment
4. Acid Rain
5. Green House Effect

Spotters

Petro Plants

i. *Calotropis*

ii. *Euphorbia tirucalli*

iii. *Jatrophacurcas*

HORTICULTURE & PLANT BREEDING

Preamble: LTPC

The students will learn the methods of crop improvement and the importance of horticulture in human welfare.It enables the students to acquire knowledge on the application of induced mutations, induced polyploidy and wide hybridization for crop improvement. This fundamental course will help the students to undertake the breeding of horticultural crops.

UNIT - I

Horticulture:

Scope, importance and divisions, Vegetative propagation methods- cutting, layering, budding, grafting and vegetative propagules (bulb, sucker, corm).Advantages and disadvantages of vegetative propagation.

UNIT - II

Gardening:

Types of gardens – Formal, informal, Design and Establishment of Garden,Garden components, garden implements, lawn making, glass house, rockery, hanging baskets, water garden, terrarium, topiary and Bonsai.

UNIT - III

Kitchen garden:

Establishment, Organic manures and growth regulators in horticulture, Plant protection measures for horticulture, Seed Propagation methods, Preparation of Nursery beds, Transplantation – steps and Methods.

UNIT - IV

Plant Breeding-

Nature, Scope and Objectives, Plant introduction, selection methods (pure line and mass), Hybridization techniques, Heterosis breeding, Interspecific and intergeneric hybridization.

UNIT – V

Mutation breeding:

Procedure and practices, Mutagens, Polyploidy breeding and its applications.Breeding for disease resistance.

REFERENCES:

1. Allard, R.W. (1960). *Principles of Plant Breeding*. John Wiley & Sons, NewYork.
2. Bose, T.K., Maiti, R.G., Dhua, R.S. and Das, P. (1999).*Floriculture and Landscaping*.NayaPrakash, Calcutta.
3. Chopra, V.L. (1989). *Plant Breeding.*Oxford IBH, New Delhi.
4. Kumar, N. (1997). *Introduction to Horticulture*.Rajalakshmi Publication, India.

ManibhushanRao, K. (1991). *Text Book of Horticulture*.Macmillan Publications, New Delhi. Mukherjee, D. (1972). *Gardening in India*. Oxford & IBH Publishing Co., Kolkatta, Mumbai, New Delhi.

5. Roy Choudhry, N. and Mishra, H.P. (2001).*Text book on Floriculture and Landscaping*.Raja Infotech Enterprise, India. Sharma, J.R. (1994). *Principles and Practice of Plant Breeding*.Tata McGraw Hill, New Delhi.

PRACTICALS :

Demonstration

i. Vegetative methods of propagation.

a. Cutting-Stem and Leaf cutting

b. Layering-Simple and air layering.

c. Grafting – Tongue grafting.

d. Budding – T-budding.

ii. Garden components -Rockery, hanging baskets,
terrarium and topiary.

iii. Garden implements-spade, water can, pruning scissors, digging fork

iv. Designing Kitchen Garden.

v. Plant Breeding: Emasculation and Bagging methods.

To maintain a record note book.

SKILL BASED
PERSONALITY DEVELOPMENT

Course objective :

- To develop the skills of the professional undergraduate students for proper self expression, social communication, spoken English, correct pronunciation, voice modulation and business etiquettes.
- The students should improve their personality, communication skills and enhance their self-confidence.
- To develop the presentation skills of the undergraduate students.
- The students should be able to act with confidence, should be clear about their own personality, character and future goals.

UNIT-I:
PERSONALITY

Definition – Determinants - Personality Traits – Theories Of Personality – Importance Of Personality Development - SELF AWARENESS – Meaning – Benefits Of Self – Awareness – Developing Self- Awareness. SWOT – Meaning – Importance – Application – Components. GOAL SETTING: Meaning – Importance – Effective Goal Setting – Principles Of Goal Setting – Goal Setting At The Right Level .

UNIT-II:
SELF MONITORING

Meaning-High Self – Monitor Vs. Low-Self Monitor-Advantages & Disadvantages of Self- Monitor- Self Monitoring And Job Performance. PERCEPTION – Definition – Factors Influencing Perception – Perception Process – Errors In Perception – Avoiding Perceptual Errors. ATTITUDE- Meaning – Formation Of Attitude – Types Of Attitude – Measurement Of Attitude – Barriers To Attitude Change- Methods To Attitude Change. ASSERTIVENESS - Meaning – Assertiveness In Communication - Assertiveness Techniques – Benefits Of Being Assertive – Improving Assertiveness.

UNIT-III
TEAM BUILDING

Meaning – Types Of Teams – Importance of Team Building - Creating Effective Team. LEADERSHIP – Definition – Leadership Style – Theories Of Leadership – Qualities Of An Effect Leader. NEGOTIATION SKILLS – Meaning – Principles Of Negotiation - Types Of Negotiation – The Negotiation Process – Common Mistakes In Negotiation Process.CONFLICT MANAGEMENT – Definition – Types Of Conflict – Levels Of Conflict – Conflict Resolution – Conflict Management.

UNIT-IV
COMMUNICATION

Definition – Importance Of Communication – Process Of Communication – Communication Symbols – Communication Network – Barriers In Communication - Overcoming Communication Barriers. TRANSACTIONAL ANALYSIS –Meaning – EGO states – Types Of Transactions – Johari Window – Life Positions. EMOTIONAL INTELLIGENCE – Meaning – Components Of Emotional Intelligence – Significance Of Managing Emotional Intelligence – How Develop Emotional Quotient. STRESS MANAGEMENT – Meaning – Sources Of Stress – Symptoms Of Stress – Consequences Of Stress – Managing Stress.

UNIT – V:
SOCIAL GRACES

Meaning – Social Grace At Work – Acquiring Social Graces. TABLE MANNERS – Meaning – Table Etiquettes In Multicultural Environment – Do‟s And Don‟ts Of Table Etiquettes. DRESS CODE – Meaning – Dress code for selected Occasions – Dress Code for an Interview – GROUP DISCUSSION: Meaning - Personality Traits Required For Group Discussion – Process Of Group Discussion – Group Discussion Topics. INTERVIEW – Definition – Types Of Skills – Employer Expectations – Planning For The Interview – Interview Questions – Critical Interview Questions.

REFERENCE BOOKS:

1. Personality Development – Dr. S. Narayanarajan, Dr. B. Rajasekaran, G. Venkadasalapathi, V. VijueshNayaham and Herald M.Dass
2.Organisational Behaviour – Stephan P. Robbins
3. Organisational Behaviour – Jit S. Chandran
4. From campus to Corporate – Dr.K.K. Ramachandran and Dr. K.K. Karthick