## 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-VI								
Part	Subject Status	Subject Title	Subject Code	Credit				
III	Core Paper IX	Plant Physiology	SMBO61	4				
	Core Paper X	Genetics, Evolution and Biostatistics	SMBO62	4				
	Major Elective 3	Plant Ecology & Phytogeography	SEBO6A	4				
	Major Practical VII	Plant Physiology& Elective III	SMBOP7	2				
	Major Practical VIII	Genetics, Evolution, Biostatistics	SMBOP8	2				
	Group Project	Project	SMBO6P	6				



## 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	0	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	А	8	Very Good
4	60-69	B+	7	Good
5	50-59	В	6	Above Average
6	40-49	С	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

# <u>Cumulative Grade Point Average (CGPA)</u>

$$\mathsf{CGPA} = \frac{\Sigma \left(\mathsf{GP} \times \mathsf{C}\right)}{\Sigma \mathsf{C}}$$

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

## $\succ$ Classification

- a) First Class with Distinction : CGPA  $\ge 7.5^*$
- b) First Class

- : CGPA  $\geq 6.0$
- : CGPA  $\ge$  5.0 and < 6.0
- c) Second Class d) Third Class : CGPA  $\leq 5.0$



# PLANT PHYSIOLOGY

## **Preamble: LTPC**

To acquaint the students to understand the various functions of the plants, mechanisms of the various activities; anabolic and catabolic The course will enable the learners to gain more information in recent findings in the field of physiology.

## UNIT I

## Water Relation of Plants & Transpiration:

Water Relations: Imbibition, Diffusion and Osmosis; Water Potential-Definition, Components, Absorption of Water – Mechanism and Factors affecting Water Absorption; Transpiration- Definition, Types, Significance and Mechanism of Stomatal Transpiration- steps and theories, Guttation

## UNIT II

## Ascent of Sap&Mineral nutrition:

Ascent of Sap –Definition, Path of Ascent of Sap, Mechanism- Transpiration Pull and Cohesion Theory.Mineral nutrition - Macro and Micro Nutrients-Absorption of Mineral Salts – Mechanism, Translocation of Organic Solutes - Mechanism of Phloem Transport (Munch"s Mass flow hypothesis).

## UNIT III

## Photosynthesis&.Respiration:

Photosynthesis:Light and Dark Reactions - Photosynthetic Electron Transport Chain and Photophosphorylation (Cylic and Non cyclic); Carbon Assimilation - C3, C4 and CAM Pathways andits Significance;Respiration: Glycolysis, TCA cycle and Oxidative Phosphorylation.

# UNIT IV

## **Growth and Development:**

Growth Curve and phases of growth;Phytohormones:Physiological Effect and Practical Applications - Auxin, Gibberellic acid, Cytokinin, Ethylene and Abscisicacid;Photoperiodism and Vernalization.

# UNIT V

## Seed Dormancy:

Causes and Methods ofBreaking Dormancy; Stress Physiology -Classification–Bioticand Abiotic, Stress Factors- Response of Plants to Salt, Drought, Frost and Heat.



# **REFERENCES:**

- 1. Devlin, R.M. (1969). Plant Physiology. Holt, Rinehart & Winston & Affiliated East West Press (P) Ltd., New Delhi.
- 2. Dulsy Fatima, R.P. et. al., (1994).*Elements of Biochemistry*.Saras Publications, Nagercoil, Tamilnadu.
- Jain, V.K. (1990). Fundamentals of Plant Physiology. S. Chand & Co., New Delhi. Noggle, R. and Fritz (1989).Introductory Plant Physiology.Prentice Hall of India. Pandey, S.N. (1991). Plant Physiology.Vikas Publishing House (P) Ltd., New Delhi. Periyasamy, K. (1978). Cell IyakkaViyal(Cell Physiology). Tamilnadu text Book Society, Chennai.
- 4. Salisbury, F.B. and Ross, C.W. (1999).*Plant Physiology*.CBS Publishers and Printers, New Delhi.

## PRACTICALS

- 1. Water Potential by Gravimetric Method.
- 2. Water Potential by Falling Drop Method.
- 3. Osmotic Potential by Plasmolytic Method.
- 4. Rate of Photosynthesis in Different Concentrations of Bi-Carbonate Bubble Method.
- 5. Measurement of Stomatal Index.
- 6. Effect of Temperature on Permeability of Plasma Membrane.
- 7. Separation of Chlorophyll Pigments by Ascending Paper Chromatography.

## **DEMONSTRATION:**

- 1. Tissue Tension
- 2. Suction due to Transpiration
- 3. Ganong"sPhotometer
- 4. Fermentation
- 5. Arc Auxanometer
- 6. Clinostat
- 7. Phototropism

## **Spotters**

- 1. Absorption Spectrum of Chlorophylls
- 2. Growth curve.



# **GENETICS, EVOLUTION AND BIOSTATISTICS**

## **Preamble: LTPC**

To learn the pattern of inheritance, to understand the mechanism of gene action, to learn the concept of biometrics and to become aware of the importance of statistical tools and computer applications in life sciences. The students will also learn about use of Statistics in the plant sciences which will be helpful to them during research.

# UNIT-I

## Monohybrid and dihybrid cross & Polygenic inheritance:

Monohybrid and dihybridcross,testcross,back cross, Mendel"slaws, Deviation fromMendelianratioincompletedominance,lethalfactor,complementaryfactor,suppleme ntaryfactor,duplicate and inhibitory. Polygenic inheritance- Inheritance of Wheat Kernel and Ear length in Maize.

## UNIT-II

## Linkage& Sex determination:

Linkage, crossing over and recombination; Sex determinationin plants;Extra nuclear inheritance - male sterility in corn; Population genetics - Hardy – Weinberg"s principle.

## UNIT-III

## **DNA Model:**

Watson and Crick, DNA as genetic material, DNA replication, Genetic code, Gene regulation in prokaryotes, Operon Concept, *Lac* Operon.

# UNIT-IV

## **Origin of life& Evolution**:

Chemosynthetic theory–evidences (any five); Evolution: Evolutionary theories of Lamarck, Darwin, De Vries, Modern synthetic theory of evolution; Speciation – concept of species-Allopatric and Sympatric, Isolation mechanisms.

# UNIT-V

## Measures of central tendencies & dispersion

Collection and interpretation of data. Measures of central tendencies - Mean, Mode and Median. Measures of dispersion - Standard Deviation, Chi-square test.

## **REFERENCES:**

- 1. Agarwal, V.K. (2000). *Simplified course in Genetics* (B.Sc., Zoology). S. Chand & Company Ltd., New Delhi.
- 2. Ahluwalia, K.B. (1990). Genetics. Wiley Eastern Ltd., Madras.
- 3. Chandrasekaran, S.N. and Parathasarathy, S.V. (1965). *Cytogenetics and Plant Breeding*. P. Varadhachari& Co., Madras.
- 4. Gupta, P.K. (2000). Genetics. Rastogi Publishers, Meerut. Jain, H.K. (1999).



*Genetics-Principles, Concepts & Implications*.Oxford & IBH Publishing Co., (P) Ltd., New Delhi.

- 5. Lewin, B. (1990). Genes IV. Oxford University Press, Oxford.
- 6. Palaniyappan, S. (1987). Marabiyal (Genetics In Tamil).
- 7. V.K. Publishing House, Madras.
- 8. Pandey, B.P. (2012). *Cytology, Genetics and Molecular Genetics*. Tata McGraw-Hill Education Private Ltd., New Delhi.
- 9. Genetics. D. Van Nostrand Co., Ltd. Inc., New York.
- 10. NageswaraRao, G. (1983). *Statistics for Agricultural Science*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- 11. Olive, J.D. (1995). *Basic Statistics A Primer for the Biomedical Sciences*. John Wiley and Sons, New Delhi.
- 12. Gottlieb, LD. and Jain, S.K. (1988).*Plant Evolutionary Biology*. Chapman & Hall, London. Shukla, R.S. and Chandel, P.S. (1996).*Cytogenetics, Evolution & Plant Breeding*. S. Chand & Company Ltd., New Delhi.
- 13. Sproule, A. (1998). *Charles Darwin Scientists who have changed the world*. Orient Longmans, Hyderabad.
- 14. Verma, P.S. and Agarwal, V.K. (1999). *Concepts of Evolution*. S. Chand & Company Ltd., New Delhi.

# **PRACTICALS** :

- 1. 1.Simple genetic problems in monohybrid crosses, incomplete dominance and lethal genes.
- 2. 2. Simple problems on dihybrid ratio and interaction of factors.
- 3. Using available data, calculate the Mean and Standard deviation.
- 4. Spotters:

Linkage and Crossinz over DNA model/ Photograph Evolution (Origin of life, Speciation).

5. To maintain a record note book.



# PLANT ECOLOGY AND PHYTOGEOGRAPHY

#### **Preamble: LTPC**

To enable the students to understand biotic and abiotic factors in our ecosystem, to study the need of various ecosystems and vegetation. This course will enable the students to understand how environment influence the life of different organisms and vice versa.

## UNIT – I

#### Vegetation:

Biotic and abiotic factors and their influence on vegetation, a brief account of microbes, plants, animals, soil,wind, light, temperature, rainfall and fire. **Biogeochemical cycles** - Nitrogen and Carbon.

## UNIT – II

#### **Ecosystem:**

Concept, processes and component;Types of ecosystems–Aquatic and Forest;Ecological Classification of Plants; Morphological, anatomical and physiological adaptations of plants with special reference to Hydrophytes and Xerophytes

#### UNIT – III

#### Autecology and Synecology:

Autecology and Synecology - Definition (Species, Population, Community); **Vegetation** – Units of vegetation- Formation, Association, Consociation; Society-development of vegetation; Migration- ecesis, colonization; Methods of study of vegetation- Quadrat and transect.

## UNIT - IV

#### **Biomonitoring:**

Biomonitoring - Biodegradation of Xenobiotics using microbe, Types of Bioremediation-*in situ* and *ex situ*, Phytoremediation, Biosensors and Bioindicators, Bioleaching.

## UNIT – V

#### **Phytogeography:**

Principles, continental drift and endemism. Centre of origin- paddy and tomato. Vegetationsin Tamil Nadu, Remote Sensing.



# **PRACTICALS:**

- 1. Analysis of herbaceous vegetation by using quadrate and line transect method to find out frequency, density, abundance and interpret the vegetations in terms of Raunkaier's frequency formula.
- 2. Morphological and anatomical adaptations of hydrophytes and xerophytes (each 2).

Hydrophytes: Hydrilla, Nymphaea Xerophytes: Nerium, Casuarina

3. Maintain a Recordnote book.

# **REFERENCES:**

- 1) Singh, J.S., Singh, S.P. and Gupta, S. (2006) Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi
- 2) Wilkinson, D.M. (2007). Fundamental Processes in Ecology. An Earth
- 3) System Approach. Oxford.
- 4) Daubenmier, R.F. (1970). Plants and Environment: A text book of PlantAutoecology, Wiley Eastern Private Limited
- 5) Daubenmier, R.F. (1970), Plant Communities, Wiley Eastern Private Limited
- 6) Odum, E. (2008) Ecology. Oxford and IBH Publisher.
- 7) Sharma, P.D. (2010) Ecology and Environment, (8th Ed.)Rastogi Publications, Meerut.
- 8) Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A.4th edition.

