



Shri Sangameshwar Education Society's
Sangameshwar College, Solapur [Autonomous]
 (Affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur)
 Kannada Linguistic Minority Institute
NAAC Accredited with 'A' Grade (III Cycle CGPA 3.39)

Academic Council 4(4.2)
 26th March, 2022

UG Science Programme: B.Sc.-III to be implemented from A.Y. 2022-2023

System: Choice Based Credit System (CBCS) with SGPA and CGPA

B.O.S. in: Botany

Structure of Choice Based Credit System for Undergraduate Science **Program B.Sc. III (Botany)** to be implemented from **A.Y.2022-2023**

Table:5

Semester	Course		Course Code	Teaching Scheme/week		
				Hours	Lectures	Credits
V	AECC-C	ENGLISH FOR COMMUNICATION-III	2231501	3.2	4	2
	DSE-1A	Theory Paper-IX: PLANT SYSTEMATICS	2231561	2.4	3	3
		Practical-IV: PLANT SYSTEMATICS & PLANT PATHOLOGY	2231666	4	5	2
	DSE-2A	Theory Paper-X: GENETICS	2231562	2.4	3	3
		Practical-V: GENETICS & PLANT BIOTECHNOLOGY	2231667	4	5	2
	DSE-3A	Theory Paper-XI: MOLECULAR BIOLOGY	2231563	2.4	3	3
		Practical-VI: MOLECULAR BIOLOGY & CELL BIOLOGY	2231668	4	5	2
	ANY ONE from DSE-4A (1) & 4A (2)					
	DSE-4A (1)	Theory Paper-XII: PLANT BREEDING	2231564	2.4	3	3
		Practical-VII: PLANT BREEDING & NURSERY GARDENING AND HORTICULTURAL PRACTICES	2231669	4	5	2
	DSE-4A (2)	Theory Paper-XII: ECONOMIC BOTANY	2231565	2.4	3	3
		Practical-VII: PLANT BREEDING &	223166	4	5	2

		NURSERY GARDENING AND HORTICULTURAL PRACTICES	9			
	SGSEC-3	Theory Paper-III: Organic Farming	2231566	2.4	3	2
	Total			31.2	39	24
VI	AECC-D	ENGLISH FOR COMMUNICATION-IV	2231601	3.2	4	2
	DSE-1B	Theory Paper-XIII: PLANT PATHOLOGY	2231661	2.4	3	3
		Practical-IV: PLANT SYSTEMATICS & PLANT PATHOLOGY	2231666	4	5	2
	DSE-2B	Theory Paper-XIV: PLANT BIOTECHNOLOGY	2231662	2.4	3	3
		Practical-V: GENETICS & PLANT BIOTECHNOLOGY	2231667	4	5	2
	DSE-3B	Theory Paper-XV: CELL BIOLOGY	2231663	2.4	3	3
		Practical-VI: MOLECULAR BIOLOGY & CELL BIOLOGY		4	5	2
	ANY ONE from DSE-4B (1) & 4B (2)					
	DSE-4B (1)	Theory Paper-XVI: NURSERY, GARDENING & HORTICULTURE	2231664	2.4	3	3
		Practical-VII: PLANT BREEDING & NURSERY GARDENING AND HORTICULTURAL PRACTICES		4	5	2
	DSE-4B (2)	Theory Paper-XVI: BIOSTATISTICS	2231664	2.4	3	3
		Practical-VII: PLANT BREEDING & NURSERY GARDENING AND HORTICULTURAL PRACTICES	2231669	4	5	2
	Total			28.8	36	22
Total Semester V and VI				60	75	46

Table: 6

Semester	Course		EXAMINATION			Credits
			Marks			
			CA	SEE	Total	
V	AECC-C	ENGLISH FOR COMMUNICATION-III	15	35	50	2
	DSE-1A	Theory Paper-IX: PLANT SYSTEMATICS	30	70	100	3
	DSE-2A	Theory Paper-X: Theory Paper-X: GENETICS	30	70	100	3

	DSE-3A	Theory Paper-XI: MOLECULAR BIOLOGY	30	70	100	3
	ANY ONE from DSE-4A (1) & 4A (2)	Theory Paper-XII: PLANT BREEDING	30	70	100	3
		Theory Paper-XII: ECONOMIC BOTANY				
	SEC-3	Theory Paper-III: Organic Farming	15	35	50	2
	Total		135+15	315+35	450+50	16
VI	AECC-D	Theory-V: ENGLISH FOR COMMUNICATION-IV	15	35	50	2
	DSE-1B	Theory Paper-XIII: PLANT PATHOLOGY	30	70	100	3
	DSE-2B	Theory Paper-XIV: PLANT BIOTECHNOLOGY	30	70	100	3
	DSE-3B	Theory Paper-XV: CELL BIOLOGY	30	70	100	3
	ANY ONE from DSE-4B (1) & 4B (2)	Theory Paper-XVI: NURSERY, GARDENING & HORTICULTURE	30	70	100	3
		Theory Paper-XVI: BIOSTATISTICS				
	DSE-1A & DSE-1B	Practical-IV PLANT SYSTEMATICS & PLANT PATHOLOGY	30	70	100	4
	DSE-2A & DSE-2B	Practical-V GENETICS & PLANT BIOTECHNOLOG	30	70	100	4
	DSE-3A & DSE-3B	Practical-VI MOLECULAR BIOLOGY & CELL BIOLOGY	30	70	100	4
	DSE-4A & DSE-4B	Practical-VII PLANT BREEDING & NURSERY GARDENING AND HORTICULTURAL PRACTICES	30	70	100	4
	Total		240+15	560+35	800+50	30
	Total Semester V and VI			405	945	1350

CA: Continuous Assessment SEE: Semester End Examination

Note:

The above structure (Table-5 and Table-6) is for Sem-V and Sem-VI of the undergraduate B.Sc.-III programmes* under science faculty.

* B.Sc.-III Chemistry/Physics/Mathematics/Statistics/Electronics/Botany/Zoology.

DSE: Discipline Specific Elective Core Course (When a Student opts a particular course^s as a principal course from the core courses opted at B.Sc.- II excluding Geography and Psychology).

\$ Chemistry/Physics/Mathematics/Statistics/Electronics/Botany/Zoology

AECC: Ability Enhancement Compulsory Course **SEC:** Skill Enhancement Course

Passing in each course is compulsory. SGPA/CGPA and Total Marks will be calculated excluding AECC courses.

Programmes	Total Marks	Credits
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B.Sc.-I	1200+100+50	52
B.Sc.-II	1300+50	56
B.Sc.-III	1250+100	46
Total	3750+250+50	154

PROGRAM OUTCOMES OF B.Sc. PROGRAM

PO1 Acquire skill, training and knowledge to enhance thinking, comprehension and application abilities to compete, succeed and excel globally.

PO2 Gain knowledge and experience (through theory, experiments, tutorials, projects and industrial / field visits), to achieve ultimate progress and improvement, to be capable of employment and meet the global competencies.

PO3 Identify, formulate and analyze problems. Create, select, and apply suitable techniques, resources, and modern scientific tools to accomplish verified conclusions with an understanding of the limitations.

PO4 Apply moral principles and commit to the norms of scientific practice in every endeavor. Validate expertise to conduct wide range of scientific experiments to solve problems.

PO5 Communicate efficiently scientific events with the Scientific community and with Society at large with capability to comprehend and pen operative reports and design documentation, make effective presentations, and give and receive clear instructions.

PO6 Reveal knowledge with thoughtful expression of the scientific principles in one's own work, as an individual member and capable leader in a team, to manage projects in multidisciplinary environments.

Program Specific Outcomes

1. Understand the diversity among Algae.
2. Know the systematic, morphology and structure of Algae.

- 3 Understand the life cycle pattern of Algae.
4. Understand the useful and harmful activities of Algae.
5. Understand plant communities and ecological adaptations in plants.
6. Know the concept of methodology in taxonomy.
7. Learn about conservation of biodiversity, Non-conventional Energy and Pollution.
8. Understand the growth and developmental processes in plants.
9. Know about Photosynthesis and Respiration in plants.
10. Understand the process of translocation of solutes in plants
11. Know the nitrogen metabolism and its importance.
12. Know the evolutionary trends and affinities of living gymnosperms with respect to external and internal features
13. Know the conceptual development of „taxonomy“ and „systematics“
14. Understand the Phylogeny of angiosperms -A general account of the origin of Angiosperms.
15. Understand the general range of variations in the group of angiosperms.
16. Trace the history of development of systems of classification emphasizing angiospermic taxa.
17. To learn the wide activities in angiosperm and trends in classification.
18. Learn about the characters of biologically important families of angiosperms.
19. Know the floral variations in angiospermic families, their phylogeny and

evolution.

Semester- V

Academic Council 5(5.2)
15th June, 2022

Title: PLANT SYSTEMATICS BOTANY- IX (2231561)

Credits: Theory- 4, Practical- 2

Lectures:36

Unit 1: Descriptive Terminology

(12 Lecture)

1.1: Habitat.

1.2: Habit and life span.

1.3: Roots- Types and modification.

1.4: Stems- Types and modification.

1.5: Leaves- Types and modification.

1.6: Inflorescence- Racemose types, Cymose types, Specialized types. **1.7:**

Flower- Calyx, Corolla, Perianth, Androecium, Gynoecium.

1.8: Fruit- Simple fruits, Aggregate fruits, Multiple fruits. **1.9:** Floral formula and Floral diagram.

Unit 2: Species Concept, Identification and Nomenclature (4 Lectures)

2.1: Species definition and Species concept (Typological, Non-dimensional multi-dimensional species concept).

2.2: Identification of plants.

2.3: Nomenclature, Binomial nomenclature of plants.

2.4: Principles of ICBN.

Unit 3: Herbarium and Botanical Garden

(4 Lectures)

3.1: Herbarium- Steps in preparation and significance.

3.2: Botanical gardens of India- Sir J. C. Bose Botanical Garden, Calcutta & Lead Botanical Garden of Shivaji University Kolhapur.

Unit 4: Systems of Classification

(5 Lectures)

4.1: Outline of Bentham and Hookers system of classification. Merits and Demerits of Bentham and Hookers system of classification.

4.2 Outline of APG III system of classification of Angiosperm Phylogeny Group.

4.3: Merits and Demerits of APG III system of classification.

Unit 5. Study of following Angiosperm families ; follow the Bentham and Hooker's system of classification

(11 Lectures)

1. Annonaceae 2.Malvaceae 3.Rutaceae.4.Rubiaceae
- 5.Bignoniaceae 6.Lamiaceae 7.Nyctaginaceae 8.Amaranthaceae
- 9.Liliaceae 10.Poaceae

Course outcome	
1	Students will be able to recall all angiospermic terminology
2	Students can recall botanical names of local plants
3	Students are able to identify the plants with respect to family according to different classification systems

Suggested Readings-

1. Cooke, T. 1901–1908. *The Flora of The Presidency of Bombay*. London. (B.S.I. Reprint). Calcutta, Vols. I, II & III, 1958.
2. Gaikwad, S. P. & Garad K. U. 2016. *Flora of Solapur District*. Laxmi Book Publication, Solapur.
3. Singh, N. P. & Karthikeyan, S. (edt.) 2000. *Flora of Maharashtra State, Dicotyledones*. vol. I.&II Botanical Survey of India, Calcutta.
4. Gurucharan S. 2010. *Plant Systematics- Theory and Practice*. Science Publishers, Enfield, NH, USA an imprint of Edenbridge Ltd., British Channel Islands Printed in India.
5. Naik V. N. 2005. *Taxonomy of Angiosperms*. Tata McGraw- Hill Publishing Company Limited, New Delhi.

Semester- V

Academic Council 5(5.2)
15th June, 2022

Title: GENETICS BOTANY- X (2231562)

Credits: Theory- 4, Practical- 2

Lectures:36

Unit1: Heredity

(8 Lectures)

- 1.1: Introduction to genetics.
- 1.2: Brief life history of Mendel.
- 1.3: Terminologies.
- 1.4: Mendel's Laws of Inheritance:
 - A) Law of dominance,
 - B) Law of segregation,

C) Law of independent Assortment.

1.5: Back cross, Test cross.

1.6. Gene Interaction.

Unit 2: Linkage and Crossing over

(8 Lectures)

2.1 : Linkage: concept & history

2.2 : Complete & Incomplete linkage, Bridges experiment.

2.3: Coupling & Repulsion, recombination frequency.

2.4: Linkage maps based on two and three factor crosses.

2.5: Crossing over: concept and significance, cytological proof of crossing Over.

Unit 3: Sex-determination and Sex-linked Inheritance

(7 Lectures)

3.1: Autosomes and sex chromosomes. 3.2: Mechanism of sex determination.

3.3: Sex chromosomes in *Drosophila*. 3.4: Sex chromosomes in man.

3.5: Balance concept of sex determination in *Drosophila*- Bridge's Experiment.

3.6 : Sex linked inheritance in man:

a) Colour blindness. b) Haemophilia. c) Holandric gene

Unit 4: Quantitative inheritance

(6 Lectures)

4.1: Quantitative traits, continuous variation.

4.2: Polygenic trait in corolla length in *Nicotiana*, cob length in *Zea mays*.

4.3: Population genetics. Hardy –Weinberg's law, Factors affecting on gene and gene frequencies.

Unit 5: Cytoplasmic inheritance

(7 Lectures)

5.1: Mitochondrial and Chloroplast genome.

5.2: Inheritance of chloroplast genes (*Mirabilis jalapa* and *Zea mays*).

5.3: Inheritance of mitochondrial genes (Petite in Yeast and cytoplasmic male sterility in plants).

5.4: Interaction between cytoplasmic and nuclear gene. 5.5: Maternal effect in inheritance.

Course Outcomes :-	
1	Students can analyse Mendel's law of inheritance
2	Students will be able to explain process of linkage and crossing over
3	Students will be able to explain mechanism of sex determination
4	Students can analyse Polygenic traits and can explain Hardy and Weinberg's law

Suggested Readings-

1. Plant Chromosomes: Analysis Manipulation and Engineering. Hawood Sharma A K and Sharma A.1999: Academic Publishing Co. Australia.

2. Principles of Gene Manipulation. Old R. W. and Primrose, S. B.1989
Blackwell Scientific Publications. Oxford UK.
3. Genetics: M. L. Shrivastav, Shri Publishers and Distributors, Ansari Road
New Delhi,110002.
4. Genetics, P. K. Gupta, Rastogi Publications, Meerut, 250002.
5. Genetics and Evolution, H. S. Bhamrah, KavitaJuneja, Anmol Publications,
Pvt. Ltd. New Delhi,110002

Semester- V

Academic Council 5(5.2)
15th June, 2022

Title: MOLECULAR BIOLOGY BOTANY- XI (2231563)

Credits: Theory- 4, Practical- 2

**Lectures: 36
(5 Lectures)**

Unit 1: Nucleic acids

- 1.1: Introduction.
- 1.2: Historical perspective.
- 1.3: DNA as the carrier of genetic information
 1. Harshy and Chase experiment
 - 2.Avery Mccleod and McCarthy Experiment
 - 3.Griffith's experiment

Unit 2: The Structures of Genetic Material

(8 Lectures)

- 2.1: Introduction.
- 2.2: Structure of DNA: Watson and Crick model.
- 2.3: Salient features of double helix.
- 2.4: Types of DNA.
- 2.5: Denaturation and renaturation of DNA.
- 2.6: Organization of DNA in Prokaryotes and Eukaryotes.
- 2.7: Structure of RNA.
- 2.8: Types of RNA.

Unit 3: Replication of DNA

(7 Lectures)

- 3.1: Introduction.
- 3.2: Synthesis of DNA (Kornberg's discovery).
- 3.3: Replication of DNA in prokaryotes and eukaryotes.
- 3.4: Enzymes involved in DNA replication.

Unit 4: Transcription

(8 Lectures)

- 4.1: Introduction.
- 4.2: Transcription in prokaryotes and eukaryotes.

- 4.3: Principles of transcriptional regulation.
 4.4: Prokaryotes: Regulation of lactose metabolism in *E. coli*.
 4.5: Eukaryotes: transcription regulation, regulation of gene expression.

Unit 5: Translation

(8 lecture)

- 5.1: Introduction.
 5.2: Structure of Ribosome.
 5.3: Assembling of Ribosome and m-RNA.
 5.4: Charging of t-RNA and aminoacyl t-RNA synthetases.
 5.5: Steps in protein synthesis
 5.6: Proteins involved in initiation, elongation and termination of polypeptides.
 5.7: Protein folding and molecular chaperons
 5.8: Post-translational modifications of proteins.

Course Outcomes :-	
1	Students will be able to distinguish between different experiments related to discovery of DNA as genetic material
2	Students will be able to compare structure of DNA and RNA
3	Students will be able to explain mechanism of DNA replication in Prokaryotes and Eukaryotes
4	Students can analyse process of transcription and translation in Prokaryotes and Eukaryotes

Suggested Readings-

1. Watson J.D., Baker, T. A., Bell, S. P., Gann, A., Levine, M., Losick, R. (2007). Molecular Biology of the Gene, Pearson Benjamin Cummings, CSHL Press, New York, U.S.A. 6th edition.
2. Snustad, D. P. and Simmons, M. J. (2010). Principles of Genetics. John Wiley and Sons Inc., U. S. A. 5th edition.
3. Klug, W. S., Cummings, M. R., Spencer, C. A. (2009). Concepts of Genetics. Benjamin Cummings U.S.A. 9th edition.
4. Russell, P. J. (2010). i-Genetics- A Molecular Approach. Benjamin Cummings, U. S. A. 3rd edition.
5. Griffiths, A. J. F., Wessler, S. R., Carroll, S. B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freeman and Co., U. S. A. 10th edition.

Semester- V

Academic Council 5(5.2)
 15th June, 2022

Title: PLANT BREEDING (Elective)
BOTANY- XII (2231564)

Credits: Theory- 4, Practical- 2

Lectures: 36

Unit1: Plant Breeding: (5 Lecture)

- 1.1: Introduction.
- 1.2: Aim and objectives.
- 1.3: Scope of plant breeding.

Unit 2: Methods of Crop Improvement (17 Lecture)

- 2.1: Introduction.
- 2.2: Methods of crop improvement.
- 2.3: Centres of origin and domestication of crop plants.
- 2.4: Plant genetic resources.
- 2.5: Introduction and acclimatization.
- 2.6: Selection methods: Pure line, Mass and Clonal selection.
- 2.7: Hybridization: Procedure.
- 2.8: Hybridization in self-pollinated crop plants.
- 2.9: Hybridization in cross pollinated crop plants.

Unit 3: Mutation and Plant Breeding (8 Lecture)

- 3.1: Role of mutation
- 3.2: Role of polyploidy.
- 3.3: Role of biotechnology in crop improvement.

Unit 4: Intellectual Property Rights (3 Lecture)

- 4.1: Introduction
- 4.2: Types of Property.
- 4.3: Intellectual Property.
- 4.4: Forms of Intellectual Property.
- 4.5: Advantages and Disadvantages of IPR.

Unit 5: Crop Breeding Institutes/Centers (3 Lectures)

- 5.1: Introduction.
- 5.2: International Institutes.
- 5.3: National Institutes

Course Outcomes :-	
1	Students will be able to illustrate aim and objectives of plant breeding
2	Students will be able to explain different methods of crop improvement
3	Students will be able to distinguish between role of mutation and role of polyploidy in plant breeding technique

Suggested Readings-

- 1. Singh, B. D. (2005). Plant Breeding: Principles and Methods. Kalyani Publishers. 7th edition.
- 2. Chaudhari, H. K. (1984). Elementary Principles of Plant Breeding. Oxford – IBH. 2nd edition.

3. Acquah, G. (2007). Principles of Plant Genetics & Breeding. Blackwell Publishing.
4. Kader, A. A. (2002). Post-Harvest Technology of Horticultural Crops. UCANR Publications, U. S. A. 5.
5. Capon, B. (2010). Botany for Gardeners. 3rd Edition. Timber Press, Portland, Oregon.

Title: ECONOMIC BOTANY(Elective)
BOTANY- XII (2231565)

Academic Council 5(5.2)
15th June, 2022

Credits: Theory- 4 Practical- 2

Lectures: 36

Unit 1: Legumes

(7Lecture)

1.1 Botanical names, Morphology, Source and Economic importance of Pulses-Chickpea and Red gram, legumes - Lucerne and *Sesbania*

Unit2: Plant Fibres

(7Lecture)

2.1 Botanical names, Morphology, Source and Economic importance of Cotton and Coir.

Unit3: Vegetable Oil Sources

(7 Lecture)

3.1 Botanical name, source and economic importance of – Groundnut, Soybean; Brief account of cultural practices of Ground nut and Soybean.

Unit4: Drug Yielding Plants

(7 Lecture)

4.1 A brief account of plant drugs and their chief constituents used in Indigenous and allopathic systems in-

- A) Rhizome –1.*Zingiber officinale* 2.*Curcuma longa*
- B) Root –1.*Withania somnifera* 2.*Asparagus racemosus*
- C) Stem – 1.*Tinospora cordifolia* 2.*Glycyrrhiza glabra*
- D) Leaf –1.*Adhatoda zeylanica*. 2. *Aloe vera*
- E) Floral bud – *Syzigium aromaticum*
- F) Fruit – *Emblica officinalis*

Unit5: Natural Products

(8 Lecture)

A- Rubber- Introduction, properties of rubber, source (*Hevea brasiliensis*), morphological characters, extraction method and economic importance

B- Botanical pesticides: Botanical name, morphological characters, source and importance of Neem, Tobacco, Custard apple.

C- Plant Dyes - Botanical name, source and economic importance.

- a) Wood-Log wood, Kutch. b) Bark-Oak, Teak.
- c) Root and rhizome -Manjista, Turmeric, d) Leaves- Indigo, Henna.
- e) Flowers-Saffron, Palas.

Course Outcomes :-	
1	Students can understand the uses of different plants and plant part
2	Students will be able to explain uses of different plant as source of vegetable oil
3	Students will be able to compare natural source of drugs obtained from different plants and their parts
4	Student can categorise the plant natural products as per their origin and importance.

Suggested Readings-

1. R.C. Grewal – Medicinal plants, Campus Books International 4825/24, Prahiadstreet, Ansari Road, Darya Ganj, New Delhi.
2. F.O. Bower – Plants and Man Ariana Publishing House, New Delhi.
3. Fuller, K.W. and Galon, J.r. 5985. Plant Products and New Technology. CalrendonPress, Oxford, New York.
4. Kocchar, S.L. 5998. Economic Botany in Tropics, 2nd edition. Macmillan India Ltd., New Delhi.
5. Sambamurthy, A.V.S.S. and Subramanyam, N.S. 5989. A Textbook of Economic Botany, Wiley Eastern Ltd., New Delhi.

Semester- VI

Academic Council 5(5.2)

15th June, 2022

Title: PLANT PATHOLOGY BOTANY- XIII (2231661)

Credits: Theory- 4, Practical- 2

Lectures: 36

Unit 1: Introduction

(4 Lectures)

- 1.1: Terms, Nature, and concept of plant diseases. 1.2: Cause of disease.
1.3: Classification of Plant Diseases Based on- 1. Symptoms, 2. Spread and Severity of Infection.
1.4: Importance of plant diseases.

Unit 2: Rots, Damping offs, Downy mildews, Powdery Mildews, White rusts and Smuts

(9 Lectures)

- 2.1 Study of following plant diseases with respect to causal organisms, symptoms, and control measures-
1. Fruit rot of Cucurbits.
 2. Late blight of Potato.
 3. Downy mildew of Grapes.
 4. Powdery mildew of Mango
 5. White rust of Crucifers.
 6. Smut of Jowar

Unit 3: Rusts, Wilts, Leaf spots & blights and Anthracnoses

(9 Lectures)

- Study of following plant diseases with respect to causal organisms, symptoms, and control measures-
1. Brown rust of Wheat
 2. Wilt of Pigeon pea (*Cajanuscajan*)
 3. Brown spot of Maize
 4. Tikka disease of Groundnuts
 5. Red-rot of Sugarcane

Unit 4: Mycoplasmas, Bacteria and Viruses

(9 Lectures)

- 4.1 Study of following plant diseases with respect to causal organisms, symptoms, and control measures-
1. Little leaf of Brinjal
 2. Oily spot of Pomegranate (Telya diseases)
 3. Citrus canker
 4. Tobacco & Tomato mosaic

Unit 5: Aerobiology and Seed Pathology

(5 Lectures)

- 5.1: Aerobiology- Definition, scope and importance and disease forecasting.
5.2: Seed pathology- Definition, seed borne pathogens (external and internal) seed treatment (hot water, solar, chemical) and seed certification.

Course Outcomes :-	
1	Students can identify plant diseases as per their characteristics
2	Students will be able to compare symptoms of fungal and bacterial diseases of plants
3	Students will be able to examine the symptoms of mycoplasma, bacterial and viral plant disease
4	Students can identify healthy and high productive seeds by its character

Suggested Readings-

1. Introductory Mycology John Wiley and Sons Inc. by Alexopoulos C.J., Mims C.W. and Blackwel.M. (1996).
2. Introduction to Bacteria McGraw Hill book Co. New York by Clifton.A.(1958)
3. Introductory Phycology Affiliated East – West Press Ltd. New Delhi by Kumar H. D. (1988).
4. Introduction to Plant Viruses Chand and Co. Ltd. Delhi by Mandahar C. L. (1978).
5. Diseases of crop plants in India Prentice Hall of India Pvt. Ltd. New Delhi by Rangaswamy G. and Mahadevan A.

Semester- VI

Academic Council 5(5.2)
15th June, 2022

Title: PLANT BIOTECHNOLOGY BOTANY- XIV (2231662)

Credits: Theory- 4, Practical- 2

Lectures:36

Unit1: Recombinant DNA Technology

(8 Lectures)

- 1.1: Introduction and principles.
- 1.2: Enzymes involved in recombinant DNA Technology.
- 1.3: Vectors.
- 1.4: Southern and northern blotting technique.
- 1.5: DNA finger printing, PCR, DNA libraries.

Unit 2: Methods of Gene Transfer

(8 Lectures)

- 2.1: Introduction.
- 2.2: Marker and Reporter genes.
- 2.3: Methods of gene delivery-Physical, Chemical and Biological (*Agrobacterium* mediated gene transfer).
- 2.4: Transgenic plants (Flavr - Savr tomato, Golden rice).

Unit 3: Gene Cloning

(5 Lectures)

- 3.1: Introduction.
- 3.2: Bacterial Transformation and selection of recombinant clones
- 3.3: PCR- mediated gene cloning.
- 3.4: Complementation, colony hybridization.

Unit 4: Plant Tissue Culture

(10 lectures)

- 4.1: Introduction and totipotency
- 4.2: Terminology in tissue culture.
- 4.3: Techniques of tissue culture.
 - 4.3.1 Media preparation
 - 4.3.2 Sterilization and aseptic condition
- 4.4: Micro propagation.
- 4.5: Anther culture and haploid production
- 4.6: Protoplast isolation and culture.
- 4.7: Somatic Hybridization.

Unit 5: Applications of Biotechnology

(5 lectures)

- 5.1: Introduction.
- 5.2 : Role of Biotechnology in agriculture, Industry, Forestry.
- 5.3: Biotechnological Institutes and their role (any two).

Course Outcomes :-	
1	Students will be able to explain recombinant DNA technology
2	Students will be able to compare the different methods of gene transfer
3	Students will be able to explain different methods of gene cloning
4	Students can explain different application of plant tissue culture .

Suggested Reading-

1. Bhojwani, S. S. and Razdan, M. K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
2. Glick, B. R., Pasternak, J. J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
3. Bhojwani, S. S. and Bhatnagar, S. P. (2011). The Embryology of Angiosperms. Vikas Publication House Pvt. Ltd., New Delhi. 5th edition.
4. Snustad, D. P. and Simmons, M. J. (2010). Principles of Genetics. John Wiley and Sons, U. K. 5th edition.
5. Stewart, C. N. Jr. (2008). Plant Biotechnology & Genetics: Principles, Techniques and Applications. John Wiley & Sons Inc. U. S. A.

Semester- VI

Academic Council 5(5.2)

15th June, 2022

Title: CELL BIOLOGY BOTANY- XV (2231663)

Credits: Theory- 4, Practical- 2

Lectures: 36

Unit 1: Microscopic Techniques in Biology

(8 Lectures)

1.1: Principles of microscopy.

1.2: Light microscopy.

1.3: Sample preparation for light microscopy.

1.4: Phase contrast microscopy.

1.5: Electron microscopy (EM)-

1.5.1 Scanning electron microscopy (SEM) and Scanning transmission electron microscopy (STEM).

1.5.2: Sample Preparation for electron microscopy.

Unit2: Cell- Unit of Life

(6 Lectures)

2.1: The Cell Theory.

2.2: Prokaryotic cell- structure, cell size and shape.

2.3: Eukaryotic cells- structure, cell size and shape.

2.4: Prokaryotic cell components

2.5: Eukaryotic cell components.

Unit 3: Cell Organelles

(10 Lectures)

3.1: Ultra structure and function- Mitochondria, Chloroplast, Nucleus, ER, Golgi body, Lysosomes, Peroxisomes and Glyoxisomes, Cell-Membrane and Cell wall.

3.2: Structure and function of cytoskeleton & its role in motility.

Unit 4: Chromosome

(6 Lectures)

4.1: Introduction.

4.2: History of chromosome.

4.3: Morphology, shape, size.

4.4: Types of Chromosome.

4.5: Karyotype.

Unit 5: Cell Division

(6 Lectures)

5.1: Mitosis & Meiosis, their regulations.

5.2: Steps in cell cycle.

5.3: Regulation & Control of cell cycle.

5.4: Significance of cell cycle (Mitosis and Meiosis).

Course Outcomes :-	
1	Students can compare scanning and scanning transmission electron microscopy
2	Students will be able to compare structure of Eukaryotic and Prokaryotic cell
3	Students will be able to categorise cell organelles as per their functions
4	Students can explain the process of meiosis and mitosis

Suggested Reading-

1. Lewin B.2000 Genes VII Oxford University Press, New York.
2. Wolfe, S. L. (1993) Molecular and cell Biology-Wadsworth publishing Co. California, U.S.A.
3. Krishnmourthy, K. V. (2000) Methods in Cell Wall chemistry. CRC Press, Boca Raton, Florida.
4. Buchanan, B. B. Griossem W and Jones, R.L.2000. Biochemistry and Molecular Biology of Plants American Society of plant Physiologist, Maryland, U.S.A.
5. Harris, N. and Oparka, K.J.1994. Plant cell Biology: A Practical Approach, IRL press at Oxford university Press, Oxford, U.K.

Semester- VI

Academic Council 5(5.2)

15th June, 2022

Title: NURSERY, GARDENING & HORTICULTURE (Elective)
BOTANY- XVI (2231664)

Credits: Theory- 4, Practical- 2

Lectures: 36

Unit1: Nursery & Gardening

(6 Lectures)

- 1.1: Introduction.
- 1.2: Objectives and scope.
- 1.3: Types of gardening–landscape, rock garden ,home gardening and parks
- 1.4: Computer applications in landscaping

Unit 2: The Seed

(10 Lectures)

- 2.1: Introduction.
- 2.2: Structure and types.
- 2.3: Seed dormancy; causes and methods of breaking of dormancy.
- 2.4: Seed storage: Seed banks, factors affecting seed viability, genetic erosion.
- 2.5: Seed production technology.
- 2.6: Seed testing and certification.

Unit 3: Vegetative Propagation

(6 Lectures)

- 3.1: Introduction.
- 3.2: Types of layering, cutting, budding and grafting.

Unit 4: Horticultural Techniques

(6 Lectures)

- 4.1: Introduction.
- 4.2: Application of manure, fertilizers, nutrients and PGRs.
- 4.3: Weed control, Biofertilizers and biopesticides.

Unit 5: Floriculture

(8 Lectures)

- 5.1: Introduction.
- 5.2: Cut flowers.
- 5.3: Bonsai, commerce (market demand and supply).
- 5.4: Importance of flower shows and exhibitions.

Course Outcomes :-	
1	Students can explain nursery and gardening skills
2	Students will be able to develop seed bank
3	Students will be able to demonstrate procedure of layering, cutting and grafting
4	Students will be able to construct different bonsai
5	Students can create different commercial flower articles

Suggested Reading-

1. Singh, D. & Manivannan, S. (2009). Genetic Resources of Horticultural Crops. Ridhi International, Delhi, India.
2. Swaminathan, M. S. and Kochhar, S. L. (2007). Groves of Beauty and Plenty: An Atlas of Major Flowering Trees in India. Macmillan Publishers, India.
3. NIIR Board (2005). Cultivation of Fruits, Vegetables and Floriculture. National Institute of Industrial Research Board, Delhi.
4. Kader, A. A. (2002). Post-Harvest Technology of Horticultural Crops. UCANR Publications, U. S. A.
5. Capon, B. (2010). Botany for Gardeners. 3rd Edition. Timber Press, Portland, Oregon.

15th June, 2022

Semester- VI
Title: BIOSTATISTICS (Elective)
BOTANY- XVI (2231665)

Credits: Theory- 4, Practical- 2

Lectures: 36

Unit1: Introduction

(7 Lectures)

- 1.1: Definition.
- 1.2: Basic principles.
- 1.3: Statistical methods.
- 1.4: Variables - measurements, functions, limitations and uses of statistics.

Unit 2: Collection of Primary and Secondary Data

(8 Lectures)

- 2.1: Introduction
- 2.2: Types of data
- 2.3: Methods of data collection.
- 2.4: Merits and demerits.
- 2.5: Classification of data.
- 2.6: Tabulation and presentation of data
- 2.7: Sampling methods

Unit3: Measures of Central Tendency

(7 Lectures)

- 3.1: Introduction.
- 3.2: Mean, median and mode, merits & demerits.
- 3.3: Measures of dispersion- range, standard deviation and mean deviation, merits & demerits.
- 3.4: Co- efficient of variations.

Unit 4: Probability

(7 Lectures)

- 4.1: Introduction.
- 4.2: Basic Concepts.
- 4.3: Kinds of Probabilities.
- 4.4: Measures of Probability.

Unit 5: Statistical Inference

(7 Lectures)

- 5.1: Introduction.
- 5.2: Hypothesis - Student 't' test and chi square test and its significance.

Course Outcomes :-	
1	Students can explain different statistical methods
2	Students will be able to analyse primary and secondary data
3	Students will be able to solve problems related to central tendency
4	Students can solve the problems related to probability

Suggested Readings-

1. Biostatistics Dannel, W.W., 1987. New York, John Wiley Sons.
2. An introduction to Biostatistics, 3rd edition, Sundarrao, P. S. S and Richards, J. Christian Medical College, Vellore.
3. Statistical Analysis of epidemiological data, Selvin, S., 1991. New York University Press.
4. Statistics for Biology, Boston, Bishop, O. N. Houghton, Mifflin.
5. Statistics for Biologists, Campbell, R. C., 1998. Cambridge University Press

Academic Council 5(5.2)
15th June, 2022

Semester- VI

Title: PLANT SYSTEMATICS & PLANT PATHOLOGY BOTANY PRACTICAL- IV (2231666)

1. Preparation of botanical description of a plant species.
2. Study of root types.
3. Study of stem modifications.
4. Study of inflorescence types (Cymose, Racemose & Specialized).
5. Study of fruit types.
- 6-11. Study of families as per theory syllabus (Available plant families and Bentham and Hooker's system to be followed).
12. Identification of genus and species with the help of regional (any available) flora.
13. Preparation & submission of herbarium specimens preferably of weeds (10).
14. Study of laboratory equipment's- Autoclave, Hot Air Oven, Inoculating chamber, Laminar Air Flow, Air Sampler, Incubator, Centrifuge etc.
15. Preparation of culture media (PDA).
16. Micrometry- Calibration of microscope and measurement of fungal spores.
17. Study of air-borne pathogen by exposed petri plates/air sampler.
18. Isolation of plant pathogens (Serial Dilution Agar Plate Method).
19. Estimation of chlorophylls (Any healthy & diseased/infected plant material).
20. Study of symptoms and causal organisms of-
 1. Rots- Fruit rot of Cucurbits
 2. Damping offs- Late blight of Potato

3. Downy mildews- Downy mildew of Grapes.
21. Study of symptoms and causal organisms of-
 1. White rusts- White rust of Crucifers.
 2. Powdery Mildews- Powdery mildew of Mango
 3. Smuts- Smut of Jowar
22. Study of symptoms and causal organisms of-
 1. Rusts- Brown rust of Wheat
 2. Wilts- Wilt of Pigeon pea (*Cajanuscajan*)
 3. Leaf spots- Brown spot of Maize
23. Study of symptoms and causal organisms of-
 1. Leaf blights- Tikka disease of Groundnuts 2. Anthracnoses- Red-rot of Sugarcane
 3. Mycoplasmas- Little leaf of Brinjal
24. Study of symptoms and causal organisms of-
 1. Bacteria- Citrus canker, Oily spot of Pomegranate (Telya diseases)
 2. Viruses- Tobacco & Tomato mosaic
25. A) **Study Excursion**
 1. Long study Excursion report
 2. Short study Excursion reportB) **Collection and submission of plant diseases as per the theory syllabus.**

Semester- VI

Title: GENETICS & PLANT BIOTECHNOLOGY BOTANY PRACTICAL- V (2231667)

1. Solve the problems based on Mendelian inheritance (Monohybrid ratio and Dihybrid ratio)
 2. Studies on Mendelian trait by using pea plant.
 3. Studies on genetic trait related to the Colour blindness, Haemophilia, Holandric genes by using photograph.
 4. Solve the problems based on Linkage and crossing over (two point cross, three point cross)
 5. Solve the problems based on polygenic inheritance
 6. Solve the problems based on Population genetics.
 7. Study of *Mirabilis jalapa* with respect to Plastid inheritance
 8. Studies on biotechnological equipments (Principle and working).
 9. Study of recombinant vectors with the help of photographs.
 10. Studies on transgenic plant (Bt-cotton and golden rice)
 11. Demonstration of Gene transfer techniques (Video/Photograph).
 12. Demonstration of gel-electrophoresis techniques
 13. Organization of plant tissue culture laboratory.
 - 14-16. Aseptic culture techniques for establishment and maintenance of cultures
- Techniques in Plant Tissue Culture.

17. Demonstration of Southern blotting technique with the help of Chart/photograph
18. Demonstration of Northern blotting technique with the help of Chart/photograph
- 19-20. Preparation of plant tissue culture medium (M.S.)
- 21-23. Study of anther, embryo culture and micropropagation.
24. Isolation of protoplast from given plant material
25. **Visit :**
 1. Biotechnology laboratory

Semester- VI

Title: MOLECULAR BIOLOGY & CELL BIOLOGY BOTANY PRACTICAL- VI (2231668)

1. Preparation of LB medium and raising *E. Coli*.
2. Isolation of genomic DNA from *E. Coli*.
3. DNA isolation from cauliflower head (or any suitable plant material).
4. Qualitative and Quantitative estimation of DNA by diphenylamine reagent.
5. Qualitative and Quantitative estimation of RNA by Orcinol reagent.
6. Dialysis of starch and simple sugar.
- 7-8. Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and Semi-discontinuous replication).
9. Study of structures of prokaryotic RNA polymerase and eukaryotic RNA polymerase-II through photographs.
10. Photographs establishing nucleic acid as genetic material (Griffith's experiments).
11. Mitosis and the cell cycle in onion root-tip cells.
12. Meiotic cell division in *Allium* spp.

13. Study of permeability of plasma membrane.
14. Isolation of Mitochondria
15. Isolation of chloroplasts.
16. To study of karyotype and prepare ideogram of plant by photograph.
17. Estimation of amount of chlorophyll present in the leaf tissue.
18. Observation of growth and differentiation in single cells.
19. Structure of onion peel cell.
- 20-24. Microtome technique.
25. **Submission** (submit different charts of molecular and cell biology experiments).

Semester- VI

**Title: PLANT BREEDING & NURSERY GARDENING AND
HORTICULTURAL PRACTICES (Elective)
BOTANY PRACTICAL- VII (2231669)**

1. To study floral biology in self-pollinated crop plants.
2. To study floral biology in cross pollinated crop plants.
3. To study pollen viability.
4. Calibration of ocular micrometer and estimate the size of pollen grain.
5. To study hybridization techniques in Malvaceae.
6. To study hybridization techniques in Fabaceae.
7. To study hybridization techniques in Brassicaceae.
8. To study hybridization techniques in Poaceae.
9. Study of male sterility in sorghum in field or in laboratory by staining the pollen grain.
10. Studies on Learning the precautions on handling of different mutagenic agents: Physical and chemical mutagens.
11. Different types of pots and potting medium & Potting and Repotting.
- 12-13. Propagation practices by seed, vegetative propagation, cutting, budding, layering and grafting.
14. Method of preparing Bonsai, Bottle garden/Terrarium, Hanging Baskets, Dish Garden.

15. Preparation of garden layout.
16. List of plants suitable for garden locations- 2 to 3 plants for each location.
- 17-18. Identification of important horticultural plants- herbs(Foliage and flowering); shrubs(Foliage and flowering); trees (Foliage and flowering); climbers; Lianas; Epiphytes; Creepers; Trailers; Aquatic plants; Succulents;(from all types- any two plants).
- 19-20. Flower Arrangements- Indian (Gajara, Veni, Garland, Bouquet, Pot, Hanging).
- 21-22. Green house plants- Information regarding soil, temperature, irrigation and fertilizer, requirements and propagation methods for- Anthurium, Gerbera, Orchids, Tuberose, Carnation, Roses and Capsicum.
- 23-24. **Project**- Each student should individually present a project to any topic related to nursery and garden development. It should be duly certified by HOD and submit in the practical examination (Compulsory).

25. Visits:

1. Visit to breeding/research stations.
2. Visit to garden/Parks/Nurseries/Exhibition/Horticulture industries etc. and record should be duly certified by HOD and submit in practical examination.

Semester- VI

Title: ECONOMIC BOTANY & BIOSTATISTICS (Elective) BOTANY PRACTICAL- VII (2231669)

1. Study of Vegetative, Floral morphology and pod in Chickpea, Red gram.
2. Study of fodder legumes- Source and uses-Sesbania and Lucerne.
3. Study of structure of oil storing tissues in sectioned seeds of Groundnut and Coconut endosperm using micro chemical tests.
4. Study of vegetative, Floral and Fruit morphology of Cotton. Microscopic structure Cotton fibres.
5. Study of plants (live or herbarium) used as resource of drugs as per theory.
6. Study of plant pesticides (as per theory).
7. Study of dyes- source and uses (as per theory).
8. Study of ornamental plants, seasons of flowering plants, botanical name morphology and uses (as per theory).
9. Study of plant perfumes and cosmetics (as per theory).
10. Horticultural term Paper-Based on- Seasonal/Perennials/Climbers/Cacti/ Succulents/Bonsai/Indoor plants and Cut flowers etc.

- 11-13. Methods of estimation of Heterosis (i) Mid- Parent Heterosis (ii) Better parent Heterosis (iii) Standard Heterosis (Demo).
14. Determination of interspecific variation in chromosome number in Allium.
- 15-16. Collection of Data and tabulation.
- 17-18. Methods of sampling. 19-20. Presentation of Data.
21. Measures of central tendency (Mean, mode and median) of given plant material.
22. Calculation of Standard Deviation.
23. Examples based on probability.
24. Calculation of 't' test. And Calculation of chi square test.
25. Submission of medicinal plants

6	Identification	10
	A. Identify and describe specimen E. (oil storing tissue/cotton morphology/St. of cotton fiber)	
	B. Identify and describe specimen F (ornamental plants/ plant perfumes and cosmetics)	
	C. Identify and describe specimen G (Indian gajara, veni, garland, bouquet, pot, hanging basket)	
	D. Identify and describe specimen H (Green house plants: Anthurium, Gerbera, Orchids, Tuberose, Carnation, Roses, Capsicum)	
	E Identify and describe specimen I (Indore ornamental plants - Money plant , Snake plant , Adenium)	
7	A – Journal	10
	B- submission	10

Academic Council 5(5.2)
15th June, 2022

SEC: SYLLABUS

ORGANIC FARMING (2231566)

CREDITS:2 MARKS:50 HOURS:30

- A. What is Organic Farming?
- B. Why Organic Farming?

1 Detrimental effects of currently chemical dependent farming

- i) Reduction of crop production due to depletion of soil Health.
- ii) Pesticide contamination and human health hazard
- iii) Contamination of food products by pesticides & chemicals.
- iv) Environmental (soil, water, air) pollution.
- v) Reduction of natural enemies of crop pests.
- vi) Threat to Bio diversity

2. i) Historical development of Organic Agriculture in India.

ii) Present status of Organic Agriculture in West Bengal.

iii) Feasibility of adoption of organic Agriculture
in West Bengal and its difficulties.

3. Types of Farming (Advantage & disadvantage of each system):

Organic Agriculture Pure Organic Farming – Definition, Concept & Benefits

Integrated Farming system (Combination of Organic
and Inorganic) Mixed Farming

4. Concept of different cropping systems in relation to Organic Farming
(Inter cropping etc.)

5. Organic Farming (Process) Concept of farming system Developing
organic farms Important steps & methods

6. Plant Nutrients:

Name of plant Nutrients Functions of Nutrients in plant growth and
Development

Job Opportunities

- Skilled labor

- Farm advisor
- Self-Practice
- Organic food producers and supplier
- Horticultural practices in Gardening

COURSE OUTCOME

1. Students will be able to understand the concept of organic farming.
2. Students will be able to analyse the general farming and organic farming.
3. Interest about organic farming will increase.
4. Knowledge about organic farming will help to save human as well as animal life.

**Chairman
BOS in Botany**

Academic Council 5(5.2)
15th June, 2022

CBCS BSc. PART III SEMESTER V

AECC- C

ENGLISH FOR COMMUNICATION-III (2231501)

SEE- 35 + CA- 15 = 50 marks

**COURSE CREDITS 03L+01T=04
CONTACT HOUR 60**

COURSE

Course Objectives:

- To make the students comprehend English language in general
- To enhance the quest for knowledge and correct pronunciations
- To strengthen oral and written communication skills with grammar accuracy
- To galvanize soft skills

Course Outcomes:

By the end of the course the students will be able to:

- Use oral and written English effectively and fluently
- Demonstrate their knowledge of correct pronunciations
- Apply English language skills and grammar accuracy in clearing competitive examinations
- Apply their knowledge of Soft Skills to succeed in career as well as in practical life.

Module No and Title:

Module I: Prose

1. The Gift of the Magi: O' Henry
2. The Homecoming: Rabindranath Tagore
3. The California's Tale: Mark Twain

Module II: Poetry

1. The Solitary Reaper: William Wordsworth
2. The Queen's Rival: Sarojini Naidu
3. Oh! How I faint When I
of You Do Write (Sonnet No 80) : William Shakespeare
4. The Road Not Taken: Robert Frost

Module. III: Pronunciation Skills

- 1) Basic Sounds in English
- 2) IPA Symbols
- 3) Phonetic Transcription
- 4) Stress and Intonation

Module. IV: Soft Skills

1. Types of 21st Century Skills
2. Learning Skills (4Cs)
3. Preparation for Employment

Reference Books:

BA/BSC Part III Compulsory English Literary Mindscapes-I PAH Solapur University,
Solapur (With 20% new additions & changes)

CBCS BSc. PART III SEMESTER VI

AECC- D

ENGLISH FOR COMMUNICATION-IV (2231601)

SEE- 35 + CA- 15 = 50 marks

**COURSE CREDITS 03L+01T=04
CONTACT HOUR 60**

COURSE

Course Objectives:

- To make the students comprehend English language in general
- To enhance the quest for knowledge and correct pronunciations
- To strengthen oral and written communication skills with grammar accuracy
- To galvanize soft skills

Course Outcomes:

By the end of the course the students will be able to:

- Use oral and written English effectively and fluently
- Demonstrate their knowledge of correct pronunciations
- Apply English language skills and grammar accuracy in clearing competitive examinations
- Apply their knowledge of Soft Skills to succeed in career as well as in practical life.

Module No and Title:**Module. I: Prose**

- | | |
|----------------------------------|----------------|
| 1. Growing Up: | Joyce Cary |
| 2. God See the Truth, but Waits: | Leo Tolstoy |
| 3. On the Rule of The Road: | A. G. Gardiner |

Module. II: Poetry

- | | |
|---------------------------------------|-----------------|
| 1. Sita: | Toru Dutt |
| 2. My Last Duchess: | Robert Browning |
| 3. Ode to Beauty: | John Keats |
| 4. Song: Go and Catch a Falling Star: | John Donne |

Module. III: Grammar

1. Simple and Multiple Sentences
2. Direct and Indirect Speech

Module. IV: Soft Skills

1. Literacy Skills
2. Life Skills
3. Employability Skills

Reference Books:

BA/BSC Part III Compulsory English Literary Mindscapes-I PAH Solapur University
Solapur (With 20% new additions & changes)

**Chairman
BOS in English**



Shri Sangameshwar Education Society's
Sangameshwar College, Solapur [Autonomous]
Kannada Linguistic Minority Institute
NAAC Accredited with 'A' Grade (III Cycle CGPA 3.39)

UG Science Programme: B.Sc.-III

To be implemented from A.Y. 2022-2023

System: Choice Based Credit System (CBCS) with SGPA and CGPA

Skill Enhancement Course – SECIII(Semester V) and SEC2(Semester VI)

BOTANY

Certificate course in organic farming

- Duration : 6 months
- Theory : 20 lectures
- Practical : 10 lectures
- Eligibility : 12th
- Intake capacity : 20+5

• **Requirements**

▪ **Lecture room**

▪ **Equipements**

1. Cultivator

2. Plow

3. Tiller
4. Harrow
5. Broadcast or air seeder
6. Seed drill, air seeder or precision gun
7. Transplanter
8. Harvester or combine
9. Equipment for transportation
10. Organic manure

Expenses

Equipements : Rs. 25,000/-

Faculty : Rs. 30,000/-

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BOS in Botany

