



ANDHRA KESARI UNIVERSITY

B. Vocational course AGRICULTURE (Minor) framework w.e.f. AY 2025-26

Course Structure

Year	Semester	Course	Title of the Course	No.of Hrs /Week	No. of Credits
II	III	1	Fundamentals of Genetics	3	3
			Fundamentals of Genetics Practical	2	1
	IV	2	Horticulture	3	3
			Horticulture Practical	2	1
III	V	3	Principles Of Organic Farming	3	3
			Principles Of Organic Farming Practical	2	1
		4	Production Technology of Fruits a nd Vegetables	3	3
			Production Technology of Fruits a nd Vegetables Practical	2	1
	VI	5	Principles of Seed Technology	3	3
			Principles of Seed Technology Practical	2	1
		6	Introduction to Production Economics and Farm Management	3	3
			Introduction to Production Economics and Farm Management Practical	2	1

CHAIRMAN (UG)
BOARD OF STUDIES
BOTANY
ANDHRA KESARI UNIVERSITY
ONGOLE,Prakasam District.



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – III

Coures 1 : FUNDAMENTALS OF GENETICS

Credits 3

UNIT – I

- Gene expression and differential gene activation – Operon concept – Lac Operon
- Meiosis – definition – process – differences between mitosis and meiosis – significance in plant breeding
- linkage – definition – linkage groups – characteristic features of linkage – pleiotropy – linkage groups
- Crossing over – mechanism of crossing over – types of crossing over – factors effecting crossing over – cytological proof of crossing over in *Drosophila* – significance of crossing over in plant breeding – coincidence – interference

UNIT – II

- Mendel's Laws – Law of segregation – Law of independent assortment – Principle of dominance – Principle of unit characters – exceptions to Mendel's Laws
- Monohybrid and dihybrid ratios – modifications of F₂ ratio in monohybrid and dihybrid crosses and lethal factors

UNIT - III

- Gene action – types of gene action – pleiotropism – alleles – characteristic features of alleles
- multiple alleles (blood groups in human beings) – characteristic features of multiple alleles –
- Penetrance (complete penetrance and incomplete penetrance) and expressivity (uniform expressivity and variable expressivity) – sex determination

UNIT – IV

- Gene mutations – introduction – definition – terminology – classification of mutations – characteristic features of mutations – spontaneous mutations and induced mutations
- Gene mutations – artificial induction of mutations – physical and chemical mutagens
- Chromosomal aberrations – structure – types of structural chromosomal aberrations – deletions (deficiencies) and duplications

UNIT - V

- Numerical chromosomal aberrations – terminology – classification – euploidy and aneuploidy – kinds of polyploids – autopolyploids, allopolyploids and segmental allopolyploids
- Numerical chromosomal aberrations – euploidy – monoploids – haploids – differences between monoploids and haploids – diploidy – polyploidy – origin of polyploidy – induction of polyploidy – triploids – tetraploids
- Numerical chromosomal aberrations – polyploidy
- Numerical chromosomal aberrations – aneuploidy – types of aneuploids – monosomics, double monosomics, nullisomics, double nullisomics, trisomics (primary, secondary and tertiary trisomics) and tetrasomics

References

1. Gupta, P.K. 1985. Cytology, Genetics and Cytogenetics. Rastogi Publications, Meerut. Gupta, P.K. 2007. Genetics. Rastogi Publications, Meerut.
2. Pundhan Singh, 2000. Elements of Genetics. Kalyani Publishers, Ludhiana.
3. Singh, B.D. 2007. Fundamentals of Genetics. Kalyani Publishers, Ludhiana.
4. Strickberger, M.W. 2004. Genetics. Prentice – Hall of India Pvt. Ltd., New Delhi.
5. Verma, P.S. and Agarwal, V.K. 2005. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand and Co., New Delhi



CHAIRMAN (UG)
BOARD OF STUDIES
BOTANY
ANDHRA KESARI UNIVERSITY
ONGOLE, Prakasam District.



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – III

Coures 1 : FUNDAMENTALS OF GENETICS(PRACTICAL)

(Credits 1)

1. Study of microscope.
2. Study of cell structure.
3. Practice on mitotic cell division.
4. Practice on meiotic cell division.
5. Practice on meiotic cell division.
6. Probability and Chi-square test.
7. Monohybrid and its modifications.
8. Dihybrid.

**CHAIRMAN (UG)
BOARD OF STUDIES
BOTANY
ANDHRA KESARI UNIVERSITY
ONGOLE, Prakasam District.**



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – III

Coures 1: FUNDAMENTALS OF GENETICS (PRACTICAL)

Credits 1

1. Study of microscope.
2. Study of cell structure.
3. Practice on mitotic cell division.
4. Practice on meiotic cell division.
5. Practice on meiotic cell division.
6. Probability and Chi-square test.
7. Monohybrid and its modifications.
8. Dihybrid.

**CHAIRMAN (UG)
BOARD OF STUDIES
BOTANY
ANDHRA KESARI UNIVERSITY
ONGOLE,Prakasam District.**



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – IV

Coures 2: HORTICULTURE

Credits 3

UNIT-I

- Propagating structures- Plant propagation- Methods - Sexual and asexual – Propagation by cuttings – Definition of cutting – Stem cuttings – Leaf cuttings – Root cuttings.
- Propagation by Layering - Types of layering (tip, simple, compound, mound, trench, air layering) - Natural modifications of layering (runners, suckers, stolon, offset)- Propagation by separation - Bulbs, corms; division (rhizome, stem tuber, tuberous roots).

UNIT II

- Grafting, budding -Rootstock and scion selection – Grafting methods – Attached scion methods of grafting, simple or approach grafting, detached scion methods of grafting (side grafting - Veneer grafting, apical grafting- epicotyl grafting, double, soft wood grafting, cleft grafting, tongue grafting, whip grafting) - Graft incompatibility – Types – Translocated and localized incompatibility; Budding – Methods of budding – T-budding, inverted T-budding, patch budding and ring budding - Top working.
- Principles of orchard establishment – Points to be kept in mind while selecting site for the establishment of orchards - Principles and steps in orchard establishment - Layout of orchards – Systems of planting - Square, rectangle, quincunx, hexagonal and contour systems of planting-their merits and demerits.

UNIT-III

- Principles and methods of training and pruning - Definition of training, objectives and training, principles and methods of training of fruit crops - Open centre, closed centre and modified leader systems their merits and demerits - Definition of pruning, objectives of pruning, principles and methods of pruning of fruit crops.
- Pollination - Self and Cross pollination, pollinizers and pollinators Fertilization and parthenocarpy – Types.

UNIT-IV

- Types of vegetables Gardens – Kitchen Garden, market garden, truck garden, vegetable forcing, garden for processing, seed production garden and floating garden. Ornamental garden types – Formal – Informal – Wild Garden – Parts/ features of an ornamental garden.
- Lawn making - Preparation of soil – Drainage – Digging – Manuring and grading – Methods of planting – Sowing of seeds – Dibbling – Turfing – Maintenance of lawn – Mowing – Rolling – Sweeping –Scraping – Raking – Weeding – Irrigation – Top dressing with compost and fertilizers - Diseases and other problems – Fairy ring – Pale Yellow Laws.

UNIT-V

- Use of plant bio-regulators (PBR) in horticulture – Introduction – Applications of PBR in fruit crops.
- Irrigation methods in horticulture crops - Different methods followed in horticultural crops (check basin, furrow, ring basin, basin, flood, pitcher, funnel, drip and sprinkler).
- Fertilizer application- Different methods of application to horticultural crops- Broad casting, top dressing, localized placement, contact placement Band placement, row placement, pellet, foliar application, starter solution, fertigation.



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – IV

Coures 2: HORTICULTURE (PRACTICAL)

Credits 1

1. Identification of garden tools.
2. Identification of horticultural crops.
3. Layout of different planting systems.
4. Layout of kitchen garden.
5. Preparation of nursery bed (raised and flat beds) and sowing of seeds.
6. Practice of different asexual methods by divisions.
7. Practice of different asexual methods by cuttings.
8. Practice of different asexual methods by grafting.
9. Practice of different asexual methods by budding.
10. Practice of different asexual methods by layering.
11. Training and pruning of fruit trees.
12. Transplanting and care of vegetable seedlings.
13. Making of herbaceous and shrubby borders.
14. Preparation of potting mixture, potting and repotting.
15. Fertilizer application in different crops.
16. Visits to commercial nurseries/orchard.

References

1. Chadha, K.L. 2001. *Handbook of Horticulture*. ICAR, New Delhi.
2. Jitendra Singh, 2012. *Basic Horticulture*. Kalyani Publishers. New Delhi.
3. Randhawa, G.S. and Mukhopadhyaya, A. 1994. *Floriculture in India*. Allied Publishers Pvt. Ltd., New Delhi
4. Kumar, N. 1997. *Introduction to Horticulture*. Rajyalakshmi Publications, Nagorcoil, Tamilnadu.

CHAIRMAN (UG)
BOARD OF STUDIES
BOTANY
ANDHRA KESARI UNIVERSITY
ONGOLE, Prakasam District.



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – V

Coures 3: PRINCIPLES OF ORGANIC FARMING

Credits 3

UNIT - I

- Organic farming – definition – need – scope – principles – characteristics - relevance to modern agriculture.
- Different ecofriendly farming systems- biological farming, natural farming, regenerative agriculture – permaculture - biodynamic farming.
- Relevance of organic farming to A.P, India, and global agriculture and future prospects- advantages - barriers.

UNIT - II

- Initiatives taken by the central and state governments, NGOs and other organizations for promotion of organic agriculture in India.
- Organic nutrient sources and their fortification – organic manures- methods of composting
- Green manures- bio fertilizers – types, methods of application – benefits and limitations.

UNIT - III

- Nutrient use in organic farming-scope and limitations.
- Nutrient management in organic farming.
- Organic ecosystem and their concepts.
- Choice of crops and varieties in organic farming – crop rotations – need and benefits – multiple cropping.

UNIT - IV

- Fundamentals of insect, disease and weed management under organic mode of production- cultural-biological methods-non chemical pest & disease management.
- Botanicals- pyrethrum, neem seed kernel extract, neem seed powder, soluble neem formulations, neem oil.
- Operational structure of NPOP – other agencies for organic production.

UNIT - V

- Inspection – certification - labelling and accreditation procedures for organic products.
- Processing, - economic consideration and viability.
- Marketing and export potential of organic products – national economy



ANDHRA KESARI UNIVERSITY

B.VocAGRICULTURE -Minor

Semester – V

Coures 3: PRINCIPLES OF ORGANIC FARMING (PRACTICAL)

Credits 1

1. Visit to organic farm to study the various components, identification and utilisation of organic products.
2. Compost making- aerobic and anaerobic methods
3. Vermicompost preparation
4. Preparation of enriched farm yard manure
5. Visit to organic clusters and bio control lab to study the maintenance of bio-fertilizers/bio-inoculant cultures
6. Biological nitrogen fixers.
7. Methods of application of Bio-pesticides (Trichocards, BT, NPV)
8. Preparation of neem products and other botanicals for pest and disease control
9. Preparation of green pesticides (panchagavya, beezamrutam, jeevamrutam, ghanajeevamrutam, dravajeevamrutam).
10. Different methods of biofertiliser applications.

References

2. Arun K. Sharma. 2002. A Hand book of organic farming. Agrobios, India. 627p.
3. Palaniappan, S.P and Annadurai, K.1999. Organic farming-Theory and Practice. Scientific publishers, Jodhpur,India. 257p.
4. Mukund Joshi and Prabhakarasetty, T.K. 2006. Sustainability through organic farming. Kalyani publishers, New Delhi. 349p.
5. Balasubramanian, R., Balakishnan, K and Siva Subramanian, K. 2013. Principles and practices of organic farming. Satish Serial Publishing House. 453p
6. Tarafdar, J.C., Tripathi, K.P and Mahesh Kumar, 2009. Organic AGRICULTURE (Honours). Scientific Publishers, India. 369p.
7. Tiwari, V.N., Gupta, D.K., Maloo, S.R and Somani, L.L. 2010. Natural, organic, biological, ecological and biodynamic farming. Agrotech Publishing Academy, Udaipur. 420p.
8. Dushyent Gehlot. 2005. Organic farming- standards, accreditation, certification and inspection. Agrobios, India. 357p



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – V

Coures 4: PRODUCTION TECHNOLOGY OF FRUITS AND VEGETABLES

Credits 3

UNIT – I

- Fruits- Mango, Banana, Citrus, Grape - Botanical Name – Family – Origin – Area – Production- Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage

UNIT – II

- Guava, Sapota, Papaya, Botanical Name – Family – Origin – Area – Production- Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage

UNIT – III

- Importance of vegetables and spices in human nutrition and national economy
- Classification of vegetables - 1) Botanical 2) Based on Hardiness 3) Parts Used 4) Method of culture 5) Season.
- Tomato, Brinjal, Chilli, Okra - Botanical Name – Family – Origin – Area – Production- Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage

UNIT – IV

- Cucurbits – Flowering, sex expression, sex ratio - Cucumber, Ridge gourd, Bitter gourd, Bottle gourd - Botanical Name – Family – Origin – Area – Production- Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting – Yield
- Cole crops- Cabbage and Cauliflower - Botanical Name – Family – Origin – Area – Production- Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield

UNIT – V

- Peas and beans (Cluster bean, French bean, Dolichos) Botanical Name – Family – Origin – Area – Production- Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield
- Root crops (Carrot and Radish) - Botanical Name – Family – Origin – Area – Production- Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting – Yield

- Bulb crops – Onion and Garlic - Botanical Name – Family – Origin – Area – Production-Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting – Yield



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – V

Coures 4: PRODUCTION TECHNOLOGY OF FRUITS AND VEGETABLES(PRACTICAL)

Credits 1

1. Identification of vegetables and their seeds.
2. Identification of Fruit crops and their seeds.
3. Nursery raising techniques of vegetable crops.
4. Direct seed sowing and transplanting.
5. Study of morphological characters of different vegetables.
6. Study of morphological characters of different Fruits.
7. Intercultural operations in vegetable crops.
8. Fertilizers application methods.
9. Seed extraction methods in vegetables.
10. Seed extraction methods in Fruits.
11. Harvest indices and maturity standards of vegetable crops.
12. Harvesting and preparation for market.

References

1. Pranab Hazra, A. Chattopadhyay, K. Karmakar and S. Dutta. 2010. *Modern Technology in Vegetable Production*. New India Publishing Agency, New Delhi.
2. Neeraj Pratap Singh, .2007. *Basic Concepts of Vegetable Science*. International Book Distributing Co. New Delhi. Academic Press, New Delhi.
3. Nempal Singh, Singh, D.K., Singh, Y.K. and Virendra Kumar. 2006. *Vegetable Seed Production Technology*. International Book Distributing Co. Lucknow.
4. Prem Singh Arya and S. Prakash 2002. *Vegetables Growing in India*. Kalyani publishers, New Delhi



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – VI

Coures 5: PRINCIPLES OF SEED TECHNOLOGY

Credits 3

UNIT I – Introduction to seed and seed quality

- Seed – definition – Seed structure – Seed development and maturation Germination – phases of seed germination
- Dormancy – types of seed dormancy – Seed senescence – causes of seed senescence Seed quality characteristics – significance
- Classes of seed – Generation system of seed multiplication in seed supply chain .

UNIT II – Principles of seed production

- Seed replacement rate and varietal replacement – Seed Multiplication Ratio – Seed renewal period. Causes of varietal deterioration and maintenance Genetic and agronomic principles of seed production Factors affecting quality seed production
- Methods of seed production of varieties and hybrids.

UNIT III – Seed production techniques of agricultural crops

- Floral biology and pollination behavior – seed production techniques of varieties and hybrids of: rice, maize

UNIT IV – Seed production techniques of vegetable crops

- Floral biology and pollination behavior – seed production techniques of varieties and hybrids of: tomato, snakegourd, bittergourd, ashgourd, ribbed gourd and bottlegourd

UNIT V – Post harvest seed handling techniques Threshing – methods

- Drying – methods of seed drying – advantages and disadvantages Seed processing – definition – importance
- Seed cleaning and grading – upgrading – equipments – working principles
- Seed treatment – importance – types



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – VI

Coures 5 PRINCIPLES OF SEED TECHNOLOGY(PRACTICAL)

Credits 1

1. Study of seed structure of agricultural and horticultural crops.
2. Seed dormancy breaking methods.
3. Acid delinting in cotton.
4. Detasseling techniques for hybrid seed production in maize.
5. Emasculation and dusting techniques for hybrid seed production in important field crops.
6. Practicing pre-germinative techniques, enhancing floral ratio and improving seed set in cucurbits
7. Fruit grading and seed extraction methods in vegetables – tomato, brinjal, chillies, bhendi and cucurbits.
8. Seed cleaning and grading techniques and detection of seed mechanical injury.
9. Collection of seeds.

REFERENCES

Principles of Seed Technology ; Author, P. K. Agrawal ; Contributor, Indian Council of Agricultural Research. Publications and Information Division



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – VI

Coures 6: INTRODUCTION TO PRODUCTION ECONOMICS AND FARM MANAGEMENT

Credits 3

UNIT I: Production Economics and Farm Management - Nature and Scope

- Production Economics: Meaning, Definition and Nature and Scope – Farm Management: Definition and Objectives of farm management – Production Economics Vs. Farm Management – Farm Management Decisions: Decision making process – Scope of farm management – Types and Systems of farming: Types – Specialized, Diversified, and Mixed farming – Systems of farming: Peasant Farming, State Farming, Capitalistic, Collective and Co – operative Farming.

UNIT II: Factor – Product Relationship

- Factor – Product relationship: Meaning – Agricultural Production Function: Meaning, Definition – Laws of Returns: Increasing, Constant and Decreasing Returns – Classical production function and Three stages of production – Elasticity of production –Types / Forms of Production functions – Linear, Cobb–Douglas and Quadratic – Cost Concepts and Cost curves: Total, Average and Marginal Costs – Economies of Scale – Economies of Size - Determination of Optimum Input and Output – Physical and Economic Optimum.

UNIT III: Factor – Factor Relationship

- Factor – Factor relationship: Meaning - Isoquant: Definition and Types, Isoquant map – Marginal Rate of Technical Substitution – Factor Intensity – Isocline – Ridge Line – Returns to Scale – Elasticity of Factor Substitution – Isocost line – Principle of Factor Substitution and Least Cost Combination of inputs – Expansion Path – Effect of input price changes on the least cost combination.

UNIT IV: Product – Product Relationship

- Product – Product relationship: Meaning – Production Possibility Curve – Marginal Rate of Product Transformation – Enterprise relationship: Joint Products, Complementary, Supplementary and Competitive Products – Isorevenue line – Optimum Combination of Products – Principle of Equi–Marginal Returns – Principle of Opportunity Cost and Minimum Loss Principle.

UNIT V: Farm Planning and Budgeting

- Farm Planning: Importance – Characteristics of good Farm Plan – Farm planning procedure
- Budgeting: Definition and Types: Partial budgeting, Enterprise budgeting, Complete budgeting and Cash flow budgeting – Limitations of budgeting – Linear Programming: Assumptions – Linear Programming Model: Definition, Graphical solution, Advantages and Limitations – Risk and Uncertainty: Definition – Types of Risk and Uncertainty – Safeguards against Risk and Uncertainty.



ANDHRA KESARI UNIVERSITY

B.Voc Agriculture -Minor

Semester – VI

Coures 6: INTRODUCTION TO PRODUCTION ECONOMICS AND FARM MANAGEMENT (PRACTICAL)

Credits 1

Computation of depreciation cost of farm assets. Determination of most profitable level of inputs use in a farm production process. Application of equi-marginal returns/ opportunity cost principle in allocation of farm resources. Determination of least cost combination of inputs. Selection of most profitable enterprise combination. Farm holding survey. Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises. Farm business analysis, Preparation of farm plan and budget, farm records and accounts and profit & loss accounts. Collection and analysis of data on various resources in India. Seminar on selected topics.

References

1. Johl, S.S. and Kapoor, T.R. (1973), Fundamentals of Farm Business Management, Kalyani Publishers, Ludhiana.
2. Sankhayan, P.L. (1988), Introduction to the Economics of Agricultural Production, Prentice Hall of India Private Limited, New Delhi-110 001.
3. Raju, V.T. and Rao, D.V.S. (1990), Economics of Farm Production and Management, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi-110 001.
4. Dhondyal, S.P. (1985), Farm Management, Friends Publication Meerut (India).
5. Kahlon, A.S. and Karam Singh (1992), Economics of Farm Management, Allied Publishers, New Delhi. 6. Doll, John P. and Orazem. F. (1984), Production Economics: Theory with Application, John Wiley and Sons, New York.