

B.Sc. (Hons)Agriculture – 2025 Syllabus

First Year – First Semester			
S. No	Course Code	Course Title	Credit Hours
1.	IFP 101	Induction cum Foundation Pogramme	2 (0+2) (Non-Gradial)*
2.	SEC 1 TAM / ENG	Skill Enhancement Course – I <i>வேளாண் அறிவியல் தமிழ் திறன் மேம்பாடு /</i> English for Professional Skills	2 (0+2)
3.	SEC 2	Skill Enhancement Course – II	2 (0+2)
4.	AEX	Communication Skills	2 (1+1)
5.	AEX	Rural Sociology and Educational Psychology	2 (2+0)
6.	AGR	Farming Based Livelihood Systems	3 (2+1)
7.	AGM	Fundamentals of Microbiology	3 (2+1)
8.	AEC	Principles of Agricultural Economics	1 (1+0)
9.	SAC	Fundamentals of Soil Science	3 (2+1)
10	HOR	Fundamentals of Horticulture	3 (2+1)
11	NSS / NCC	National Service Scheme I / National Cadet Corps I	1 (0+1) #
12	MAT	Introductory Mathematics	1 (0+1)
13	PED	Physical Education, First Aid and Yoga Practice	2 (0+2)**
		Total	25 (12+13)
<p>*Non- Gradial but compulsory courses</p> <p>#NSS & NCC: Registered in I Semester and Evaluate in II Semester</p> <p>**PED: Registered in I Semester and Evaluate in IV Semester</p>			

IFP 101 Induction-cum-Foundation Programme 0+2 (NG)

Objective

- To give a broad view and application areas of the subject of study
- Helping students from different backgrounds for cultural Integration
- Knowing about the operational framework of academic process in university
- Instilling life and social skills, leadership qualities, team working spirit
- Developing social awareness, ethics and values, creativity
- Helping students to identify the traditional values and indigenous cultures along with diverse potentialities both in indigenous and developed scenario

Activities

The details of activities/ schedules will be decided by the parent universities. The structure shall include, but not restricted to:

- i. Discussions on operational framework of academic process in university, as well as interactions with academic and research managers of the University
- ii. Creating awareness on the subject of study, and the traditional values and indigenous cultures along with diverse potentialities both in indigenous and developed scenario
- iii. Interaction with alumni, business leaders, perspective employers, outstanding achievers in related fields, and people with inspiring life experiences
- iv. Group activities to identify the strength and weakness of students (with expert advice for their improvement) as well as to create a platform for students to learn from each other's life experiences
- v. Field visits to related fields/ establishments
- vi. Sessions on personality development (instilling life and social skills, social awareness, ethics and values, teamwork, leadership, etc.) and communication skills.

AEX 101 Communication Skills (1+1)

Theory

UNIT -I: Communication Process

The magic of effective communication; Building self-esteem and overcoming fears; Concept, nature and significance of communication process; Meaning and types

UNIT – II: Models and Barriers of Communication

Models of communication; Verbal and non-verbal communication; Linguistic and non-linguistic barriers to communication and reasons behind communication gap/miscommunication.

UNIT -III: Basic Communication Skills

Listening, Speaking, Reading and Writing Skills; Precis writing/ Abstracting/ Summarizing; Style of technical communication

UNIT -IV: Writing and Questioning

Curriculum vitae/resume writing; Innovative methods to enhance vocabulary, analogy questions.

UNIT- V: Structural and Functional Grammar

Sentence structure, modifiers, connecting words and verbals; phrases and clauses; Case: subjective case, possessive case; objective case; Correct usage of nouns, pronouns and antecedents, adjectives, adverbs and articles; Agreement of verb with the subject: tense, mood, voice; Writing effective sentences; Basic sentence faults.

Practical

Listening and note taking; Writing skills: precis writing, summarizing and abstracting; Reading and comprehension (written and oral) of general and technical articles; Micro-presentations and Impromptu Presentations: Feedback on presentations; Stage manners: grooming, body language, voice modulation, speed; Group discussions; Public speaking exercises; vocabulary building exercises; Interview Techniques; organization of events.

Theory Schedule

1. The magic of effective communication: Definition of communication- Principles- Functions-Information Function-Command and instructive Function-Influence or persuasive function and Integrative function-Concepts related to communication (Fidelity Noise, Empathy, Homophily, Heterophily, Propaganda, Publicity and Persuasion.)
2. Building self-esteem and overcoming fears: Understanding Confidence and Fear Strategies to build self-esteem and overcome fears-Techniques for Building Confidence- (positive self-talk, practice self-care, build positive relationship, learn from mistakes, practice assertiveness etc.,).
3. Techniques for overcoming fears (focus on preparation, gradual exposure to different communication situations, consistent practice, rehearse out loud etc.,).
4. Communication Process-Meaning, Concept, nature (dynamic, social, reciprocal and interdependent) and Significance-Elements of communication process.
5. Communication Types: Verbal - Written communication –oral communication- interpersonal and intrapersonal communication-mass Communication-Components of Non-Verbal Communication-Proxemics, Haptics, Gestures, Paralinguistic, Facial expressions, Chronemics Oculistics, Posture, Appearance and Artifacts.
6. Models of communication –Linear Model-Aristotle, Lasswells model, Shanon-Weaver, Berlo, Leagans, Rogers & Shoemaker. Interactive Model-Schramm, Westley& Maclean. Transactional Model-Dance Helical model.
7. Linguistic and non-linguistic barriers to communication- communication gap- Types of communication gap (Vertical gaps, Horizontal gaps, Internal gaps, External gaps, Knowledge gaps, Delivery gaps, Generation gaps) Miscommunication- concept and disadvantages
8. Listening and Speaking: Definitions: Hearing Vs Listening. Stages of listening process- Types of listening (Active listening, passive listening, appreciative, critical, Discriminative Listening, Comprehension listening -Selective Listening). Speaking skills (motor perceptive skills and interaction skills) and types (imitative, intensive, responsive, transactional, interpersonal and extensive).
9. **Mid semester Examination**

10. Reading Skills -Types of reading (Intensive, extensive, selective, loud, silent, skimming, scanning, - Comprehension -Reading comprehension- comprehension skills- Readability index- Guidelines for effective reading.
11. Writing Skills-Graham's Flow Chart on Writing-Types - writing skills for easy reading- Points to be considered in technical writing.
12. Precis writing - Rules for making a precis-guidelines - Abstracting and Summarizing - Styles of technical communication: Assertive Style- Aggressive Style- Passive-Aggressive Style- Submissive Style- Manipulative Style.
13. Tips for writing resume and curriculum vitae and difference between them.
14. Innovative methods to enhance vocabulary (reading extensively, playing word game, listening to podcast, use of mnemonics, practice using new words).
15. Analogy questions: (power of reasoning and ability to think concisely and accurately) for writing farm related contents, Sentence structure Modifiers, connecting words and verbals for effective literature writing.
16. Phrases and clauses: Use of phrases and clauses. Case: subjective case, possessive case; objective case; Correct usage of nouns, pronouns and antecedents, adjectives, adverbs and articles.
17. Agreement of verb with the subject: tense, mood, voice in communication. Writing effective sentences- Basic sentence faults to be avoided while writing for farmers.

Practical schedule

1. Practicing micro presentations - I
2. Practicing micro presentations- II
3. Impromptu presentations
4. Analysing the feedback on presentations
5. Stage manners (grooming, body language, voice modulation and speed: Practicing as individual)
6. Stage manners (grooming, body language, voice modulation and speed: Practicing as Groups)
7. Public speaking Exercise (Practicing)
8. Exercise on organising Training and Demonstration events for Farmers

9.Exercise on Interview Techniques

10.Practicing group discussion

11.Practicing Listening and note taking methods

12.Practicing Writing Skills- Precise writing

13.Practicing Summarizing and Abstracting

14.Practicing Reading and Comprehension (written) of general and technical articles

15.Practicing Reading and Comprehension (oral) of general and technical articles

16.Practising vocabulary building exercise and resume writing

17.Final Practical Examination

Learning Outcome

1. Develop confidence and overcome fears to communicate effectively in personal and professional settings.
2. Understand the process, types, models and barriers of communication for practical application.
3. Acquire basic skills in listening, speaking, reading, and writing for effective expression.
4. Practice grammar, sentence structure and vocabulary for clear and correct communication.
5. Gain skills in resume writing, précis writing, summarizing and technical writing.
6. Demonstrate positive group communication through discussions, presentations and interviews.

Textbooks

- Chandrakandan, K., VenkataPirabu, J., Karthikeyan, C. and Anandaraja, N. 2001 Mass Media and Interpersonal Communication for Social Awakening. Authors Press, New Delhi. ISBN: 81-7273-058-6.
- Chandrakandan, K., Karthikeyan, C., Venkatesan, C. and BalajiBabu, C. 2003. Development Communication and Information Technology Management. Pragati Prakashan, Meerut. ISBN: 81-7556-506-3

- Sharma,S.D. 2006. A text book of Professional communication skills and ESP for Engineers and Professionals , Mehara Offset Press, New Delhi
- Laxmi Lal Somani, 2020. Textbook of Communication and Soft Skills Development, AGROTEC Publishing Academy. ISBN: 978-81-8321-517-6

Reference Books

- Allport, G. W. 1937. Personality: A Psychological Interpretation. Holt, New York.
- Thomson, A. J. and Martinet, A. V. 1977. A Practical English Grammar. Oxford University.
- Brown Michele and Gyles Brandreth. 1994. How to Interview and be Interviewed. Sheldon Press, London.
- Carnegie Dale. 1997. The Quick and Easy Way to Effective Speaking. Pocket Books, New York.
- Pease, Allan. 1998. Body Language. Sudha Publications, Delhi.
- Raman, M. and Singh, P. 2000. Business Communication. Oxford University Press.
- Neuliep James, W. 2003. Intercultural Communication - A Contextual Approach. Houghton Mifflin Co Boston
- Kumar, S. and Pushpalata. 2011. Communication Skills. Oxford University Press.
- Francis Peter, S. J. 2012. Soft Skills and Professional Communication. Tata McGraw Hill, New Delhi.
- Seely, J. 2013. Oxford Guide to Effective Writing and Speaking. Oxford University Press.

AEX 102 Rural Sociology and Educational Psychology (2+0)

Theory

UNIT I- Rural Sociology, Indian Rural Society, Social Groups, Social Stratification

Extension Education and Agricultural Extension: Meaning, definition, scope, and importance. Sociology and rural sociology: Meaning, definition, scope, importance of rural sociology in Agricultural Extension, and interrelationship between rural sociology and Agricultural Extension. Indian Rural Society: important characteristics, differences and relationship between rural and urban societies. Social Groups: Meaning, definition, classification, factors considered in formation and organization of groups, motivation in group formation and role of social groups in Agricultural Extension. Social Stratification: Meaning, definition, functions, basis for stratification, forms of social stratification- characteristics and- differences between class and caste system.

UNIT II -Culture, Values, Social Institutions and Organisations

Cultural concepts: culture, customs, folkways, mores, taboos, rituals. Traditions: Meaning, definition and their role in Agricultural Extension. Social Values and Attitudes: Meaning, definition, types and role of social values and attitudes in agricultural Extension. Structure of Rural Society and Pattern of Rural settlement. Social Institutions: Meaning, definition, major institutions in rural society, functions, and their role in agricultural Extension. Social Organizations: Meaning, definition, types of organizations and role of social organizations in agricultural Extension.

UNIT III - Social Control, Social Change

Social Control: Meaning, definition, need of social control and means of social control. Social change: Meaning, definition, nature of social change, dimensions of social change and factors of social change. Leadership: Meaning, definition, classification, roles of leader, different methods of selection of professional and lay leaders. Training of Leaders: Meaning, definition, methods of training, Advantages and limitations in use of local leaders in Agricultural Extension.

UNIT IV- Psychology, Intelligence and Personality

Psychology and educational psychology: Meaning, definition, scope, and importance of educational psychology in Agricultural Extension. Basics of Human behaviour. Intelligence: Meaning, definition, types, factors affecting intelligence and importance of intelligence in Agricultural Extension. Personality: Meaning, definition, types, factors influencing the personality and role of personality in agricultural Extension.

UNIT V- Teaching-Learning Process

Sensation, Attention and Perception- meaning, definition and factors. Attitude – Concept – Factors influencing the development of attitude of farmers. Teaching: Learning process: Meaning and definition of teaching, learning, learning experience and learning situation, Domains of Learning - Cognitive, Affective and Psychomotor, Elements of learning situation and its characteristics. Principles of learning and their implication of teaching.

Lecture Schedule

1. Extension Education and Agricultural Extension: Meaning, definition, scope, and importance.
2. Sociology and Rural Sociology- Meaning, definition, scope and importance- Interrelationship between rural sociology and Agricultural Extension.
3. Indian Rural Society – important characteristics - Differences and relationships between rural and urban societies.
4. Rationale of understanding the traits of rural society for Effective Extension work
5. Social Groups -Meaning, definition, and classification of social groups.
6. Factors considered in formation and organization of groups
7. Motivation in group formation- Role of social groups in Agricultural Extension - Commodity groups, Farmer Interest Groups and Farmer Producer Companies
8. Social Stratification -Meaning, definition, functions, basis and forms.
9. Characteristics and Differences between class and caste systems- Understanding Social Stratification with respect to Agricultural Extension work
10. Cultural Concepts in Rural Society- Culture, Customs, folkways, mores, taboos, rituals, traditions and belief – Meaning, Definition and their role in agricultural Extension.
11. Cultural traditions and their relevance to extension- Barriers due to cultural norms.
12. Social Values and Attitude- Meaning, definition, and types of social values and attitudes- Role in Agricultural Extension

13. Social Institutions in Rural Society- Meaning, definition, and major institutions (family, religion, education, economy, politics) -- Functions and Roles of Social Institutions in Agricultural Extension
14. Social Organizations-Meaning, definition, and types of organizations - Role in agricultural development (e.g., cooperatives, SHGs, Voluntary organisations and NGOs)
15. Social Control- Meaning, definition, need for social control- Means of social control: formal and informal
16. Social Change: Meaning, Definition, Nature and Dimensions of social change
17. Factors Influencing Social Change- Technological, cultural, economic, political, and environmental factors- Agricultural Extension as a change agent
18. **Mid Semester Examination**
19. Leadership: Meaning, definition, classification, roles of a leader
20. Different methods of selection of professional and lay leaders
21. Training of Leaders: Meaning, definition, methods of training, Advantages and limitations in use of local leaders in Agricultural Extension.
22. Psychology and Educational Psychology- Meaning, definition, and scope and importance of educational psychology in Agricultural Extension
23. Basics of Human Behavior- Definition and characteristics of human behaviour
24. Factors influencing behavior: biological, psychological, social- Importance of understanding behavior in Agricultural Extension.
25. Intelligence: - Meaning, definitions of Intelligence-Gardner's multiple intelligences- Types of Intelligence
26. Factors affecting Intelligence and importance of intelligence in Agricultural Extension.
27. Personality: Meaning, definition, types, factors influencing the personality and role of personality in agricultural extension.
28. Sensation, Attention and Perception- meaning, definition and factors.
29. Attitude – Concept – Factors influencing the development of attitude of farmers
30. Cognitive, Affective and Psychomotor Domain of Learning - Bloom's Taxonomy - Importance for adults learning
31. Teaching Learning Process- Meaning and Definition of Teaching- Principles of Teaching- Steps in Extension Teaching.
32. Learning process: Meaning and definition of learning, learning experience and learning situation.
33. Elements of learning situation and its characteristics.

34. Principles of Learning and their implications of teaching.

Learning Outcomes

1. Understand key concepts of rural sociology and their relevance to agricultural extension.
2. Recognize the role of social groups, institutions and organizations in rural development.
3. Analyse social interaction, social change and their impact on agricultural extension work.
4. Apply basic concepts of psychology and educational psychology in extension programmes.
5. Understand intelligence, personality, motivation and learning domains for effective farmer education.
6. Develop skills to apply teaching–learning principles for technology transfer and farmer capacity building.

Text books

- Chauhan, S.S. (2009) - *Advanced Educational Psychology*. Vikas Publishing House.
- Chitambar. (1977). *Introductory Rural Sociology*. New Age International Publishers. ISBN: 9389802288.
- Dahama, O.P., & Bhatnagar, O.P. (2005). *Education and Communication for Development*. Oxford IBH.
- Desai, A.R. (1977). *Rural Sociology in India*. Popular Prakashan.
- Janaki Rani A, M. Ramasubramanian, C. Karthikeyan and A.M. Juno. 2025. *Applied Behaviour and Human Construct*. Notion Press. ISBN: 979-88-977707-2-4
- Karthikeyan, C., Chandrakandan, K. and Balasubramani, N. 2004. *A text book on Instructional Technology*. RBSA Publishers, Jaipur. ISBN: 81-7611-244-5.
- Karthikeyan, C., Sendilkumar, R. and Jaganathan, D. 2008. *A Text Book of Agricultural Extension Management*. Atlantic Publisher and Distributors (P) Ltd, New Delhi. ISBN: 978-81-269-0081-3.
- Santrock, J.W. (2020) - *Educational Psychology*. McGraw-Hill Education.

- Woolfolk, A. (2016) - *Educational Psychology*. Pearson Education.

Reference Books

- Chauhan, S.S. (2009) - *Advanced Educational Psychology*. Vikas Publishing House.
- Chitambar. (1977). *Introductory Rural Sociology*. New Age International Publishers. ISBN: 9389802288.
- Dahama, O.P., & Bhatnagar, O.P. (2005). *Education and Communication for Development*. Oxford IBH.
- Desai, A.R. (1977). *Rural Sociology in India*. Popular Prakashan.
- Santrock, J.W. (2020) - *Educational Psychology*. McGraw-Hill Education.
- Woolfolk, A. (2016) - *Educational Psychology*. Pearson Education.

Online Resources

- Food and Agriculture Organization (FAO): *Extension and Rural Development*www.fao.org
- National Institute of Agricultural Extension Management (MANAGE) Resources.
- National Digital Library of India (NDLI) - Educational Psychology Resources

MIT Open Course Ware - *Introduction to Educational Psychol*

AGR 101 Farming Based Livelihood Systems (2+1)

Theory

Unit- I

Status of agriculture in India and different states, income of farmers and rural people in India, livelihood-definition, concept and livelihood pattern in urban and rural areas, different indicators to study livelihood systems.

Unit- II

Agricultural livelihood systems (ALS): meaning, approach, approaches and framework, definition of farming systems and farming based livelihood systems prevalent farming systems in India contributing to livelihood. Types of traditional and modern farming systems. Region-specific farming livelihood. Farming typology analysis.

Unit- III

Components of farming system/ farming-based livelihood systems- crops and cropping systems, livestock (dairy, piggery, goatry, poultry, duckry etc.), horticultural crops, agro--forestry systems, aqua culture duck/poultry cum fish, dairy cum fish, piggery cum fish etc., small, medium and large - Enterprises including value chains and secondary enterprises as livelihood components for farmers

Unit- IV

Factors affecting integration of various enterprises of farming for livelihood. Feasibility of different farming systems for different agro-climatic zones, commercial farming-based livelihood models by NABARD, ICAR and other organizations across the country, case studies on different livelihood enterprises associated with the farming.

Unit- V

Risk and success factors in farming-based livelihood systems, schemes and programs by Central and State government, public and private organizations involved in promotion of farming-based livelihood opportunities. Role of farming-based livelihood enterprises in 21st century in view of circular economy, green economy, climate change, digitalization and changing life style.

Practical

Survey of farming systems and agricultural based livelihood enterprises. Agro-climatic zones of India and the components of farming systems prevalent in each zone. Preparation of cropping scheme and IFS model for wetland, irrigated upland and dryland. Working out indices for evaluating the cropping system. Production and profitability analysis of crop-based livelihood models. Study of livestock-based livelihood models. Visit to agro-processing unit. Resource recycling in integrated farming system models of different eco systems. Visit to integrated farming systems models at colleges / research stations/KVKs. Visit to innovative farming model - organic farming. Functional analysis of a value chain model in agriculture. Developing a project proposal for farming-based livelihood model. Case study of Start-Ups in agri-sectors. Final practical examination

Lecture Schedule

1. Status of agriculture in India, different states and Tamil Nadu: Historical significance of agriculture in India, Role of agriculture in India's economy (GDP contribution, employment, etc.). - Major crops and agricultural zones in India, Challenges facing Indian agriculture: Comparative analysis of productivity variations across Indian states.
2. Farmers' income: Current trends in farmers' income across India. Challenges - low profitability, high input costs, and market access. - Role of Minimum Support Price (MSP) and government schemes. Policy initiatives for doubling farmers' income.
3. Challenges and opportunities for enhancing farmers' income: Key challenges - climate change, input costs, fragmented landholdings, and market access. Opportunities - crop diversification, organic farming, digital agriculture and agro-processing industries.
4. Livelihood definition, concept, and patterns in urban and rural areas: resources, assets and activities. Differences in livelihood patterns between urban and rural areas.
5. Livelihood systems indicators for analysis: Key indicators of livelihood systems - Economic (income, employment, productivity), Social (education, health, gender equity), Environmental (resource sustainability, ecological balance). Methods for assessing livelihood systems.
6. Definition of Agricultural Livelihood Systems (ALS). Major components of ALS - land, labour, capital, and knowledge.

7. Approaches to agricultural livelihood systems: Traditional vs. modern approaches to ALS - Integrated farming systems, sustainable agricultural practices and climate-resilient approaches. Sustainable Livelihood Framework (SLF). Application of the SLF in understanding ALS.
8. Challenges and future perspectives in agricultural livelihood systems: Future trends - digital agriculture, agro-ecotourism, and value-chain integration.
9. Introduction to farming systems and farming based livelihood systems: Definition of farming systems. Components of farming systems. Relationship between farming systems and rural livelihoods.
10. Types of farming systems, characteristics and farm type assessment: Classification of farming systems - subsistence farming, commercial farming and mixed farming. Specialized systems - organic farming, agroforestry, integrated farming systems (IFS). Farm type assessment - Farm Typology.
11. Prevalent farming systems in India and their role in livelihoods: Overview of prevalent farming systems in India: Crop based systems (e.g., rice-wheat, millet-pulse), Livestock based systems (e.g., dairy, goat and poultry farming), Horticulture based systems (e.g., fruit and vegetable cultivation).
12. Components of farming systems/farming based livelihood systems - Cropping systems: Monocropping, mixed cropping, intercropping, crop rotation. Factors influencing cropping patterns, Examples of region-specific cropping systems in India.
13. Components of farming systems / farming based livelihood systems - Dairy farming: Milk production, breeds, and fodder management. Small livestock farming: Piggery, goat rearing, poultry and duck rearing. Integration of livestock with crop farming for nutrient recycling.
14. Components of farming systems / farming based livelihood systems - Horticulture as a component of farming based livelihoods: Importance of horticultural crops (fruits, vegetables, spices) in livelihoods. High-value horticulture: floriculture and medicinal plants.
15. Components of farming systems / farming based livelihood systems - Agroforestry systems in farming based livelihoods: Definition and types of agroforestry -

silviculture, agri-silviculture, and agri-horticulture. Benefits of agroforestry - income diversification, environmental conservation.

16. Components of farming systems / farming based livelihood systems - Fish farming. Integrated models - duck/poultry cum fish, dairy cum fish, piggery cum fish. Economic and environmental benefits.

17. Mid semester examination

18. Components of farming systems / farming based livelihood systems: Definition and examples of small, medium, and large farm-based enterprises. Small enterprises - beekeeping, mushroom cultivation, sericulture. Medium enterprises - agro-processing units. Commercial based Large enterprises.

19. Value chains in farming based livelihood systems: Definition and importance of agricultural value chains. Steps in value chain creation - production, processing, marketing, distribution.

20. Secondary enterprises and their role in livelihoods: Examples of secondary enterprises - food processing, dairy products, handicrafts. Role in income diversification and rural employment.

21. Challenges and future prospects of farming based livelihood systems: Challenges: resource constraints, climate change, market access, and policy gaps. Innovations for the future: digital agriculture, agro-tourism, vertical farming.

22. Factors affecting integration of various enterprises in farming for livelihood: Resource availability (land, water, labour, and capital), Agro-climatic conditions (soil type, rainfall, and temperature), Socio-economic factors (education, market access, and traditional practice).

23. Feasibility of farming systems across agro-climatic zones: Wetland IFS model, Garden land IFS model and Dryland IFS model.

24. Future directions in integrated farming systems: Climate smart agriculture and resilient farming systems- Case studies

25. Overview of commercial farming based livelihood models in India - Definition and scope - Role of organizations – ICAR and NABARD.

26. NABARD's initiatives in rural livelihoods and agriculture: Producer organizations, Self-Help Groups (SHGs) and Agri-clinics and agri-business centers (ACABC).
27. Climate-resilient farming practices under NICRA. NGO-led livelihood enterprises (e.g., BAIF Development Research Foundation). Government programs: Rashtriya Krishi Vikas Yojana (RKVY) and eNAM.
28. Types of risks in farming: economic, environmental, technological, and social. Success factors in farming based livelihood systems: resource management, innovation, market access, and community support.
29. Central and State Government schemes and programs for promoting farming based livelihoods.
30. Role of public and private organizations in promoting farming based livelihoods.
31. Introduction to the circular economy concept - sustainability, reducing waste, and promoting the reuse of resources. Zero-waste farming systems - recycling organic waste, composting, and integrated waste management.
32. Definition and principles of the green economy. Sustainable agriculture practices and Eco-friendly technologies in farming.
33. Digitalization and its impact on farming based livelihood enterprises: Role of drones, sensors, and data analytics. Digital platforms for market access, e-commerce, and direct-to-consumer sales. Financial technologies - Role of platforms like eNAM, digital seed systems, and mobile apps in India and Tamil Nadu.
34. Changing lifestyles and their impact on farming based livelihood enterprises. Diversification of income through eco-tourism, agri-tourism, and farm visits.

Practical Schedule

1. Survey of farming systems and agricultural based livelihood enterprises
2. Agro-climatic zones of India and the components of farming systems prevalent in each zone
3. Preparation of cropping scheme and integrated farming system models for wetland

4. Preparation of cropping scheme and integrated farming system models for Irrigated upland
5. Preparation of cropping scheme and integrated farming system models for dryland
6. Working out indices for evaluating the cropping system
7. Production and profitability analysis of crop-based livelihood models
8. Study of livestock-based livelihood models
9. Study of agro-processing unit
10. Resource recycling in integrated farming system models of different eco systems
11. Visit to integrated farming systems models at colleges / research stations/KVKs
12. Visit to innovative farming model - organic farming.
13. Functional analysis of a value chain model in agriculture
14. Interaction with FPOs for knowledge sharing on Value addition
15. Developing a project proposal for farming-based livelihood model
16. Case study of Start-Ups in agri-sectors
- 17. Final practical examination**

Learning Outcomes

- Students will gain the basic and applied knowledge on farming systems and exposed to various income generation enterprises

Text books

- Reddy, S.R. 2016. Farming System and Sustainable Agriculture, Kalyani Publishers, New Delhi.
- Singh, J.P., et al. 2015. Region Specific Integrated Farming System Models, ICAR-Indian Institute of Farming Systems Research, Modipuram.
- Walia, S. S. and Walia, U. S. 2020. Farming System and Sustainable Agriculture, Scientific Publishers, Jodhpur, Rajasthan.

- Raghuveer Singh, N. Ravisankar, V. Ramamurthy, Meraj Alam Ansari, Raghavendra, KJ, M. Shamim, A. S. Panwar, A.K. Prusty, S. Bhaskar, N. Subash, Sunil Kumar, Rajbir Singh and Meenu Rani.2023. Atlas of Cropping Systems in India, ICAR-Indian Institute of Farming Systems Research, Modipuram p. 320
- Palaniappan, SP and K. Sivaraman.1996. Cropping systems in the tropics Principles and management. New Age International (P) Ltd., New Delhi.
- Jayanthi, C. Devasenapathy, P and C. Vennila. 2007. Farming Systems. Principles and practices. Satish Serial Publishing House. New Delhi.

References

- Agarwal, A. and Narain, S. 1989. Towards Green Villages: A strategy for Environmentally, Sound and Participatory Rural Development, Center for Science and Environment, New Delhi, India.
- Ashley, C. and Carney, D. 1999. Sustainable Livelihoods: Lessons from Early Experience; Department for International Development: London, UK; Volume 7. [Google Scholar].
- Carloni, A. 2001. Global Farming Systems Study: Challenges and Priorities to 2030 – Regional Analysis: Sub-Saharan Africa, Consultation Document, FAO, Rome, Italy.
- Dixon, J. and Gulliver, A. with Gibbon, D. 2001. Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing World. FAO & World Bank, Rome
- Evenson, R.E. 2000. Agricultural Productivity and Production in Developing Countries'. In FAO, The State of Food and Agriculture, FAO, Rome, Italy
- Livelihood Improvement of Underprivileged Farming Community: Some Experiences from Vaishali, Samastipur, Darbhanga and Munger Districts of Bihar by B. P. Bhatt, Abhay Kumar,P.K. Thakur, Amitava Dey Ujjwal Kumar, Sanjeev Kumar, B.K. Jha, Lokendra Kumar, K. N. Pathak, A. Hassan, S. K. Singh, K. K. Singh and K. M. Singh ICAR Research Complex for Eastern Region ICAR Parisar, P.O. Bihar Veterinary College, Patna - 800 014, Bihar

- Panwar et al. 2020. Integrated Farming System models for Agricultural Diversification, Enhanced Income and employment, Indian Council of Agricultural Research, New Delhi.
- Ravisankar, N., B. Gangwar, Kamta Prasad, Raghuveer Singh and Rajbir Singh (Eds).2015. Farming Systems Research: Success Stories (Series 1), AICRP on Integrated Farming Systems, ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut p. 246
- Barba-Escoto, L., Prusty, A. K., Lopez-Ridaura, S., Ravisankar, N., Jat, M.L., Tatarwal, J. P. and Panwar, A. S.2019. Researchers' Manual for Quantitative Farming Systems Typologies Applications using the R Statistical Tool, ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut and International Maize and Wheat Improvement Centre (CIMMYT), Mexico p. 169
- Mohammad Shamim, N. Ravisankar, A.K. Prusty, Meraj Alam Ansari, Raghuveer Singh, Raghavendra, KJ, A.S. Panwar, S. Bhaskar, Rajbir Singh and Sunil Kumar.2024. Bankable Integrated Farming System Models, ICAR-AICRP on Integrated Farming Systems, ICAR-Indian Institute of Farming Systems Research, Modipuram p. 211

AGM 101 Fundamentals of Microbiology (2+1)

Theory

Unit I: Introduction

Definition and scope of Microbiology. Milestones in Microbiology; Discovery of microorganisms biogenesis and abiogenesis theory; contributions of Antonie Van Leeuwenhoek, Louis Pasteur, John Tyndall, Robert Koch, Edward Jenner, Joseph Lister, John Franklin Enders, Maurice Hilleman, Alexander Fleming and Waksman. Germ theory of diseases, fermentation and origin of life

Unit II: Microbiological Techniques

General principles of light microscopy - magnification, resolving power and numerical aperture. Different types of light and electron microscopes; three-dimensional imaging - atomic force and Confocal scanning laser microscopy. Staining techniques - principle and types of stains; simple, negative, differential and structural staining. Sterilization and disinfection techniques; principles and methods of sterilization - physical methods – heat, filters and radiation; chemical methods. Isolation, enrichment culture techniques of bacteria, yeast, molds and actinobacteria. Preservation of microbial cultures.

Unit III: Microbial World

Evolutionary relationship among the living organisms. Whittaker's five kingdom concept of living organism and Carl Woese systems. Prokaryotic and eukaryotic microorganisms. Three domains of life –similarities and differences; Bergey's Manual of Systematic Bacteriology. Bacteria - bacterial size, shape and arrangement; bacterial cell structure and function. Morphology of fungi and algae. Rickettsia and Chlamydia- similarities and differences. General properties of viruses: different types; overview of bacteriophages; morphology of bacteriophages: Lytic and lysogenic cycles; Virulent and temperate phages.

Unit IV.:Microbial Growth and Metabolism

Bacterial growth and reproduction - population growth- growth cycles of population; environment on growth –temperature, oxygen, pH and salts; nutritional classification – chemoautotrophy and photo autotroph. Energy generation in bacteria. Aerobic and anaerobic respiration and fermentation in bacteria.

Unit V: Microbial Genetics and Immunology

Central dogma of life. Genetic elements of bacteria; bacterial chromosomal DNA, plasmids, IS elements and transposons; Mutation - types and mutagens. Genetic recombination; transformation, transduction and conjugation. Genetic engineering – an introduction. Basic concepts of immunology – antigen –antibody reactions and vaccines.

Practical

Microbiological safety in the laboratory; Introduction to microbiology laboratory and its equipment's. Microscopes- handling with microscope. Micrometry. Methods of sterilization and equipment's used for sterilization. Nutritional media and their preparations. Enumeration of microbial population - bacteria, fungi and actinobacteria. Methods of purification and preservation of microbial cultures. Staining and microscopic observations; simple and differential staining – spore staining. Measurement of bacterial growth. Identification of microorganisms – morphological identification of yeasts, molds and algae. Identification-cultural, physiological and biochemical tests for bacteria and actinobacteria. Isolation of bacteriophages. Isolation of mutants employing physical or chemical mutagens. Determination of Antigen- antibody reaction.

Theory schedule

1. Definition and scope of microbiology
2. Biogenesis and a biogenesis theory. Contributions by Antonie Van Leeuwenhoek and Louis Pasteur
3. Contributions of John Tyndall, Joseph Lister, Edward Jenner, Robert Koch, Alexander Fleming and Waksman, John Franklin Enders, Maurice Hilleman. Germ theory of diseases, Fermentation and Origin of life
4. Microscopy; principles – resolving power and magnification. Light microscopy
5. Different types of microscopes - UV, dark field, phase contrast and fluorescence
6. Electron microscopes; atomic and confocal scanning laser microscopy
7. Staining techniques - principle and types of stains - staining techniques- simple, negative, differential and structural staining methods
8. Sterilization – principle – physical agents and chemical methods
9. Isolation and enrichment culture techniques; preservation techniques

10. Evolutionary relationship - position of microbes in living world – concepts and developments in classification of microorganisms.
11. Groups of microorganisms - prokaryotes and eukaryotes. Archaea – ecology; differences among archaea, eubacteria and eukaryotes. Rickettsia and Chlamydia similarities and differences.
12. Bergey's manual of systematic bacteriology – outline only. Economic importance of bacteria
13. Bacteria- size, shape, structure and arrangement of cells
14. Bacteria - external and internal structures in bacteria and their functionality
15. Morphology and classification of fungi and economic importance
16. Morphology and classification of algae and economic importance
17. Viruses and their properties; bacteriophages – lytic and lysogenic cycles- Virulent and temperate phages

18. Mid Semester Examination

19. Reproduction in bacteria - population growth and growth phases – generation time and specific growth rate
20. Batch and continuous culture – chemostat and turbidostat; synchronous culture. Diauxic growth curve.
21. Conditions for growth - temperature requirements - aerobes and anaerobes – other factors influencing growth; methods of assessment of growth.
22. Nutritional types of bacteria. Metabolic diversity in microbes.
23. Aerobic respiration and anaerobic respiration
24. Fermentative mode of respiration
25. Oxygenic and anoxygenic mode of photosynthesis
26. Energy generation by substrate level phosphorylation, oxidative and photophosphorylation

27. Central dogma of life - Genetic elements in bacteria – structure and functions of bacterial chromosome and plasmid and transposons
28. Mutation in bacteria – principles and types. Mutagens – physical, chemical and biological
29. Genetic recombination – competency - transformation
30. Genetic recombination by Conjugation – concept of Hfr
31. Genetic recombination by Transduction – generalized and specialized
32. Microorganisms as tools in genetic engineering
33. Immunology – principles – specific and non-specific defense
34. Antigen – antibody reactions – vaccines - applications

Practical schedule

1. Safety in Microbiology laboratory. Microscopes – handling light microscope
2. Micrometry-measurement of microorganisms
3. Aseptic techniques – working with equipment and apparatus
4. Preparation of growth media for bacteria, yeast, molds and actinobacteria
5. Isolation of microorganisms by serial dilution and plating technique
6. Purification of bacteria and actinobacteria
7. Purification of yeasts and molds
8. Preservation of bacteria, fungi and actinobacteria
9. Staining techniques - Direct and Indirect staining
10. Differential staining - Gram staining
11. Turbidometric assessment of growth of bacteria
12. Morphology and Biochemical characteristics of bacteria and actinobacteria
13. Identification of yeasts, molds and algae - morphological characterization
14. Isolation of bacteriophages
15. Isolation of bacterial mutants by UV irradiation / chemical mutagenesis

16. Determination of Antigen- antibody reactions

17. Practical Examination

Learning outcomes

- Upon completing the course, learners can describe key historical theories and scientists in microbiology, such as germ theory and biogenesis.
- At course end, students can perform essential lab techniques including microscopy, staining, sterilization, and culture of microorganisms.
- By the end of the module, students can classify different types of microbes (bacteria, fungi, algae, viruses etc.), and compare their structures, life cycles, and evolutionary relationships.
- Upon finishing the course, students can explain how environmental factors affect microbial growth and contrast energy-generation pathways like respiration vs fermentation.
- At successful completion, students can apply knowledge of genetic processes (mutation, recombination, plasmids) and immunological principles (antigen-antibody interactions, vaccine basics).

Text Books

1. Michale J. Pelczar JR, E.C.S. Chan, Noel R. Krieg. 2023. Pelczar Microbiology, 5th Edition, Affiliated East – West Press
2. Michael T. Madigan, Kelly S. Bender, Daniel H. Buckley, W. Matthew Sattley and David A. Stahl. 2018. Brock Biology of Microorganisms, 15th Global Edition, Pearson Education
3. Joanne M. Willey, Kathleen M. Sandman and Dorothy H. Wood. 2022. Prescott's Microbiology, 12th edition. McGraw-Hill exclusive, UK.

Reference Books

1. Hans G. Schlegel, 2012. General Microbiology, 7 th edition
2. Ronald M. Atlas, 1997. Principles of Microbiology, Second edition
3. Tortora, G.J., B.R.Funke and C.L. Case, 2009. Microbiology- An Introduction, 9 th edition

4. Stanier, R.Y., Adelberg, E.A. and Ingram, J.L. (1991). General Microbiology, 5th Ed., Prentice Hall of India Pvt. Ltd., New Delhi.

Web pages

<http://www.microbes.info>

<http://aem.asm.org>

<http://microbelibrary.com>

<http://www.rapidmicrobiology.com>

AEC 101 Principles of Agricultural Economics (1+0)

Theory

Unit 1: Nature and Scope of Economics

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro-economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, classification and characteristics, desire, want - meaning and characteristics, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country. Role of Economics in Agricultural development policies

Unit 2: Theory of Consumption

Utility theory - cardinal and ordinal utility; law of diminishing marginal utility, equi-marginal utility principle, Indifference curve analysis and properties - budget line: definition, assumptions, limitations and applications - consumer's equilibrium and derivation of demand curve. Demand: meaning, kinds of demand, law of demand, demand schedule and demand curve, determinants; Concept of consumer surplus and its importance. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Factors influencing elasticity of demand - Importance of elasticity of demand – Standard of Living: Definition, Engel's Law of Family Expenditure.

Unit 3: Theory of Production

Production: process, creation of utility, factors of production definition and characteristics - Input Output Relationship. Laws of returns: Law of variable proportions and Law of returns to scale. Cost: Cost concepts, short run and long run cost curves. Revenue concepts: Total, Average and Marginal revenue. Supply: Stock versus supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply.

Unit 4: Exchange and Distribution

Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Digital Marketing – Meaning, scope and role in agricultural markets. Distribution theory: meaning, factor market and pricing of factors of production - Concepts of

Rent and Quasi rent - Wages: Real wage and money wage - Population: Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programs on population control. Interest: Pure interest and gross interest – Profit: Meaning of economic profit -Forms of business organizations,

Unit 5: Macroeconomic Concepts

National income: Meaning and importance, circular flow, concepts of national income - accounting and approaches to measurement, difficulties in measurement. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, money supply, general price index, inflation and deflation. Agricultural and public finance: meaning, micro versus macro finance, need for agricultural finance, public revenue and public expenditure. Tax: meaning, direct and indirect taxes, agricultural taxation. Economic systems: Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning. international trade and balance of payments. GST and its implication on Indian economy

Lecture Schedule

1. Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macroeconomics, positive and normative analysis
2. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services - classification and characteristics, desire, want –meaning and characteristics, demand, utility, cost and price, wealth, capital, income and welfare.
3. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country. Role of Economics in Agricultural development policies
4. Utility theory - cardinal and ordinal utility; law of diminishing marginal utility, equi-marginal utility principle, Indifference curve analysis and properties - budget line - definition, assumptions, limitations and applications.
5. Consumer's equilibrium and derivation of demand curve, Demand: meaning, kinds of demand, law of demand, demand schedule and demand curve, determinants concept of consumer surplus and its importance.

6. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Factors influencing elasticity of demand, Importance of elasticity of demand. Standard of Living: Definition, Engel's Law of Family Expenditure.

7. Production: process, creation of utility, factors of production definition and characteristics- Input Output Relationship.

8. Mid Semester Examination

9. Laws of returns: Law of variable proportions and law of returns to scale. Cost: Cost concepts, short run and long run cost curves. Revenue concepts: Total, Average and Marginal revenue.

10. Supply: Stock versus supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply.

11. Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Digital Marketing – Meaning, scope and role in agricultural markets.

12. Distribution theory: meaning, factor market and pricing of factors of production. - Concepts of Rent and Quasi rent - Wages: Real wage and money wage - Population: Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programmes on population control.

13. Interest: Pure interest and gross interest – Profit: Meaning of economic profit Forms of business organizations.

14. National income: Meaning and importance, circular flow, concepts of national income - accounting and approaches to measurement, difficulties in measurement.

15. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, money supply, general price index, inflation and deflation. Agricultural and public finance: meaning, micro versus macro finance, need for agricultural finance,

16. Public revenue and public expenditure. Tax: meaning, direct and indirect taxes, agricultural taxation. .Economic systems: Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning. international trade and balance of payments. GST and its implication on Indian economy

Learning Outcomes

Understanding of the basic principles of economics including the problem of agricultural economics decision - making, laws of economics and macroeconomic concepts.

Text books

1. Dewett, K. K. 2004. Modern Economic Theory, Syamlal Charitable Trust, New Delhi.
2. S. Subha Reddy, P. Raghu Ram, T.V. Neelakanta and I. Bhvani Devi .2004. Agricultural Economics. Oxford & IBH publishing Co. Pvt. Ltd

References

1. Samuelson, P. 2004. Economics, (18/e), Tata Mc-graw-Hill, New Delhi
2. Seth, M. L. 2005. Principles of Economics, Lakshmi Narain Agarwal Co., Agra. New Delhi.
3. Gregory Mankiw, N. Principles of Microeconomics. 8th ed., Cengage Learning, 2016.

SAC 101 Fundamentals of Soil Science (2+1)

Theory

Soil: Pedological and edaphological concepts. Rocks and minerals, Weathering, Soil formation: Pedogenic processes. Soil profile, soil texture, soil structure, bulk density and particle density, soil consistency, soil temperature, soil air, soil water. Soil reaction and buffering capacity. Soil colloids: inorganic and organic, Properties of soil colloids. Silicate clays: constitution and properties, sources of charge, ion exchange, cation and anion exchange capacity and base saturation after buffering capacity. Soil organic matter. Soil taxonomy, keys to soil orders. Soils of India and Tamil Nadu.

Unit I Basics of Soil & Formation

Soil: Pedological and edaphological concepts. Rocks and minerals, Weathering, Soil formation: Pedogenic processes.

Unit II Soil Profile & Physical Properties

Soil profile, soil texture, soil structure, bulk density and particle density, soil consistency, soil temperature, soil air, soil water.

Unit III Soil Chemical Properties & Soil Colloids

Soil reaction and buffering capacity. Soil colloids: inorganic and organic, Properties of soil colloids

Unit IV Silicate Clays

Silicate clays: constitution and properties, sources of charge, ion exchange, cation and anion exchange capacity and base saturation.

Unit V Soil Organic Matter & Soil Taxonomy

Soil organic matter. Soil taxonomy, keys to soil orders. Soils of India and Tamil Nadu.

Practical

Study of general properties of minerals, study of minerals-silicate and non-silicate minerals, study of rocks-igneous, sedimentary and metamorphic rocks; study of a soil profile, collection and processing of soil for analysis, study of soil texture-feel method, mechanical analysis, determination of bulk density and particle density and soil porosity, determination of soil colour, study of soil structure, determination of soil moisture, determination of soil moisture constants - field capacity; water holding capacity. Study of infiltration rate of soil,

determination of hydraulic conductivity, determination of pH and Electrical conductivity of soil.

Lecture Schedule

1. Soil definition - Soil as a three dimensional natural body, Pedological and edaphological concepts of soil
2. Components of soil – soil a three phase system- Composition of Earth's crust.
3. Soil genesis: soil forming rocks-definition, formation, Classification of rocks- igneous, sedimentary and metamorphic rocks
4. Brief description of important rocks - mineralogical composition
5. Minerals- definition, occurrence, classification of important soil forming primary minerals - silicate and non- silicate minerals, ferro and non-ferro magnesium minerals
6. Formation of secondary minerals - clay minerals and amorphous minerals
7. Weathering - Rocks and minerals - Physical, chemical and biological weathering
8. Factors of soil formation- Passive and active soil forming factors
9. Soil forming process- Fundamental - Simenson's four fold soil forming process - eluviation, illuviation, translocation and humification
10. Specific Soil forming processes - podzolization, laterization, salinization, alkalization, calcification, decalcification and pedoturbation
11. Soil Profile – Horizons, Master horizons and subordinate horizons, subdivisions, Lithological discontinuity.
12. Soil physical properties: Soil texture - particle size distribution - textural classes - textural triangular diagram - significance of soil texture
13. Soil structure - classification - genesis - factors influencing structural stability - significance of soil structure
14. Soil bulk density, particle density and porosity - factors influencing – significance
15. Soil colour - Significance –measurement (Munsell colour chart) - factors influencing soil colour
16. Soil consistency - cohesion, adhesion, plasticity, Atterberg's constants - upper and lower plastic limits, plasticity number- significance of soil consistency
17. **Mid semester Examination**
18. Soil water- classification, units of expression and pF scale
19. Soil water potentials - gravitational, matric, osmotic- Soil moisture constants

20. Movement of soil water - Saturated and unsaturated flow - infiltration, hydraulic conductivity, percolation, permeability and drainage
21. Soil air, composition, gaseous exchange –effect on crop growth.
22. Soil temperature -Source, amount and flow of heat in soil and effect on crop growth.
23. Soil reaction (pH) - definition, pH scale, classification-soil acidity and alkalinity, buffering, factors affecting soil pH, effect on nutrient availability
24. Soil Electrical Conductivity – Definition-Factors affecting EC –Salinity limits- it's significance
25. Soil colloids –definition, properties, classification: inorganic and organic colloids
26. Silicate clays: structure and classification - 1:1, 2:1, 2:2 clay minerals, amorphous clay minerals and their properties
27. Sources of charge- positive and negative charge – pH dependant charge, isomorphous substitution
28. Ion exchange - Cation and anion exchange capacity and base saturation
29. Soil organic matter: properties and it's influence on soil health
30. Soil Taxonomy- Structure, differentiating characters and limitations
31. Soil Orders – keys to soil order
32. Different soil orders and distribution in the world
33. Soils of Tamil Nadu
34. Soils of India

Practical Schedule

1. Study of soil forming rocks and minerals.
2. Study of soil profile
3. Study of soil sampling tools, collection of representative soil sample, its processing and storage.
4. Determination of soil texture by feel method
5. Determination of soil texture by mechanical analysis-International pipette method
6. Determination of soil bulk density by wax coating method
7. Determination of soil bulk density, particle density and soil porosity by cylinder method.
8. Determination of soil colour
9. Determination of soil moisture content (gravimetric method).

10. Determination of soil aggregates
11. Determination of soil moisture constants - field capacity and water holding capacity.
12. Determination of infiltration rate of soil
13. Determination of hydraulic conductivity of soil
14. Determination of soil temperature
15. Determination of soil pH and Electrical conductivity.
16. Study of soil map (India and Tamil Nadu)
17. **Final Practical Examination**

Learning Outcomes

The students will gain knowledge on soil forming rocks and minerals, soil formation, pedological and edaphological approaches, physical, chemical and biological properties of soils with respect to plant growth. They will also acquire skills in determination of various soil properties

Text books

1. Thiyageshwari,S., D.Selvi, S.Meena and P.Janaki.2024. Beginner's guide to Fundamentals of Soil Science. AE Publications, Coimbatore. (ISBN:9392583753)
2. Fundamentals of Soil Science.2009 .ISSS Publication, New Delhi
3. Dilip Kumar Das. 2015. Introductory Soil Science, Kalyani Publishers, New Delhi
4. Brady, N.C.2002. The Nature and Properties of Soils (13th Edition) McMillan Co., New York. Indian Publisher – Eurasia Publishing House (P) Ltd., Ramnagar, New Delhi – 55
5. Daji A.J., (1970) A Text Book of Soil Science - Asia Publishing House, Madras
6. Biswas T.D. and Mukherjee S.K., 1987. Text Book of Soil Science–Tata McGraw Hill Publishing Co. Ltd., New Delhi

References

- <http://www.sciencedirect.com/science/books>
<http://202.200.144.17/sykc/hjx/content/ckzl/6/2.pdf>
http://www.pedosphere.com/volume01/pdf/Section._01.pdf
[http://waterquality.montana.edu/docs/homeowners/Septic Drain field Soil Suitability, Presentations /6 _Soil Texture and _Structure.pdf](http://waterquality.montana.edu/docs/homeowners/Septic_Drain_field_Soil_Suitability_Presentations/6_Soil_Texture_and_Structure.pdf)

http://wfrec.ifas.ufl.edu/landscape_horticulture/PDFdocuments/SoilProp.pdf

[http://www.rootsofpeace.org/assets/Soil%20Testing%20Manual%20V6%20\(Feb%2008\).pdf](http://www.rootsofpeace.org/assets/Soil%20Testing%20Manual%20V6%20(Feb%2008).pdf)

<http://www.soils.wisc.edu/courses/SS325/morphology.htm>

<http://www.soils.wis.edu/courses/SS325/morphology.htm>

<http://landresources.montana.edu/>

[http://ftp.wcc.nrcs.usda.gov/H...soil Other/soil-USDA-textural-class.pdf](http://ftp.wcc.nrcs.usda.gov/H...soil%20Other/soil-USDA-textural-class.pdf)

HOR 101 Fundamentals of Horticulture (2+1)

Theory

Unit 1 History, evolution and scope of horticulture

Horticulture: History, Scope and importance, Its different branches, Botanical classification of horticultural crops and nutritive value, Area and production, exports and imports, Horticultural zones of India and Tamil Nadu, soil and climate for horticultural crops.

Unit 2 Plant propagation and Nursery techniques

Plant propagation: Definition, methods and propagation structures, Seed Dormancy, Seed vigation, seed treatments and seed germination, Merits and demerits of Sexual propagation and Asexual propagation, Asexual propagation types viz., cutting, layering, grafting and budding. Use of specialized plant parts in propagation. Micropropagation - Rootstock influence - stock / scion relationship in fruit crops.

Unit 3 Orchard Establishment, Layout, planting systems and canopy management

Principles of orchard establishment, vegetable gardens, nutrition and kitchen garden and other types of gardens, planning and layout of orchards, planting systems and planting densities. Canopy management, training and pruning of horticultural crops

Unit 4 Management practices and cropping systems

Types and use of growth regulators in horticulture, water management– irrigation methods, weed management - manures and fertilizers, methods of application of fertilizers, Cropping systems, intercropping, multi-tier cropping, mulching– objectives, types merits and demerits.

Unit 5 Bearing habits, Fruitfulness and Rejuvenation

Fruitfulness and unfruitfulness - Classification of bearing habits of fruit trees, pollination, pollinizers and pollinators, fertilization and parthenocarpy, Rejuvenation of old orchards, Harvesting and post-harvest handling of horticulture crops

Practical

Identification and nomenclature of fruit, Layout of an orchard, peg marking, pit making and system of planting, Nursery raising techniques of fruit crops, Understanding of plant propagation structures, Propagation through sexual, asexual and specialized plant parts, Propagation techniques for horticultural crops, Container, potting mixture, potting and repotting, Training and pruning methods on fruit crops, Preparation of fertilizer mixture and application, Preparation and application of PGR, Layout of different irrigation systems, Maturity studies, harvesting, grading, packaging, and storage.

Theory Schedule

1. Definition, history, scope and importance, branches of horticulture and nutritive value of horticultural crops
2. Classification of horticultural crops
3. Horticultural zones of India and of Tamil Nadu, area and production statistics,
4. Exports and imports of horticultural crops in India and Central and State agencies involved in Horticultural research and development
5. Soil and climate requirements of horticultural crops
6. Types of plant propagation and plant propagation structures
7. Sexual/Seed propagation - importance, advantages and disadvantages
8. Types of dormancies- seed invigoration - seed treatments
9. Asexual/Vegetative propagation, importance, advantages and disadvantages
10. Vegetative propagation- cutting and layering methods
11. Vegetative propagation- grafting and budding methods
12. Use of specialized plant parts in propagation
13. Rootstock influence - stock scion relationship in fruit crops
14. Micropropagation of horticultural crops
15. Vegetable gardens, nutrition and kitchen garden, truck garden, riverbed cultivation, vegetable forcing, market garden and floating garden
16. Principles, planning and layout of Orchards, Planting systems i.e square, rectangular, quincunx, hexagonal, contour terracing
17. **Mid Semester Examination**
18. High density and Ultra high density planting systems and calculation of planting densities
19. Principles, objectives, methods of training in fruit crops and their merits and demerits
20. Principles, objectives, types and methods of pruning and canopy management in fruit crops
21. Types and use of growth regulators in horticulture
22. Water management– Types of Irrigation methods for horticultural crops and their merits and demerits
23. Weed management - types of weeds and their management in horticulture crops

24. Fertility management, manures and fertilizers and methods of application for horticultural crops
25. Cropping systems, intercropping, multi-tier cropping in horticultural crops
26. Mulching– objectives, types merits and demerits
27. Fruitfulness and unfruitfulness- Factors influencing the fruitfulness and unfruitfulness
28. Bearing habits of fruit trees with examples
29. Pollination, pollinizers and pollinators in Horticulture
30. Fertilization and Parthenocarpy in horticulture
31. Rejuvenation of old orchards
32. Maturity; Methods for judging the maturity in horticulture crops
33. Post harvest operations - harvesting, grading, and packing in horticulture crops
34. Transport and storage methods for horticulture crops

Practical Schedule

1. Study of different features, planning and layout of orchard
2. Identification and nomenclature of various horticultural crops
3. Study of tools and implements in horticulture
4. Study of plant growing structures
5. Preparation of nursery beds for sowing of vegetable seeds/root stock raising and Layout of nutrition garden
6. Preparation of potting mixture, Identification of containers, Potting and repotting of rootstocks and container grown plants
7. Techniques and methods of propagation through leaf, stem, root cuttings and layering
8. Techniques and methods of propagation through grafting and budding
9. Propagation through specialized plant parts
10. Layouts of different planting systems and digging of pits for fruit plants
11. Study of different methods of training and methods of pruning of orchard trees
12. Calculation of fertilizer doses, Preparation of fertilizer mixtures and field application
13. Calculation, preparation and application of growth regulators
14. Layout of different irrigation systems
15. Study of bearing habits in horticulture crops
16. Study of maturity standards, harvesting, grading, packaging and storage.
17. **Final Practical Exam**

References

1. Basics of Horticulture by Jitendra Singh
2. Introduction to Horticulture by N. Kumar
3. Handbook of Horticulture by ICAR

NSS 101 National Service Scheme I (0+1)

Practical

Introduction and Basic Components of NSS - Organizational structure of NSS - NSS program activities - Financial patterns of scheme - Understanding youth - Community mobilization - Social harmony and national integration - Indian history and culture - Volunteerism and *shramdaan* - Citizenship, constitution, and human rights - Rights to information - Family and society

Practical Schedule

1. Introduction and Basic Components of NSS. Orientation: history, objectives, principles, symbol, badge; regular programs under NSS
2. Organizational structure of NSS, Code of conduct for NSS volunteers, points to be considered by NSS volunteers' awareness about health.
3. NSS program activities: Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analyzing guiding
4. Financial patterns of scheme, youth program/ schemes of GOI, coordination with different agencies and maintenance of diary.
5. Understanding youth. Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change.
6. Community mobilization: Mapping of community stakeholders, designing the message as per problems and their culture;
7. Identifying methods of mobilization involving youth-adult partnership.
8. Social harmony and national integration.
9. Indian history and culture, role of youth in nation building,
10. Conflict resolution and peacebuilding.
11. Volunteerism and *shramdaan*. Indian tradition of volunteerism, its need, importance, motivation, and constraints; shaman as part of volunteerism
12. Citizenship, constitution, and human rights:
13. Basic features of constitution of India, fundamental rights and duties,
14. Human rights, Consumer awareness and rights ,Rights to information.
- 15 & 16 Family and society. Concept of family, community (PRIs and other community-based organizations) and society

17.Final Practical Examination

Learning Outcomes

The primary learning outcomes of the National Service Scheme (NSS) are the development of social and civic responsibility, a deeper understanding of the community, improved leadership and teamwork skills, enhanced problem-solving and communication abilities, and a greater capacity to develop practical solutions to community issues

References

<https://nss.gov.in/>

NCC 101 National Cadet Corps I (0+1)

Practical

NCC General and drill - Drill and Marching - National Integration, Personality Development, leadership development - General Awareness and involvement in social activities, Armed Forces - Social Service and Community Development

Practical Schedule

1. Aims, objectives, organization of NCC and NCC song. DG's cardinals of discipline.
2. Drill – aim, general words of command, attention, stand at ease, stand easy and turning.
3. Sizing, numbering, forming in three ranks, open and close order march, and dressing.
4. Saluting at the halt, getting on parade, dismissing, and falling out.
5. Marching, length of pace, and time of marching in quick/slow time and halt.
6. Side pace, pace forward and to the rear.
7. Turning on the march and wheeling.
8. Saluting on the march.
9. Marking time, forward march, and halt.
10. Changing step, formation of squad and squad drill.
11. Command and control, organization, badges of rank, honors, and awards.
12. Nation Building – cultural heritage, religions, traditions, and customs of India. National integration.
13. Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizens.
14. Leadership traits, types of leadership, character/personality development.
15. Civil defense organization, types of emergencies, firefighting, protection, maintenance of essential services, disaster management, aid during development projects.
16. Basics of social service, weaker sections of society and their needs, NGOs and their contribution, contribution of youth towards social welfare and family planning, structure and function of human body, diet and exercise, hygiene and sanitation, preventable diseases including AIDS, safe blood donation, first aid, physical and mental health, adventure activities, basic principles of ecology, environmental conservation, pollution and its control
17. Examination

Learning Outcomes

- Develop discipline, drill skills, and knowledge of NCC organization.
- Enhance leadership, personality, and sense of national integration.
- Apply social service, health, and environmental awareness in community.

Text books

- Handbook of NCC Cadets for 'A', 'B' and 'C' Certificate Examinations,
- Cadet's Handbook (Army Wing),

References

- Gupta, R. K. (2020). *Handbook of NCC Cadets for 'A', 'B' and 'C' Certificate Examinations*. Ramesh Publishing House. ISBN: 978-9387918573.
- St. Joseph's College of Engineering and Technology. (2022). *Cadet's Handbook (Common Subjects for All Wings)*. SJBIT Publication.

MAT 101 Introductory Mathematics (0+1)

Unit I:Algebra: Progressions- Arithmetic, Geometric and Harmonic Progressions. Matrices- Definition of Matrices-Types of Matrices- Addition, Subtraction, Multiplication, Transpose. Determinants-Properties of determinants up to 3rd order and their evaluation and Inverse up to 3rd order by adjoint method- Solution of linear equations by Crammer's rule.

Unit II:Functions: Limit: Definition, left-handed and right-handed limits, general rules for the calculation of limits Standard limits, Some Important limits (without proof).

Unit III:Differential Calculus: Definition - Differentiation of function using first principle, Derivatives of sum, difference, product and quotient of two functions, differentiation using the chain rule, differentiation of functions in parametric and implicit form, logarithmic differentiation. Geometrical interpretation of derivative. Successive differentiation. Application of Differentiation- Growth rate, Average Cost, Marginal cost and Marginal Revenue. Partial differentiation: Homogeneous function, Euler's theorem, Maxima and Minima of the functions of the form $y = f(x)$ and $y = f(x_1, x_2)$.

Unit IV:Integral Calculus: Integration -Definite and Indefinite Integrals-Methods- Integration by substitution, Integration by parts. Area under simple well-known curves.

Unit V:Mathematical Models: Agricultural systems - Mathematical models - classification of mathematical models- Fitting of Linear, quadratic and exponential models to experimental data.

Practical Schedule

1. Progressions- Arithmetic, Geometric and Harmonic Progressions.
2. Matrices-Definition of Matrices-Types of Matrices- Addition, Subtraction, Multiplication, Transpose.
3. Determinants-Properties of determinants up to 3rd order and their evaluation.
4. Inverse up to 3rd order by adjoint method- Solution of linear equations by Crammer's rule.
5. Limit: Definition, left-handed and right-handed limits, general rules for the calculation of limits Standard limits, Some important limits (without proof)

6. Definition - Differentiation of function using first principle, Derivatives of sum, difference, product and quotient of two functions.
7. Differentiation using the chain rule, differentiation of functions in parametric and implicit form, logarithmic differentiation. Geometrical interpretation of derivative.
8. Successive differentiation. Application of Differentiation- Growth rate, Average Cost, Marginal cost and Marginal Revenue.
9. Partial differentiation: Homogeneous function, Euler's theorem.
10. Maxima and Minima of the functions of the form $y = f(x)$
11. Maxima and Minima of the functions of the form $y = f(x_1, x_2)$.
12. Integration -Definite and Indefinite Integrals-Methods- Integration by substitution
13. Integration by parts. Area under simple well-known curves
14. Agricultural systems - Mathematical models - classification of mathematical model
15. Fitting of Linear and quadratic models to experimental data.
16. Fitting exponential models to experimental data.
17. **Final practical examination**

Learning Outcomes

To understand and apply fundamental concepts of mathematics applicable in biology and to acquire about theoretical concepts of Algebra, Functions, Calculus and Mathematical Modeling.

Text book

1. Kailasam.C, Pangayar Selvi. R and Vasanthi. R, 2019, Applied Mathematics, Agrobios (India), Jodhpur
2. R. Pangayar Selvi, B. Sivashankari, R. Vasanthi, 2020, A Text Book of Elementary Mathematics, AkiNik Publications, New Delhi.
3. Mehta, B. C. and G. M. K. Madhani, 2014, Mathematics for Economists, Sultan Chand & Sons, New Delhi.
4. Ranganathan.C.R. 2006, A First Course in Mathematical Models of Population Growth (with MATLAB programs), Associated publishing company, New Delhi

5. Manickavasagam Pillai, T. K and Natarajan, T. 2016. Calculus, Viswanathan Publications, Madras.

PED 101 - Physical Education, First Aid, Yoga Practice and Meditation (0+2)

Practical

History of sports and ancient games- rules, measurements of major games - Need and requirement of first aid.

Practical Schedule

1 to 4:History of sports and ancient games.

5 to 8:Governance of sports in India

9 to 14 :Important national sporting events; Awards in Sports

15 to 22:Cricket : Latest rules, measurements of playfield, specifications of equipment and teaching of skills and techniques

23 to 28:Hockey : Latest rules, measurements of playfield, specifications of equipment and teaching of skills and techniques

29 to 31:Need and requirement of first aid. First aid equipment and upkeep

32 to 34:First aid related with Bones, Joints Muscle related injuries. First aid related with Nervous system and Unconsciousness. First aid related with Gastrointestinal Tract.

Learning Outcome

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

1. Improve health related fitness, mastery of fundamental motor skills
2. Understand rules, strategies and tactics of games and sports
3. Learn safety measures, injury prevention and the basics of first aid.

References:

- Smith, J. K. 2021. *Physical education training and coaching*. Sports Science Press. Pages 245.
- Singh, H. 1984. *Sports training: General theory & methods*. Netaji Subhas National Institute of Sports. Pages 486.
- Sharma, R. 2019. *Effect of exercise on muscular, respiratory, circulatory and digestive system*. Health & Fitness Publications. Pages 486.
- Kumar, P. 2018. Effect of exercise on muscular, respiratory, circulatory and digestive system. In S. Gupta (Ed.), *Foundations of exercise physiology*. Sports Science Press. Pages 356.
- Smith, S. K. 2023. *Balanced diet and nutrition: Effects of diet on performance*. Health & Performance Press. Pages 256.
- Taylor, A. W., & Johnson, M. J. 2008. *Physiology of exercise and healthy aging*. Human Kinetics. Pages 304.

Skill Enhancement Courses (SEC) for First Semester

Sl.No	Course Code	Course Title	Credit Hours	Remarks
1.	SEC 1 TAM 151 / ENG 151	வேளாண் அறிவியல் தமிழ் திறன் மேம்பாடு / English for Professional Skills	2 (0+2)	Students studied Tamil in their school must choose Tamil SEC others English SEC
2.	SEC 2	List of Courses		
	AEN 151	Bee Keeping	2 (0+2)	<ul style="list-style-type: none"> • Students can select any one course based on their interest or the course will be allotted based on the +2 Aggregate marks • Minimum number of students required to offer a course will be 20 and maximum number per course will be 40 students
	AGR 151	Organic input preparation	2 (0+2)	
	SAC 151	Soil, Plant and Water Testing	2 (0+2)	
	FSN 151	Bakery Technology	2 (0+2)	
	HOR 151	Nursery Technology for Horticultural crops	2 (0+2)	

TAM 151 – வேளாண் அறிவியல் தமிழ்த் திறன் மேம்பாடு (0+2)

நோக்கம்

- ❖ தமிழ் இலக்கியங்கள் பாரம்பரிய வேளாண் தொழில் முறைகளையும் தொழில் நுட்பங்களையும் அழுத்தமாகக் கூறுகின்றன. இத்தகை பாரம்பரியத் தொழில்நுட்பத்தின் அறிவு, மாணக்கர்களின் நவீனத் தொழில்நுட்பம் உருவாக்குதற்கு வித்தாக அமையும்.
- ❖ அறிவியல் அறிவும் மொழித் திறன் மேம்பாடும் ஒருசேரப் பெறும் மாணாக்கர்களே தொழில்நுட்ப உலகில் சிறக்க முடியும். அதற்கு இதுபோன்ற பாடத்திட்டம் பெரிதும் துணைநிற்கும்.
- ❖ அறிவியல் வளர்ச்சியோடு மொழி வளர்ச்சியும் அடைய வேண்டியது இன்றையக் காலத்தின் கட்டாயம் ஆகும். அதற்கேற்றவாறு புதிய புதிய சொற்களோடு, கணினி மற்றும் இணையத்தில் தான் கற்ற வேளாண் நுட்பங்களை உலகறியச் செய்ய ஏதுவாக இப்பாடம் உருவாக்கப் பெற்றுள்ளது.

செய்முறைப் பயிற்சி

- ❖ பண்டையத் தமிழர்களின் பாரம்பரிய வேளாண்மைத் தொழில் நுட்பம் அறிதல் – வாய்மொழி இலக்கியங்களில் பயிர்த்தொழில் நுட்பம் பெறுதல் – கருத்துப்பரிமாற்றத் திறன் பயிற்சி – மென்திறன் – ஆளுமைத் திறன் – தலைமைப் பண்பு – மனித உறவு வளர்க்கும் திறன் – கலைச்சொல்லாக்கம் – மொழிபெயர்ப்பு - எழுத்துப் பயிற்சி – பேச்சுப் பயிற்சி – கணினிப் பயன்பாட்டுத் திறன் மேம்பாடு – இணையத் தமிழ்ப் பயிற்சி – வேளாண் இதழ்களுக்கு எழுதும் திறன் வளர்த்தல் – அறிவியல் தமிழில் வேளாண்மை – காலந்தோறும் தமிழின் வளர்ச்சி நிலையை அறியச் செய்தல்.

பயிற்சி அட்டவணை:

1. தொல்காப்பியம் காட்டும் வேளாண்மை;
வேளாண்மை - சொற்பொருள் விளக்கம் – முதற்பொருள் (நிலம் + பொழுது),
கருப்பொருள் – மண்ணறிவியல் ஆகியன அறிதல்
2. தாவரவியல் இலக்கண விளக்கம்;
தாவரவியல் குறித்த மரபுசார்ந்த அறிவியல் - விளக்கம் - வேளாண் மாந்தர்கள் - அறிதல்
3. சங்க இலக்கியங்களில் உழவியல் தொழில்நுட்பங்கள்;
உழவு – உழவு வகைகள் (சேற்று உழவு + புழுதி உழவு) உழவியல் தொழில் நுட்பங்கள்
4. தமிழ் இலக்கியங்களில் வேளாண் கருவிகள்.

உழவுக் கருவிகள் விளக்கம் (ஏரின் பாகங்கள் + பகடு வகைகள்) – நீர் இறைக்கும் கருவி (ஏற்றம் + கமலை + பத்தர் + அடர் + ஆம்பி)

5. இலக்கியங்களில் பயிர்ப் பாதுகாப்புக் கருவிகள்.

பயிர்ப் பாதுகாப்புக் கருவிகள் (ஞெகிழி + தழல் + தட்டை + தண்ணுமை + கவண்கல் + கிணைபறை + துளர் போன்றன) அறுவடைக் கருவிகள் (குயம் + அம்பணம் + வட்டை போன்றன) – பின் செய் நேர்த்திக் கருவிகள் (குதிர் + குலுமை + பத்தாயம் போன்றன)

6. சங்க இலக்கியத்தில் நீர் மேலாண்மை:

மென்புல நீர்நிலைகள் – வன்புல நீர்நிலைகள்

7. இலக்கியங்களில் பாசனக் கட்டமைப்புகள்;

மடை + மதகு + குமிழி + சுருங்கை + புதவு + கலிங்கு போன்ற நீர்ப்பாசனக் கட்டமைப்புகள் - அமைப்பு – விளக்கம் அறிதல்.

8. சங்க இலக்கியங்களில் பயிர் மேலாண்மை உத்திகள்;

உயிர்வேலி அமைப்புகள் – (வாழ்முள் வேலி + இடுமுள் வேலி) – விலங்குகளை விரட்டும் உத்திகள் - பறவைகளை விரட்டும் உத்திகள் - அறிதல்

9. இலக்கியத்தில் வேளாண்மை;

தோட்டவியல் – வனவியல் - மனையியல் – சூழலியல் - வேளாண் பொறியியல் - அறிதல்.

10. மூலிகைத் தாவரங்கள்;

பதினெண் கீழ்க்கணக்கு நூல்களில் மூலிகை – மூலிகைத் தாவரங்களின் மருத்துவப் பயன்பாடுகள் – நிகழ்காலப் பயன்பாடு – விழிப்புணர்வு - அறிதல்.

11. ஏரெழுபது நூலில் வேளாண்மை;

வேளாண்மைச் சமூகம் – வேளாண் தொழில் வளம் – எழுபது கருவிகள் – செயல்பாடுகள் - அறிதல்

12. பள்ளு இலக்கியத்தில் வேளாண்மை;

உழவு முறைகள் (தரிசு உழவு, மறித்து உழவு, நயம் உழவு) – வானிலை அறிவு – நெல் இரகங்கள் – அறிதல்

13. பழமொழிகளில் பயிர்த்தொழில்;

நிலத்தேர்வு - களர் நிலச்சீர்திருத்தம் - உழவு - விதை அறிவியல் -- நாற்று நடுதல் – எருவிடுதல் – அறிதல்.

14. பழமொழிகளில் பயிர் மேலாண்மை;

களை மேலாண்மை - நீர்மேலாண்மை, அறுவடை, சேமிப்பு உத்திகள் - அறிதல்.

15. நாட்டுப்புற இலக்கியங்களில் வேளாண்மைச் செய்திகள்;

உழவுப்பாட்டு – உழத்திப்பாட்டு – குரவைப்பாட்டு – ஏற்றப்பாட்டு - அறுவடைப் பாட்டு
வழி பழந்தமிழர் வேளாண் அறிவைத் தொகுத்தல்.

16. பிழையின்றி எழுதுதல்;

சந்திப்பிழை, சொற்பிழை, சொற் பிரிப்புப் பிழை, வாக்கியப் பிழை – பிழைத்திருத்தக்
குறியீடுகள் – அறிதல்

17. இடைநிலைப் பருவத்தேர்வு

18. பாரம்பரிய வேளாண் தொழில் நுட்பங்கள்;

வேளாண்மை – வகைகள் - உத்திகள் – தோட்டக்கலைத் தொழில்நுட்பங்கள் –
பொறியியல் நுட்பங்கள் - அறிதல்.

19. வாழ்வியல் நெறிகள்;

தனிமனித வாழ்வியல் நெறி - சமூகம் சார்ந்த வாழ்வியல் நெறிகள் – பயன்பாடும்
தேவையும் அறிதல்.

20. இலக்கியத்தில் மென்திறன்கள்;

தலைமைப்பண்பு – கால மேலாண்மை – அறிதல்

21. இலக்கியத்தில் ஆளுமைத் திறன்கள்;

ஆளுமைப் பண்புகள் – மனித உறவுகளை வளர்க்கும் திறன் – அறிதல்

22. அறிவியல் தமிழில் வேளாண்மை:

வேளாண்மை நூல்கள் – வேளாண்மை இதழ்கள் - அறிதல் மற்றும் சேகரித்தல்

23. கணினித்தமிழ்: (Tamil Computing)

ஒருங்கு குறியீடு அறிதல் – ஒருங்கு குறியீடு எழுத்துரு பயிற்சி – வேளாண் செயலிகளை
அறிதல்

24. இணைய உலகில் தமிழ்;

இணையத்தின் தோற்றம் , வளர்ச்சி- இணையத்தில் தமிழ்ப்பயன்பாடு - இணைய இதழ்கள் – மின்னிதழ்கள்

25. கலைச்சொல்லாக்கம்;

கலைச்சொல் உருவாக்கும் முறைகள் – கலைச்சொல்லாக்கத் தேவை - வேளாண் கலைச் சொற்களைத் தொகுத்தல்

26. வட்டார வழக்குச் சொற்கள்;

கொங்கு வட்டாரச் சொற்கள், கரிசல் வட்டாரச் சொற்கள், நாஞ்சில் வட்டாரச் சொற்கள், இதர வட்டார வழக்குச் சொற்களைத் தொகுத்தல்.

27. மொழி பெயர்ப்பு;

மொழிபெயர்ப்பு வகைகள், மொழிபெயர்ப்பு முறைகள் – செயலிகள் வழி மொழிபெயர்த்தல் -வேளாண் சொற்களை மொழி பெயர்ப்பு செய்தல்.

28. கருத்துப் பரிமாற்றத்திறன்;

எழுத்துப் பயிற்சி (கட்டுரை எழுதுதல், அலுவலகக் கடிதம் எழுதுதல், உழவர்களுக்கான கடிதம் எழுதுதல்) – பேச்சுப் பயிற்சி (குழுவிவாதம், வினா விடை அளித்தல், வேளாண் தொழில் நுட்ப விளக்கக் கூட்டம் நடத்துதல்).

29. வேளாண் செய்திகளைச் சிற்றிதழ்களுக்கு/வட்டார இதழ்களுக்கு எழுதுதல்;

துண்டுப் பிரசுரம், மடிப்பிதழ்கள், கையேடுகள் வழியாக வேளாண் செய்திகளைப் பரவலாக்கம் செய்தல்

30. வேளாண் செய்திகளை ஊடகங்களுக்கு எழுதுதல்;

செய்தி - செய்தியின் வகைகள் – வானொலிக்கு உரை எழுதுதல் –புதிய இரகங்களின் தொழில்நுட்பங்களைப் பரவலாக்கம் செய்தல்.

31. வேளாண் செய்திகளைக் காட்சி ஊடகங்களுக்கு எழுதுதல்;

தொலைக் காட்சிக்கு எழுதும் முறை – மின்னணு ஊடகங்களுக்கு எழுதுதல் - விவாத அரங்குகள் – வினாவிடை நிகழ்ச்சி - கலந்துரையாடல் நிகழ்ச்சியில் பங்கு பெறுதல்.

32. கருத்தரங்குகள் அமைக்கும் திறன்;

கருத்துக்காட்சி – கண்காட்சி – அமைக்கும் முறைகள் – காட்சி அமைப்புகள் – அறிதல்.

33. மேடைப் பேச்சு

பேச்சு வகைகள் (தலைமை உரை, சிறப்புரை, முதன்மையுரை, கருத்துரை, நோக்க உரை, நன்றியுரை) – பேச்சு நடைகள் (செவ்வியல் நடை, கொச்சை நடை) – அறிதல் – பயிற்சி செய்தல்

34. செய்முறை இறுதித் தேர்வு

கற்றதன் பயன்கள் (Learning Outcomes)

கற்றலின் இறுதியில் மாணாக்கர்கள் பெறும் பயன்கள் பின்வருமாறு:

- ❖ தமிழைப் பிழையின்றி, சரியான சொல்லாட்சியோடு; நேர்த்தியான மொழிநடையோடு; எழுதும் எழுத்தாற்றல் திறனும் தயக்கமின்றி ஆற்றொழுக்காகப் பேசும் பேச்சாற்றல் திறனும் மேம்படும்.
- ❖ பாரம்பரியத் தொழில்நுட்பங்கள் குறித்த சிறந்த அறிவும் அதனைத் தேடி நவீன வேளாண் தொழில்நுட்பத்தோடு பொருத்திப் பார்க்கும் வேட்கையும் மேம்படும்.
- ❖ கலைச்சொற்கள் உருவாக்கும் திறன்; செயலி மற்றும் இயந்திர வழி கற்றல் திறன் மொழிபெயர்க்கும் திறன் வளர்த்தல் மேம்படும்.
- ❖ மாணாக்கர்களின் எழுதும் முறை, அமைப்பு, வடிவம், மொழிநடை குறித்த தெளிவு கிடைக்கும். இதன் வழி அச்ச ஊடகங்கள் மற்றும் மின் ஊடகங்களுக்குத் தயக்கமின்றி எழுதவும் உரையாடவும் கூடிய திறன் மேம்படும்.
- ❖ இன்றையத் தேவைக்கேற்ப, தான் கற்ற வேளாண் அறிவியல் தொழில்நுட்பத்தினைத் தமிழ்மொழித் திறன் பெறும் மாணாக்கர்கள், கணினித் தமிழ் வழி இணையத்தில் ஏற்றி உலகறியச் செய்யும் திறனைப் பெறமுடியும்.

மேற்பார்வை நூல்கள்:

1. கந்தசாமி. இல.செ. 1974. வேளாண்மையும் பண்பாடும், தமிழ்நாடு வேளாண்மைப் பல்கலைக்கழகம், கோயம்புத்தூர், 148 பக்கங்கள்.
2. கந்தசாமி. இல.செ. 1981. இலக்கியத்தில் வேளாண்மை, தமிழ்நாடு வேளாண்மைப் பல்கலைக்கழகம், கோயம்புத்தூர், 156 பக்கங்கள்.
3. கந்தசாமி. இல.செ. 1983. வேளாண்மைப் பழமொழிகள், கலைச்செல்வம் பதிப்பகம், கோயம்புத்தூர், 125 பக்கங்கள்.
4. குழந்தைசாமி வா.செ. அறிவியல் தமிழ், பாரதிப் பதிப்பகம், சென்னை, 186 பக்கங்கள்.
5. மீனாட்சிசுந்தரம். மா. மற்றும் விசயலட்சுமி, ஏ. இல. 2002. தகவல் தொடர்பில் தமிழ்மொழிப் பயன்பாடு, கே.ஆர்.எ ஆப்செட் பிரிண்டர், கோயம்புத்தூர். 216 பக்கங்கள்.

6. மணிமேகலை,ம. .2002. தமிழ்மொழித் தடத்தில் வேளாண் அறிவியலின் சுவடுகள், தேவிப்பதிப்பகம், திருச்சிராப்பள்ளி, 312 பக்கங்கள்.
7. வெள்ளைச்சாமி, பெ. 2006. தமிழ் இலக்கியங்களில் வேளாண்மைத் தொழில் நுட்பங்கள், அஜய் கம்ப்யூட்டர்ஸ் பிரின்டிங், மதுரை, 420 பக்கங்கள்.
8. மாதையன், பெ. 2004. சங்க இலக்கியத்தில் வேளாண் சமுதாயம், நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிமிடெட், சென்னை, 320 பக்கங்கள்.
9. இராதாசெல்லப்பன், 2006. கலைச்சொல்லாக்கம், அறிவுப் பதிப்பகம், சென்னை, 182 பக்கங்கள்.
10. தமிழரின் மரபுச் செல்வங்கள், உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை (ஆய்வுக்கட்டுரைகள் தொகுப்பு) , 460 பக்கங்கள்.
11. முருகேசபாண்டியன், ந. 2008. மொழிபெயர்ப்பியல், உயிர்ளழுத்துப் பதிப்பகம், திருச்சி, 310 பக்கங்கள்.
12. வேளாண் கலைச்சொல் பேரகராதி, 2008. தமிழ்நாடு வேளாண்மைப் பல்கலைக் கழகம், கோயம்புத்தூர், 610 பக்கங்கள்.

ENG 151 - English for Professional Skills (0+2)

Practical

Ice-breaker Activities – Phonemes - Word Stress and Sentence Stress, Intonation, Rate of Speech, Listening Clear Pronunciation, Vocabulary for Professional and Academic and Professional English Vocabulary, Brainstorming, Mind Mapping, Extempore Speech, Role-play, Letter Writing, Rejoinder Writing, Email Writing, Virtual Skills, Report Writing, Cross-Cultural Communication, Introduction to International Competitive Exams – IELTS, TOEFL, PTE, GRE etc., LSRW Tests.

Practical Schedule

- 1 Course Introduction and Ice-breaker Activities
- 2 Phonemes – Study of English Sounds - Explanation and Demonstration
- 3 Phoneme Practice in Language Laboratory with Self-Assessment Tools
- 4 Pronunciation – Application of Word Stress and Sentence Stress
- 5 English Word Stress – Practice Using Interactive Software
- 6 Intonation – Practice Using Interactive Software
- 7 Rate of Speech and Clarity – Modulation Activities
- 8 Listening Clear Pronunciation – Active Listening Exercises in Language Laboratory
- 9 Listening for Details – Language Lab Session
- 10 Academic English Vocabulary – Word Maps and Collocations
- 11 Professional English Vocabulary – Phrases and Vocabulary-Building Games
- 12 Brainstorming - Techniques – Individual and Group Practice
- 13 Mind Mapping – Concept Development Activities
- 14 Extempore Speech Practice – Welcome Address, Vote of Thanks, Introduction of Chief Guest, etc.
- 15 Role-play 1 – Situational Dialogue Practice - General Enquiries, Complaining, Apologising, etc.
- 16 Role-play 2 – Workplace Conversations: Describing, Narrating, Explaining etc.
- 17 **Mid-Semester Examination**
- 18 Letter Writing – Formal Letter Writing Practice
- 19 Letter Writing – Informal Letter Writing Practice
- 20 Rejoinder Writing – Practicing

- 21 Writing Practice - Letter to the Editor - Responding to opinions formally
- 22 Email Writing – Formal and Informal - Structures and Etiquette
- 23 Virtual Skills – Etiquette for Virtual Meetings and Video Calls
- 24 Report Writing – Events such as Annual Day, Sports Meet, Club Activities etc.
- 25 Cross-Cultural Communication – Cultural Dos and Don'ts, Idiomatic Expressions
- 26 English for Competitive Examinations –Sentence Correction - Practice
- 27 English for Competitive Examinations –Jumbled Sentence - Practice
- 28 Introduction to International Competitive Exams – IELTS, TOEFL, PTE, GRE etc.
- 29 International Exams – Real Time Listening Comprehension - Mock Test
- 30 International Exams – Real Time Speaking - Mock Test
- 31 Timed Practice – Real Time Reading Comprehension - Mock Test
- 32 International Exams – Real Time Writing - Mock Test
- 33 Final Group Role-play / Presentation
- 34 **Final Practical Examination**

Learning Outcomes

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

1. Communicate effectively in professional and social contexts using appropriate vocabulary, pronunciation, and speech strategies.
2. Demonstrate advanced listening skills to comprehend diverse spoken English, including various accents and formal settings.
3. Produce clear, structured written communications such as emails, reports, and formal letters.
4. Participate confidently in role-plays, presentations, and discussions, applying critical thinking and cross-cultural communication skills.

References

1. Brown, H. Douglas. *Principles of Language Learning and Teaching*. 2014. 6th ed., Pearson Education. 416 pages.
2. *IELTS Practice Tests with Answers*. 2018. Cambridge University Press. 240 pages.
3. Celce-Murcia, Marianne, Donna Brinton, and Marguerite Ann Snow. 2014. *Teaching English as a Second or Foreign Language*. 4th ed., Heinle ELT. 576 pages.
4. Farhathullah, 2018. M. *Effective Communication Skills*. McGraw Hill Education. 300 pages.
5. Guffey, Mary Ellen, and Dana Loewy. 2017. *Essentials of Business Communication*. 11th ed., Cengage Learning. 592 pages.
6. Kumar, Sanjay, and Pushpa Lata. *Communication Skills*. 2019. Oxford University Press. 320 pages.
7. Luthans, Fred. *Organizational Behavior: An Evidence-Based Approach*. 2017. 13th ed., McGraw-Hill Education. 624 pages.
8. Richards, Jack C., and Theodore S. Rodgers. 2014. *Approaches and Methods in Language Teaching*. 3rd ed., Cambridge University Press. 408 pages.
9. Sharma, A. K., and Meenakshi Raman. 2017. *Academic Writing and Professional Communication*. Oxford University Press. 350 pages.
10. Swan, Michael. *Practical English Usage*. 2016. 4th ed., Oxford University Press. 968 pages.
11. Sweeney, Simon. *English for Business Communication*. 2016. Cambridge University Press. 256 pages.
12. Yadugiri, M. A. *Professional English*. 2017. Cambridge University Press. 280 pages.

AEN 151 - Bee Keeping (0+2)

Practical

- The course aims to expose students to beekeeping by enriching them with knowledge on honeybee species, apiary management, production of honey, beeswax and other byproducts to meet the national and international standards.
- Knowledge and skill on various aspects of beekeeping namely, honey bee species, biology and communication, bee pasturage, honey bees for crop pollination and beehives, beekeeping equipments, site selection for apiary, migratory bee keeping, honey extraction, processing, purity testing and value addition, general and seasonal management protecting bees from pesticides, insect, mite and bird enemies of honeybees, brood and adult diseases, mass queen rearing, collection of other bee products and economics will be imparted.

Practical Schedule

1. Identification of Honey Bee Species, Bee castes and Biology
2. Honey bee morphology and structural adaptations
3. Bee Behaviour
4. Bee communication – dance and pheromones
5. Colony Organization in Honey Bees
6. Pollen and nectar pasturage crops in bee keeping
7. Preparation of floral calendar
8. Role of Honey Bees in Crop Pollination
9. Bee Hives and bee keeping appliances
10. Production Protocol of Comb Foundation Sheet in Comb Foundation Mill
11. Visit to bee keeping equipment manufacturing unit
12. Site selection and establishment of a Apiary
13. Hive inspection and maintenance of hive records
14. Hiving Indian bee feral colony
15. Meliponiculture
16. Hiving Stingless bee feral colony
17. **Mid semester Examination**

18. Artificial feeding of nectar and pollen during dearth period, Dividing and management of honey bee colony
19. Uniting and management of honey bee colonies
20. Seasonal Management of Honey Bees
21. Management of swarming, absconding and laying workers
22. Insect pests of honeybees and their management
23. Non-Insect pests of honeybees and their management
24. Identification of diseases of honeybees and their management
25. Honey extraction and processing
26. Purity testing and value addition of honey
27. Bee pollen –collection and uses
28. Apitherapy- Bee venom collection and uses
29. Other bee products- Bee wax, propolis and royal jelly – collection and uses
30. Mass queen rearing techniques
31. Migratory bee keeping and visit to migratory bee keeping site
32. Bee poisoning and management
33. Visit to Honey FPOs , Preparation of bee keeping projects for bank funding and its economics
34. **Final Practical Examination**

Learning outcome:

- Students would acquire knowledge and skills in handling honeybees in a apiary.
- Students would be motivated to take apiculture as an entrepreneurial venture

Text books:

1. Abrol D.P. 2011. Beekeeping – A comprehensive guide to bees and beekeeping. Scientific Publishers, Jodhpur, 896 pages
2. Atwal, A.S.2013.Mellifera Bee Keeping & Pollination. Kalyani Publishers, Ludhiana. 394 p.
3. Ted Hooper, 1991. Guide to Bees and Honey (Thrid Edition), BAS printers ltd. Over Wallop, Hampshire 271 p.
4. Roger A. Morse, 1994. The new complete guide to beekeeping. *The Countryman Press*, Woodstock, Vermont. 207p.

5. Thomas D. Seeley. 1995. The Wisdom of the Hive, Harvard University Press, Cambridge, 295p.
6. வா ரா சாமிநாதன், ச செளமியா, ஓ ஹென்றி பிரான்சிஸ் 2025. லாபம் தரும் தேனீ வளர்ப்பு-வங்கி கடனுதவி மற்றும் அரசு மானிய திட்டங்கள் பதிப்பகம்: நியூ செஞ்சுரி புக ஹவுஸ், சென்னை 246 ப. (தமிழ்)

References

- http://agritech.tnau.ac.in/farm_enterprises/fe_apiculture_home.html
- <http://agdev.anr.udel.edu/maarec/>
- <http://www.aragriculture.org/insects/beekeeping.htm>
- <https://scientificbeekeeping.com>
- <http://beekeeping.com/>; <http://www.apimondia.com/en>

AGR 151 Organic Inputs Preparation Techniques (0+2)

Practical

Unit I: Organic Nutrient Sources and Composting

Quantification of cow dung and cow urine recovery per animal; nutrient composition analysis; Assessment of storage methods; Collection, segregation, shredding, and quantification of farm wastes for compost preparation; pre-digestion and preparing bio-compost and vermicompost; FCO standards; Enriched organic manure/compost preparation; Compost maturity of FAO standards.

Unit II: Green Manures and Organic Formulations

Quantification of biomass for different green manures and green leaf manures; multivarietal seed technique; Preparing liquid formulations of Panchagavya, fermented extracts from various sources and Effective Microorganisms (EM).

Unit III: Biofertilizers and Bioinoculants

Mass multiplication and use of PPFM and liquid bioinoculants; Mass multiplication and use of bioinoculants for crop application; Mass production of Arbuscular Mycorrhizal Fungi (AMF); Biodiversity assessment techniques

Unit IV: Weed and Pest Management in Organic Farming

Integrated organic weed and pest management; Experiencing mulching techniques in weed management; Preparation and application of herbal leaf and fermented extracts in pest and disease management; Monitoring of insect pests through traps and lures; Biodiversity assessment techniques

Unit V: Organic Certification and Post-Harvest Management

Organic certification procedures – importance, scope, and documentation; Post-harvest management, value addition, and supply chain management in organics; Role of FPOs.

Practical Schedule

1. Quantification of cow dung and cow urine recovery per animal
2. Quality and nutrient composition analysis of cow urine and cow dung

3. Assessment of storage methods with temperature, nutrient, and microbial load in manure pits.
4. Collection, segregation, shredding and quantification of farm wastes
5. Pre-digestion of various farm wastes for composts preparation
6. Preparing bio-compost from farm wastes and quality increase to match FCO standards
7. Preparing vermicompost
8. Assessing the quality of various composts
9. Enriched organic manure/compost preparation
10. Harvest and assessment of compost maturity indices against FAO standards.
11. Quantification of biomass for different green manures and green leaf manures
12. Nutrients composition analysis of green manures and green leaf manures
13. Multi-varietal seed technique (Navadhanya) for soil quality improvement
14. Preparing the liquid formulations of *Panchagavya*, and effective microorganisms
15. Preparing the fish and egg fermented extracts
16. Mass multiplication and use of biofertilizers, Liquid bioinoculants and PPFM
17. **Mid Semester Examination**
18. Mass production of Arbuscular Mycorrhizal Fungi
19. *In situ* (Field) soil health assessment techniques
20. Exposure visit to organic farming farmer's field
21. Integrated organic weed management techniques
22. Experiencing mulching techniques in weed management
23. Integrated organic pest management

24. Preparation and application of herbal leaf extracts in insect management
25. Preparation and application of herbal /fermented extracts in disease management
26. Monitoring of insect pests through traps and lures
27. Importance and establishment of pest repellent cafeteria
28. Biodiversity assessment techniques
29. Organic certification procedures
30. Post-harvest management and value addition of organic produces
31. Supply chain management in organic agriculture
32. Role of FPOs in organic agriculture, Opportunities for entrepreneurship development
33. Exposure visit to TNOCD unit/FPOs / Organic inputs producing industries
34. **Final Practical Examination**

Learning Outcomes

- Students learn to quantify organic nutrient resources, manage composting systems, assess quality, and standardize products for marketability.
- Ability to produce and utilize traditional and scientific organic formulations for enhancing soil fertility and crop performance.
- Students acquire microbial culture handling, multiplication, and field application techniques for different biofertilizers.
- Hands-on knowledge of eco-friendly weed suppression, botanical pest control, and pest monitoring for organic crop protection.
- Students gain awareness of certification processes, market standards, value addition, and entrepreneurship opportunities in organics.

Text books

1. M. Suganthy B. Renuka Rani N R Sharma. 2023. Natural Farming for Sustainable Agriculture. E-book published by Hyderabad: National Institute of Agricultural Extension Management (MANAGE). ISBN: 978-81-19663-10-1
2. S.S. Walia , Tamanpreet Kaur & N Ravisankar. 2025. Principles and Practices of Natural Farming.
Scientific Publishers. ISBN9789363461079.
<https://www.scientificpubonline.com/bookdetail/principles-practices-natural-farming/9789363461079/0>
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9. Food and Agriculture Organization. (2022). *FAO organic standards & guidelines*. FAO. Retrieved from <https://www.fao.org/organicag/oa-faq/oa-certification/en/>

SAC 151 Soil, Plant and Water Testing (0+2)

Practical

Collection of representative soil sample- processing and storage. Determination of soil density. Determination of Soil moisture. Determination of soil colour. Determination of soil texture by feel method. Determination of Hydraulic conductivity. Preparation and standardization of laboratory reagents: acidimetry, alkalimetry, Preparation of indicators and buffers. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Estimation of soil organic carbon (SOC). Determination of lime requirement of acid soil. Gypsum requirement of sodic soil.

Collection of plant samples and processing. Digestion of plant sample - preparation of diacid and triacid mixture. Estimation of total nutrients in plant samples: nitrogen, phosphorus, potassium, calcium and magnesium, sulphur and micronutrients.

Collection of different types of irrigation water samples. Irrigation water analysis: estimation of pH and EC. Estimation of TSS and hardness of irrigation water. Estimation of cations: calcium, magnesium, sodium and potassium. Estimation of anions: carbonate and bicarbonate, chloride sulphate and boron. - Estimation of Micronutrients (Mn, Fe, Zn and Cu). Classification of irrigation waters as per USSL and other systems. - Computation of salts (RSC and SAR), Water quality indices and appraisal.

Preparation of soil health cards. Scope of establishing startups-soil testing and water testing laboratories: accreditation and quality control measures. Entrepreneurship opportunities in soil testing advisory services. visit to soil testing laboratory.

Unit I Soil Sampling & Analysis of Physical Properties

Collection of representative soil sample - processing and storage. Determination of soil density - bulk density (wax coating method) and particle density (cylinder method), Determination of Soil moisture content. Determination of soil colour. Determination of soil texture by feel method. Determination of Hydraulic conductivity.

Unit II Analytical Chemistry

Preparation and standardization of laboratory reagents: acidimetry, alkalimetry. Preparation of indicators and buffers. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Estimation of soil organic Carbon. Determination of lime requirement of acid soil. Determination of gypsum requirement of sodic soil.

Unit III Plant analysis

Plant analysis: collection of plant samples and processing. Digestion of plant sample - preparation of diacid and triacid mixture. Estimation of total nutrients in plant samples: nitrogen, phosphorus, potassium, calcium and magnesium, sulphur and micronutrients.

Unit IV Irrigation water analysis

Irrigation water: collection of different types of irrigation water samples. Irrigation water analysis: estimation of pH and EC, TSS and hardness of irrigation water. Estimation of cations: calcium, magnesium, sodium and potassium. Estimation of anions in irrigation water: carbonate and bicarbonates, chlorides sulphate and boron. Estimation of Micronutrients (Mn, Fe, Zn and Cu). Classification of irrigation waters as per USSL and other systems. Computation of salts (RSC and SAR) , Water quality indices and appraisal.

Unit V Interpretation of Analytical Results & Entrepreneurship

Interpretation of soil, plant and water test results with crop response; Soil Test based recommendations, DISSIFER, VDK. Preparation of soil health cards. Scope of establishing statrups-soil and water testing laboratories. Accreditation and quality control measures. Entrepreneurship opportunities in soil, plant and water testing advisory services in agriculture. Visit to soil testing laboratory (STL).

Practical schedule

1. Collection of representative soil, plant and water samples- processing and storage
2. Determination of soil density and interpretation
3. Determination of Soil moisture, colour and their interpretation
4. Determination of soil texture by feel method and identification
5. Determination of Hydraulic conductivity and ratings
6. Preparation and standardization of laboratory reagents: acidimetry, alkalimetry
7. Preparation of indicators and buffers.
8. Determination of soil pH and electrical conductivity and interpretation
9. Determination of cation exchange capacity of soil and interpretation

10. Estimation of organic carbon content of soil and ratings
11. Determination of lime requirement of acid soil-interpretation and reclamation
12. Determination of gypsum requirement of sodic soil- interpretation and reclamation
13. Digestion of plant sample -preparation of diacid and triacid mixture.
14. Estimation of total nutrients in plant samples: Nitrogen
15. Estimation of total nutrients in plant samples :Phosphorus and Potassium
16. Estimation of total nutrients in plant samples: Calcium and magnesium
17. **Mid Semester Examination**
18. Estimation of total nutrients in plant samples: Sulphur and micronutrients.
19. Rapid tissue tests for plant nutrient analysis
20. Irrigation water analysis- estimation of pH and EC, TSS, hardness and rating
21. Irrigation water analysis: estimation of cations (Calcium and Magnesium) and rating
22. Irrigation water analysis: estimation of cations (Sodium and Potassium) and rating
23. Irrigation water analysis: estimation of anions (Carbonate and bicarbonates) and rating
24. Irrigation water analysis: estimation of anions (Chlorides) and rating
25. Irrigation water analysis: estimation of anions (Sulphate) and rating
26. Irrigation water analysis: estimation of Micronutrients (Mn, Fe, Zn, Cu & B) and rating
27. Classification of irrigation waters as per USSL and other systems.
28. Computation of salts, Water quality indices and appraisal
29. Analytical advisory services : Soil test based recommendations, DISSIFER & VDK
30. Preparation of soil health cards and recommendations
31. Establishing Startups - soil and water testing laboratories- Accreditation and quality control measures
32. Entrepreneurship opportunities in soil testing advisory services
33. Visit to Soil testing laboratory
34. **Final Practical Examination**

Learning outcomes

Provides skill based module on soil, plant and water testing in agriculture. Develop skills to sustainably manage soil and water resources to enhance agricultural productivity and environmental sustainability. Provides competency to establish startup and operate Soil, Plant and Water Testing Laboratory

Textbooks

1. Baruah J.C and D.K.Patgiri. 1996. Physics and Chemistry of Soils, New Age International Publications
2. Garison Sposito, 2008. The Chemistry of Soils. Oxford University Press, USA
3. Black, C.A. 1965. Agronomy Monograph. Methods of Soil Analysis. Part 1. Physical and Mineralogical properties including Statistics of Measurement and Sampling. Wiley, New York.
4. Hesse, P.R. 1971. A Text book of Soil Chemical Analysis. John Murray (Publishers) Ltd. London
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FSN 151 Bakery Technology (0+2)

Practical

Introducing bakery tools and equipments. Quality evaluation of ingredients- Methods and Types of preparation – Bread, Bun, Cake, Cookie, Puffs, Rusk Doughnut and Therapeutic bakery foods. Quality evaluation of bakery products. Commercial and Cost of production of bakery products.

Practical Schedule

1. Quality evaluation of flour for bakery products
2. Identification and utilization of bakery tools and equipments
3. Different method of bread preparation- Straight dough and Sponge dough method
4. Types of bread preparation- White bread and Wheat bread
5. Types of bread preparation- Millet and Garlic bread
6. Different methods of bun preparation- Straight dough and Sponge dough method
7. Preparation of different types of bun- Maida bun and Cream bun
8. Preparation of different types of bun- Masala bun and Stolen
9. Different methods of cake preparation- Cream method, all in one method
10. Types of cake preparation – Sponge cake and Tea cake
11. Types of cake preparation – Angel cake and Plum cake
12. Types of cake preparation – Eggless cake and Cup cake
13. Icing- Butter Icing and Royal icing
14. Cake decoration- Fondants
15. Preparation of fresh cream cake and frosting
16. Different methods of cookies preparation- Drop method and Sheet method
- 17. Midsemester Examination**
18. Types of cookies- Maida and Wheat cookies
19. Types of cookies- Millet and Composite flour cookies, Coconut cookies and Peanut cookies
20. Types of cookies- Salt cookies and Chilly cookies
21. Method of preparation of pastry – Puff and Flaky pastry
22. Preparation of Naam kattai
23. Preparation of puffs –Vegetable, Egg and Mushroom puff
24. Preparation of Khari

25. Preparation of Sweet Doughnut
26. Preparation of Chocolate Doughnut
27. Preparation of Rusk – Milk and Millet Rusk
28. Quality evaluation of bakery products
29. Therapeutic bakery production- High fiber foods
30. Commercial and Cost of production of Cakes
31. Commercial and Cost of production of Bread
32. Commercial and Cost of production of Cookies
33. Layout and establishment of bakery unit
- 34. Final practical examination**

Learning Outcome

The students to understand the concepts and principles of preparation of bakery products

- This course will provide the skill on art of baking technology
- Quality assessment of the bakery products
- Provide skill on cake decorations
- Commercial production of bakery products

Text Books

1. Kamaliya, M.K. and Kamaliya, K.B. 2001. Baking: Science and Industries, Vol.1 and 2. Publisher: M.K.Kamaliya, 42, AshrutiBunglows, Jitodia Road, Anand -388001.
2. NIIR Board of Food Technologist. Modern Technology of Food Processing and Agro Based Industries. 106 - E. Kamala Nagar, New Delhi - 110007.
3. Arora, S.M. Hand Book on Bakery Products. SIRI Publication Division, New Delhi - 110007.
4. Srilakshmi, B. 2018. Food Science. New Age International (P) Ltd. Publishers. New Delhi

Reference Books

1. Dubey, S.C.1992. Basic Baking Science and Craft. Published by G.N. Dangi, G.D. Enterprises, B -13, 1st floor, Bombay - 400002.
2. Potter, N. 2005. Food Science, CBS Publishers and Distributors, New Delhi.

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4. Kingslee, J. J. 2006. A Professional Text to Bakery and Confectionery. New Age International, New Delhi.
5. Minife, B.W. 1989. Chocolate, Cocoa, and Confectionary – Science and Technology, 3rd edn. Chapman and Hall, Inc., New York, USA.

Journals

1. Indian Food Industry
2. Cereal Chemistry.
3. Journal of Food Science and Technology

Web Resources

- www.foodnetbase.com
- www.researchchandmarkets.com
- www.indiamart.com
- <http://www.foodindustryindis.com>

HOR 151 Nursery Production in Horticulture crops - (0+2)

Practical

Layout of model nursery, Tools and equipment-identification and application. Different methods of breaking seed dormancy stratification, scarification and use of plant growth regulators. Seed propagation, Extraction and storage of healthy seeds, seed bed preparation, Identification and raising of rootstocks for different fruit plants, soil solarization, - Practices in preparation of media for propagation of fruit plants, flowering annuals and perennials, foliage and indoor ornamentals and orchids, Potting, de potting and repotting - Containers for propagation and their practical usage, Types of nursery beds, Raising hybrid vegetable seedlings in Protrays, Protection of nursery plants against adverse climatic conditions- Protected structures, shade net houses and Mist chamber ,Mother plant block or scion block establishment, Calculation of growth regulators concentration for propagation, Preparation and application of growth regulators for cuttings and layering, Hands on training in preparation of stem, root, leaf and leaf bud cuttings and rooting, Different types of layering methods, Hands on training in simple layering and air layering, Rootstocks for commercial horticultural crops and raising of the rootstocks - different types of grafting methods - Hands on training in epicotyl grafting, soft wood grafting, inarching /approach grafting in fruit crops, Hands on training in shield budding and patch budding, Micro propagation- Commercial tissue culture laboratory- Visit to commercial tissue culture laboratory, Nursery management practices- i.e. weed control, irrigation, nutrition, removal of sprouts etc. Diagnosis and control of important diseases and pests in the nursery, lifting and packing of nursery plants, marketing of products in commercial nursery - Obtaining accreditation for a commercial nursery - Plant quarantine, quality standards for export and import of seeds and nursery plants produced - Project preparation for the establishment of commercial nursery.

Practical schedule

1. Layout of model nursery -Horticultural nurseries, types and economical importance and Various components of nursery
2. Tools and equipment-identification and Practices in usage and maintenance
3. Different types of media -Qualities of an ideal propagation media - Practices in preparation of media for propagation of horticultural crops
4. Containers for propagation and their practical usage
5. Practices in Potting, de potting and repotting

6. Different methods of breaking seed dormancy stratification, scarification and use of plant growth regulators and seed propagation of horticultural crops
7. Types of nursery beds – hands on training for preparation of raised beds and seed sowing
8. Hands on training raising hybrid vegetable seedlings in Protrays
9. Protected structures for propagation and
10. Hands on training for establishment of mother plant block or scion block establishment
11. Hands on training in preparation of different types of stem cuttings in horticultural crops viz., fruits and ornamental crops
12. Calculation of growth regulators concentration for propagation
13. Preparation and application of growth regulators for cuttings and layering
14. Hands on training in preparation of different types of layering in horticultural crops viz., fruits and ornamental crops
15. Hardening of rooted cuttings and layers in horticultural crops
16. Hands on training for raising the rootstocks in fruits and vegetable crops
17. **Mid semester Examination**
18. Different types of grafting methods - Hands on training in epicotyl grafting, soft wood grafting, inarching /approach grafting in fruit crops
19. Hands on training in grafting in vegetable crops
20. Hands on training in In situ grafting and top working in fruit crops
21. Hands on training in shield budding and patch budding in fruits and ornamental crops
22. Hands on training in propagation of foliage ornamental plants
23. Hands on training in propagation of flowering ornamental plants
24. Hands on training in propagation of Orchids Anthuriums, important flowering climbers, important ornamental trees
25. Hands on training in collection and preparation of explants, surface sterilization of explants, inoculation of explants and in sub culturing
26. Hands on training in micro propagation of banana
27. Hardening of seedling in nursery
28. Nursery management practices- i.e. weed, irrigation management nutrition and removal of rootstock sprouts
29. Diagnosis and control of important diseases and pests in the nursery
30. Lifting, labelling and packing of nursery plants

31. Nursery registration act, plant quarantine, quality standards for export and import of seeds and nursery plants
32. Visit to accredited nurseries and commercial tissue culture laboratory
33. Project preparation for the establishment of commercial nursery
34. **Final practical examination**

Learning Outcomes

- ❖ Students will develop entrepreneurial skills in the propagation of horticultural crops.
- ❖ They will gain hands-on training in various propagation methods and nursery management practices.
- ❖ Students will acquire knowledge of techniques and economic aspects involved in establishing a commercial nursery

Reference Books

1. Hudson T. Harmann, Dale E. Kester, Fred T. Davies, Jr. and Robert L. Geneve. Plant Propagation –Principles and Practices (7 th Edition). PHI Learning Private Limited, New Delhi – 110001
2. T. K. Bose, S. K. Mitra, M. K. Sadhu, P. Das and D. Sanyal, Propagation of Tropical & Subtropical Horticultural crops, Volume 1 (3 rd Revised edition). Naya Udyog, 206, Bidhan Sarani, Kolkata 700006.
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4. Mukherjee, S. K. and Manjumdar, P. K. 1973. Propagation of fruit crops. ICAR, New Delhi.
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6. Sadhu, M.K.1989. Plant Propagation. Wiley Eastern Ltd., 4835/24, Ansari Road, Daryaganj, New Delhi 110 002.
7. Kumar N. Introduction to Horticulture, Medtech Science Press; 9th edition, New Delhi 110002