

The course on **Agriculture for Sustainable Livelihood** is intended to explore the inter-linkages between current agricultural practices and their potential role on livelihood sustainability with an objective to evolve possible improvements by integrating advancements in the fields of science and technology, policy frameworks and entrepreneurial avenues. The program will identify researchable hypothesis and possible developmental frameworks towards an enhanced livelihood sustainability that is based on resource use efficiency, climate change resilience and that are environmentally safe. The course will evolve futuristic innovative practices for the sustainable development of the farming communities and advocates for policy or structural framework changes (if required) towards developing innovative sustainable livelihood solutions.

**Objectives:**

- To review, understand and interconnect existing agricultural scenario and evolve developmental frameworks through research.
- Develop capability in selecting appropriate research methodologies in tackling various problems and developing improved solutions.
- Evolve futuristic innovative practices for the sustainable development of the farming communities

**Course Delivery:**

A variety of teaching/learning methods will be used to achieve the course objectives. These includes: extensive readings, lectures, hands on training, field visit, critical discussions based on case studies, research papers and assignments ensuring student participation. Articles and case studies will be shared during the lectures and there will be substantial discussion.

**Brief overview of syllabus:**

Organic farming, Natural farming and Conservation Agriculture- their benefits and demerits, Climate change impact in agriculture, climate change mitigation and adaptation strategies. Role of agri-informatics in smart farming, minimising the impact of climate change and enhancing resource use efficiency. Land races and germplasm conservation for climate change mitigation. Precision irrigation as a climate change adaptation strategy. Components and criteria to assess the production potential and profitability of farms, assessing the farming potential through data assessment, knowledge discovery and rating the farm operations and

performance, providing solutions towards climate change resilience, resource use efficiency, enhanced productivity and profit through data driven approach towards decision support systems. Soil Test Crop Response (STCR) applications in precision agriculture, pest scouting, digital image processing techniques of pest and disease diagnosis, Pest and disease surveillance through drone or UAVs, Nano-based smart pesticide formulations and delivery.

**Livelihood options in Agriculture**, existing business models and the structure of start-up solutions in agriculture and life skills. Integrating technological advancements in the farming sector, IoT applications in farming sector including crop planning, management, post-harvest and marketing. Approaches and challenges and strategies to improve livelihood options with case studies on Bee Keeping, mushroom cultivation, Nursery development, Ornamental gardening and Landscaping, vertical farming, post-harvest food handling and product diversification.

**Business models** and the structure of start-up solutions in agriculture. Integrating technological advancements in the farming sector, IoT applications in farming sector including crop planning, management, post-harvest and marketing.

**Agricultural policies** that impact on farm productivity and profitability, existing policies and its impact on agriculture sector, existing government programs towards farmer's welfare and their merits and demerits. Group approaches in agricultural extension, technology transfer in agriculture, role of SHG and FPO's in agriculture, community empowerment methodologies

### **Practical**

Crop planning based on rainfall pattern, pan evaporation, and irrigation water. Water harvesting for better crop production. Nutrient recommendation based on soil test data.

Assessing and rating farming performance based on current and historical data and providing solutions. Modelling techniques for crop planning. Impact of climate change – multiple resistance of crop plants towards stress tolerance, Livelihoods options in agriculture – Bee keeping, mushroom cultivation, nursery techniques. Designing and execution of landscape garden, case studies on Post-harvest food handling of Horticultural crops, Image processing

application (e.g., satellite images, UAV) in agriculture, Decision support system – Case studies analysis, Estimation and calculation of marketing costs, margins and price spread – Case study, Data collection -gathering information on agriculture issues with various stakeholders, Interaction with successful FPO/FPC/CIG/SHG officials and members, Discussion with Agri- business incubation Centre officials and entrepreneur.

### Theory Sessions and Topics:

Units	Session	Topic
<b>Unit - 1</b>	1 - 3	Organic farming, Natural farming, Conservation Agriculture, Precision irrigation their benefits and demerits.
	4 - 7	STCR, Soil testing and making recommendations
<b>Unit - 2</b>	8	Climate change, impact in agriculture, mitigation and adaptation strategies
	9 - 10	Role of Agri-informatics in smart farming, Minimizing the impact of climate change and enhancing resource use efficiency
	11 - 12	Land races and germplasm conservation for climate change mitigation, multiple resistance of crop plants towards stress tolerance
	13 - 15	Image processing, disease symptom diagnosis, pest infestation detection, Drone or UAVs application, Nano formulation.
	16 - 17	Digital Image Processing, Unmanned aerial vehicle (UAV) imaging
	18 - 20	Pest monitoring, Assessing the pest scouting
<b>Unit - 3</b>	21	Mushroom cultivation
	22	Bee keeping
	23 - 26	Nursery practices, Landscape gardening, Meadow orcharding, Vertical farming, Post-harvest practices
<b>Unit - 4</b>	27 - 28	Decision support system
<b>Unit - 5</b>	29 - 37	Agricultural policies, Existing government program towards farmer's welfare, Diffusion of innovation, PRA technique, Transfer of technology (ToT) models, Farmers Producer Organization (FPO), Farmers Producer Company (FPC), Commodity Interest Group (CIG), Self Help Group (SHGs), Agri business, Community empowerment
Presentations by experts		

### Practical Sessions and Topics:

Units	Session	Topic
<b>Unit - 1</b>	1 - 2	Crop planning, Water harvesting
	3 - 6	Computation of fertilizer recommendation based on soil test data.
	7	Assessing and rating farming performance based on current and historical data and providing solutions
<b>Unit - 2</b>	8	Screening methods for abiotic and biotic stress tolerance
	9	Unmanned aerial vehicle (UAV) imaging
	10	Pest surveillance and forecasting, Assessing the pest scouting
<b>Unit - 3</b>	11	Mushroom cultivation
	12	Bee keeping
	13 - 17	Nursery practices, Propagation methods, Hardscape and Softscape, HDP, Meadow orcharding, Vertical farming, Post-harvest practices
<b>Unit - 4</b>	18	Decision support system (DSS): components and Case studies analysis
<b>Unit - 5</b>	19 - 21	Estimation and calculation of marketing costs, margins and price spread- Case Study, PRA technique - Case study, Ex post facto research design in social science research, Farmers Producer Organization (FPO), Farmers Producer Company (FPC), Commodity Interest Group (CIG), Self Help Group (SHGs), Agri business- models, SWOC, Agri business

\* 1 Session= 60 Min. (1 hr)

### Course Outcome:

- CO1: This course will enhance the understanding of scholars and researchers on sustainable farming practices and will enable them to make sustainable solutions
- CO2: The researchers and scholars will learn the principles and practices of sustainable farming practices and enhance their potential in formulating research frameworks towards evolving sustainable solutions.
- CO3: They will gain a holistic view on agricultural aspects of sustainable livelihood and can contribute to diversified areas through a systematic approach learned through this course.

### Evaluation Criteria

Students are evaluated based on their performance in personal learning paper; class participation and quiz; mid-term and end-term examination; and group project and presentations. The weightage for various components will be as follows:

Class participation - 10%

Reviews and Case Discussions – 25%

Presentation – 25%

End-term examination – 40%

### References

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