Training Course on Predictive Analytics for Agricultural Pest and Disease Forecasting

Professional Development Training Course Outline

Category	Agriculture	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In an era of climate uncertainty and increasing crop vulnerabilities, predictive analytics is revolutionizing agriculture by providing data-driven insights to combat pests and diseases before they spread. Training Course on Predictive Analytics for Agricultural Pest and Disease Forecasting empowers agricultural professionals with cutting-edge tools such as machine learning, remote sensing, GIS, and IoT integration to forecast outbreaks, minimize losses, and improve crop resilience. With the global demand for food security rising, accurate forecasting is essential to optimize agroecosystem health and sustainability.

Designed for precision agriculture experts, agronomists, researchers, and policymakers, this course combines technical instruction with real-life case studies. It enhances data literacy, risk mitigation, and proactive intervention strategies to support smarter agricultural decisions. Participants will gain hands-on experience in predictive modeling techniques and learn how to interpret agri-data to support early warning systems.

Programme Curriculum

Training Course on Predictive Analytics for Agricultural Pest and Disease Forecasting

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Course Objectives

1. Understand the role of predictive analytics in agricultural pest and disease forecasting.
2. Identify major data sources such as remote sensing, climate data, and field sensors.
3. Apply machine learning algorithms for outbreak prediction and classification.
4. Utilize GIS tools to map and monitor disease spread patterns.
5. Integrate IoT technologies for real-time agricultural data collection.
6. Interpret environmental variables affecting pest and disease proliferation.
7. Develop risk-based early warning systems using forecasting models.
8. Enhance data-driven decision-making for integrated pest management (IPM).
9. Analyze historical outbreak trends using time-series forecasting.
10. Build actionable dashboards and visualizations for stakeholders.
11. Explore open-source tools and platforms for model deployment.
12. Evaluate the cost-benefit impact of predictive interventions on crop yield.
13. Promote climate-smart agriculture practices using predictive analytics.

Target Audiences

1. Agricultural Extension Officers
2. Agronomists and Crop Scientists
3. Data Scientists in Agri-Tech
4. Precision Agriculture Specialists
5. Environmental and Climate Researchers
6. Government Agriculture Departments
7. Agri-Startup Founders and Innovators
8. Academic Researchers and Graduate Students

Course Duration: 10 days

Course Modules

Module 1: Introduction to Predictive Analytics in Agriculture

- Definition and relevance of predictive analytics
- Pest and disease trends in global agriculture
- Benefits of predictive forecasting
- Key terminology and concepts
- Stakeholders in forecasting systems
- **Case Study: Fall Armyworm outbreaks in Sub-Saharan Africa**

Module 2: Data Sources for Pest and Disease Forecasting

- Weather and climate datasets
- Satellite and remote sensing data
- In-situ sensor networks
- Farmer-reported observations
- Open-source platforms (FAO, NASA)
- **Case Study: NDVI use for fungal disease detection in wheat**

Module 3: Understanding Agricultural Pests and Diseases

- Classification of pests and pathogens
- Lifecycle and seasonal patterns
- Economic impact on major crops
- Pest-host-environment interactions
- Monitoring and scouting techniques
- **Case Study: Coffee rust forecasting in Latin America**

Module 4: Fundamentals of Machine Learning in Agriculture

- Introduction to supervised/unsupervised learning
- Algorithms used in pest/disease prediction
- Model training and validation
- Data preprocessing techniques
- Challenges and limitations
- **Case Study: Random Forest for predicting rice blast**

Module 5: Time-Series Analysis and Seasonal Forecasting

- Concepts of seasonality and trend analysis
- ARIMA, Prophet, and LSTM models
- Handling time-stamped agricultural data
- Visualizing temporal outbreak patterns
- Forecast evaluation metrics
- **Case Study: Aphid infestation prediction using LSTM**

Module 6: GIS Mapping for Pest and Disease Surveillance

- GIS fundamentals for agriculture
- Spatial pattern analysis and clustering
- Heatmaps and choropleth mapping
- Incorporating weather overlays
- Use of QGIS and ArcGIS
- **Case Study: GIS tracking of locust migration**

Module 7: Climate Modeling and Environmental Factors

- Role of temperature, humidity, and precipitation
- Climate-smart pest forecasting
- Linking climate data with outbreak modeling
- Predictive thresholds and alerts
- Future climate projections
- **Case Study: Climate-driven model for maize stalk borer**

Module 8: IoT and Smart Farming Sensors

- IoT architecture in agri-systems
- Types of sensors (humidity, soil, pest traps)
- Sensor network deployment
- Real-time data analytics
- Sensor-cloud integration
- **Case Study: Smart trap sensors for pest alerts in vineyards**

Module 9: Data Cleaning and Preprocessing

- Data wrangling techniques
- Dealing with missing values

- Normalization and standardization
- Feature selection and engineering
- Bias and data quality issues
- **Case Study: Preprocessing open-source cassava disease data**

Module 10: Predictive Modeling Techniques

- Logistic regression, Decision trees
- Ensemble methods (Bagging, Boosting)
- Neural networks for agriculture
- Model performance metrics
- Cross-validation approaches
- **Case Study: SVM model for tomato leaf curl virus**

Module 11: Visual Analytics and Dashboards

- Principles of agricultural data visualization
- Creating dashboards using Power BI/Tableau
- Communicating risk levels effectively
- Real-time dashboard updates
- Stakeholder interpretation
- **Case Study: Sugarcane pest warning dashboard in India**

Module 12: Model Deployment and Monitoring

- From prototype to production
- Deployment tools (Flask, Streamlit, AWS)
- Model retraining and performance tracking
- Mobile alert systems and APIs
- Ethical deployment concerns
- **Case Study: Mobile-based early alert system in Kenya**

Module 13: Integrated Pest Management (IPM) and Decision Support

- Role of analytics in IPM
- Risk-based intervention planning
- Economic thresholds
- Combining traditional and digital methods
- Policy and extension support
- **Case Study: Integrated prediction and response in cotton pests**

Module 14: Cost-Benefit Analysis of Forecasting Models

- Economic modeling of yield loss prevention
- ROI of predictive systems
- Farmer adoption and perception
- Funding sources and sustainability
- Cost-saving case comparisons
- **Case Study: Smallholder adoption of banana disease forecast app**

Module 15: Future Trends and Policy Integration

- Emerging technologies (AI, blockchain)
- Scaling predictive systems in LMICs
- Cross-border data sharing and regional platforms
- Policy frameworks for digital ag

- Public-private partnership models
- **Case Study: African Union digital pest forecasting initiative**

Training Methodology

- Interactive lectures with multimedia presentations
- Hands-on coding and modeling workshops
- Group discussions and brainstorming
- Real-world datasets and simulation labs
- Guest lectures from agri-tech innovators
- Fieldwork/data collection assignments

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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