



विज्ञान एवं प्रौद्योगिकी विभाग
DEPARTMENT OF
SCIENCE & TECHNOLOGY
DST- TEC, Pantnagar

3 MONTHS ONLINE CERTIFICATE COURSE

DATA SCIENCE AND AGRICULTURE

**A unique first of its kind initiative integrating
data science in agriculture**

**Starting
from**



**5 August,
2024**

**An initiative of DST–Technology Enabling Centre
G.B. Pant University of Agriculture and Technology, Pantnagar**

ABOUT THE COURSE

The DST - Technology Enabling Centre (TEC) of G.B. Pant University of Agriculture and Technology, Pantnagar is launching a three months online course on '**Data Science and Agriculture**' from August 5 to November 5, 2024. The course is open for all undergraduate, postgraduate, and doctoral students as well as for interested young professionals of all State Agricultural Universities (SAUs), ICAR Institutes, Central Universities, other State Universities and higher education institutes. In the present context, Data Science is an emerging field with immense scope in agriculture and allied sciences. To cater to modern day challenges in agriculture, it is important that agriculture students and academic professionals have knowledge about emerging technologies. In this context, this three months certificate course has been conceptualized to update and upskill the students and academic professionals who are pursuing higher education or practicing or have interest in agriculture and allied disciplines. The three months have a comprehensive course outline with online lectures, hands-on skilling sessions, expert talks, mentoring discussions, problem solving sessions and so on. The course will definitely induce a new set of knowledge among the learners and will also provide practical experience to use data science concepts.

COURSE CURRICULUM

- Introduction to Machine Learning, Types of Machine Learning, Real-world applications of Machine Learning
- Python Programming Basics, Python Syntax and Semantics, Error Handling and Exceptions and Data Structures in Python
- Data Manipulation and Visualization; Introduction to Libraries for Data Science, Data Cleaning and Preprocessing, Data Transformation
- Supervised Learning; Regression, Evaluation Metrics (MSE, RMSE, R-squared). Classification; Logistic Regression, k-Nearest Neighbors (k-NN), Decision Trees. Model Evaluation
- Unsupervised Learning and Advanced Topics such as Clustering, Introduction to Dimensionality Reduction, Principal Component Analysis (PCA), t-SNE
- Foundations of AI and ML in Agriculture; Precision agriculture for optimizing crop yield through IoT sensor data. Differences between AI, ML, and Data Science
- Historical Development and Current Trends; Key milestones and current trends in AI/ML relevant to agriculture, Identify major historical milestones. Understand the progression of AI technologies
- Importance and Impact of AI/ML in Agriculture; Benefits of AI/ML for agriculture, Examples of AI applications in agriculture, understand specific benefits for agriculture, Analyze real-world agricultural AI applications
- Types of Machine Learning in context of agriculture, Key ML Algorithms: Decision trees for crop disease detection from satellite imagery. Evaluation Metrics and Model Performance; Metrics like accuracy, precision, and recall in evaluating agricultural ML models

- Data Management and Preprocessing from Agricultural Sources, Integration of IoT sensor data for real-time, farming decisions. Data Storage Solutions; Importance of data privacy, GDPR and other data protection regulations, Best practices for data security
- Advanced AI Techniques for Agriculture; Predictive Modelling for Agriculture. Crop Yield Prediction; Time series forecasting models for predicting seasonal crop yields, Real-world examples of yield prediction systems, Soil sampling and analysis techniques, ML models for soil nutrient prediction, Mapping soil health indicators, Weather Prediction Models
- Data sources for weather forecasting (e.g., meteorological data), Building weather prediction models, Impact of weather on agricultural planning. Integration of IoT Sensors; Types of sensors used in agriculture (e.g., soil moisture, temperature), Collecting and analysing sensor data, Creating a sensor network for real-time monitoring
- Pest and Disease Detection - Image Recognition and Computer Vision; Using CNNs for pest and disease detection, Annotating and training image datasets, Early Detection Models, Image Analysis and Computer Vision, Satellite and Drone Imagery Analysis, Disease and Pest Detection Using Computer Vision
- Advanced Machine Learning Models; Deep Learning Applications in Agriculture: RNNs, Convolutional Neural Networks (CNNs); Architecture and components of CNNs, Applications in image processing, Training and fine-tuning CNN models
- Natural Language Processing (NLP) in Agriculture; NLP Applications in Agriculture, Text Mining and Sentiment Analysis for Market Trends, Language Translation for Farmer Communication, Chatbots for Farmer Assistance

COURSE DELIVERY METHODS

1. Live Online Classes on Zoom
2. Live Hands-on Skilling Sessions
3. Fortnightly Expert Talks and Industry Insights
4. Problem Solving and Discussion Sessions
5. Projects and Case Studies
6. Assignments and Quizzes
7. Peer Review

ELIGIBILITY

- Open for all undergraduate, postgraduate, and doctoral students as well as for interested young professionals of all State Agricultural Universities (SAUs), ICAR Institutes, Central Universities, other State Universities and higher education institutes
- **Desirable:** Working knowledge of computer and internet

ABOUT PANTNAGAR AND DST-TEC

G.B Pant University of Agriculture and Technology, Pantnagar is the first agricultural university of the country established on the Land Grant Pattern in the year 1960. The University is eulogized as 'Harbinger of Green Revolution' by Nobel Laureate Dr. Norman E. Borlaug for its immense contribution in making India self-sufficient in food grain production. Since inception, the University has produced excellent graduates and has an alumni strength of 50,000+ who are in leading positions in agriculture sectors across the country and the world. The University is one among the two State Agricultural Universities of the country to be placed in World QS Rankings by Subject, consecutively for last three years (2022, 2023, 2024). To improve the quality of teaching, research and extension in agriculture and allied fields, the University makes utmost efforts through its 350 plus scientists working in 60 departments, and 4000 plus students.

The DST- Technology Enabling Centre (TEC) established at G.B. Pant University of Agriculture and Technology, Pantnagar is the first TEC awarded to a State Agricultural University and is also the first TEC in Uttarakhand. The TEC is working towards creating an ecosystem for assessment of technologies/prototypes/products developed within the university and within Uttarakhand, ultimately to enhance the prospect of commercialization. This 3 Months Online Certificate Course in Data Science and Agriculture is another unique effort in this direction.

REGISTRATION LINK AND PAYMENT DETAILS

Registration Fees: 5000/- (Rupees Five thousand only)

The Registration Fee is to be deposited in the following account and the screenshot is to be updated in the Registration Form

Account Number: 10773372306

Account Name: Agriculture College Revolving Fund

Bank name: State Bank of India, Pantnagar

IFSC Code: SBIN0001133

FOR REGISTRATION

▶ [CLICK HERE](#)

OR

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IMPORTANT DATES

- **Last Date for Registration** : 3 August, 2024
- **Course Duration** : 5 August, 2024 - 5 November, 2024

For any queries, please contact :



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<https://www.gbpuat.ac.in>