

## **Greenhouse Management and Technology**

**Date: 28 July 2025 to 8 Aug 2025**

*Organized by*

**College of Agribusiness Management**

**GB Pant University of Agriculture and Technology, Pantnagar**

**Uttarakhand, India-263145**



## **Course Brochure**

**Course Coordinator(s):**

**Dr. Ashutosh Singh** : Course Coordinator

**Dr. Reetika Bhatt** : Course Co-Coordinator



# Greenhouse Management and Technology

## Overview

The risk of unfavorable environmental conditions for crop production is exacerbated due to climate change and global warming in many parts of the world including India. Protected crop production systems such as greenhouses enable crop production in harsh climates and aid in reducing the wastage of resources (eg, water and fertilizers). Therefore, it is needless to mention that protected cropping systems such as greenhouses can play a vital role in the face of climate change. The science and technology associated with greenhouse production is rapidly evolving in many countries including the US, the Netherlands, China, and Israel. It is unfortunate that learning experiences related to modern greenhouse management and technology are limited to students and industry professionals in India. Keeping the inevitable climate change in mind, it is extremely important to train the youth and industry professions to become next-generation scientists and workforce in the field of greenhouse crop production. Knowledge related to modern concepts in greenhouse management and technology that were developed through research and practice in the developed world needs to be transferred and provided to the students and industry professionals in India.

The proposed course will combine the research-based concepts related to plant physiology, crop environment, and advanced sensing and automation technologies used in greenhouse crop production. The course will focus on integrating both fundamental and advanced concepts to provide a rich learning experience for students to foster interest and continue education/research in the field to become next-generation scientists, growers, and educators, and professionals to develop new skills. The course will be designed to present small but several easy-to-understand one-hour modules covering a wide range of topics. In addition, the course will expose students and professionals to modern IoT sensor technologies and automation devices such as dataloggers and microcontrollers that use Python-based computer software to not only collect data but also automatically provide decision support and maintain optimal environmental conditions for plant growth in greenhouses. The course outcomes include but are not limited to proficiency in discipline, critical thinking, teamwork, and lifelong learning skills.

## Objectives

1. Familiarize with best environment management practices for growing crops in the greenhouse
2. Learn how above and below-ground environments interact with crop production
3. Experience the state-of-the-art technologies used in greenhouse production to monitor and control environments.
4. Gain sufficient background in science and technology required to continue education/research in the field to become entrepreneurs, next-generation growers, educators, and scientists.

## Teaching Faculty

**Prof. Krishna Nemali**- No. of Lectures: 19, no. of tutorials: 09

**Prof. Ranjan K. Srivastava**- No. of Lectures: 03

**Prof H.J. Shiva Prasad**- No. of Lectures: 04

**Prof Ashutosh Singh**- No. of Lectures: 02

**Prof Reetika Bhatt**- No. of Lectures: 02

## Lecture Schedule:

The course is divided into lectures, tutorials and hands-on modules as follows:

### Lectures

- Lecture 1: Introduction to Greenhouse Management and Technology
- Lecture 2: Light intensity and composition
- Lecture 3: Supplemental lighting
- Lecture 4: Temperature effects on growth and flowering
- Lecture 5: Greenhouse cooling and heating requirements
- Lecture 6: Protected cultivation of high-value horticultural crops- Indian perspective
- Lecture 7: Physical and chemical properties of soilless substrates
- Lecture 8: Different soilless substrates/ components
- Lecture 9: Production technology tips for quality production of cut flowers under protected conditions
- Lecture 10: Physics of water molecule and water potential
- Lecture 11: Irrigation scheduling basics
- Lecture 12: Protected cultivation of high-value vegetables
- Lecture 13: Macro and micro nutrients and their effects of plant growth
- Lecture 14: Electrical conductivity and pH
- Lecture 15: Understanding Plants' growth: Responses to CO and role of water use
- Lecture 16: Plant growth regulation
- Lecture 17: Regulating plant growth and development; Role of environmental variables (Light)
- Lecture 18: Value chain management in horticultural crops
- Lecture 19: Greenhouse construction, location details, orientation
- Lecture 20: Greenhouse designs, structural loads, and glazing materials
- Lecture 21: Introduction to Hydro Meteorological Parameters
- Lecture 22: Hydroponics
- Lecture 23: Aeroponics, Aquaponics and vertical farming
- Lecture 24: Flow measurement Techniques
- Lecture 25: AI and ML Applications in Hydrology
- Lecture 26: Digital sensors/ Image analysis using Python
- Lecture 27: Introduction to microcontrollers
- Lecture 28: Strategic marketing for efficient disposal of perishable commodities- the horticultural produce
- Lecture 29: Water Quality parameters in Agriculture
- Lecture 30: Higher education and collaborative research in the US

### Tutorials

- Tutorial 1: Light Intensity and Spectrum measurement
- Tutorial 2: Air and canopy temperature sensors and RH sensor
- Tutorial 3: Pore space and container capacity of substrates
- Tutorial 4: Volumetric water content sensors
- Tutorial 5: Identifying nutrient deficiencies in plants
- Tutorial 6: Electrical conductivity and Ph sensors
- Tutorial 7: Automated data collection using digital sensors
- Tutorial 8: Environmental control using data loggers
- Tutorial 9: Growth-based automation using digital sensors

## Registration Process & Fees

First, the participants must do the mandatory registration in the Google form link given below. After scrutiny of the registered participants, eligible participants will be notified through email for the registration fee payment. The registration fees (non-refundable) for participating in the course are as follows:

Category	Registration Fee (Offline)		Remarks
Students(Research Scholars)	INR	2000	<b>Note: Rs. 500 extra shall be charged for the Award of grade.</b>
Faculty/Researchers from Academic/Research Institutions	INR	4000	
Participants from Industry Gov., Engineers, Consultants, etc	INR	5000	
Participants from abroad	\$	50	

- **Total number of available seats are 50 only.**
- **No TA, DA will be provided to the participants. Participants have to arrange their own accommodation and food.** However, limited shared accommodation may be made available (subject to availability) in the university guesthouse/Hostels on request basis. Payment for accommodation & food is extra as per actuals, which shall be borne by the participants themselves.
- Last Date of Registration: **July 8, 2025**
- You will be notified about the confirmation of registration on **July 10, 2025**; you have to pay the registration fee till **July 15, 2025** and have to send the proof of payment through mail or google link shared through the confirmation mail.

## Who can Attend?

1. Senior-level undergraduate students, postgraduate students (M.Sc./Ph.D.), postdoctoral fellows, and scientists.
2. Industry professionals including growers and suppliers.
3. University faculty.
4. Horticultural extension educators.
5. Entrepreneurs/ Interested home-scale growers.

## About GBPUA&T

G. B. Pant University of Agriculture and Technology, also known as Pantnagar University, is the first agricultural university of India. It was inaugurated by Jawahar Lal Nehru on 17 November 1960 as the "Uttar Pradesh Agricultural University" (UPAU). Later the name was changed to "Govind Ballabh Pant University of Agriculture and Technology" in 1972 in memory of the first Chief Minister of Uttar Pradesh, statesman and Bharat Ratna recipient Pandit Govind Ballabh Pant. The G.B. Pant University is a symbol of successful partnership between India and the United States. The establishment of this university brought about a revolution in agricultural education, research and extension. It paved the way for setting up of 31 other agricultural universities in the country. The University lies in the campus-town of Pantnagar in the district of Udham Singh Nagar, Uttarakhand. The university is regarded as the harbinger of the Green Revolution in India.

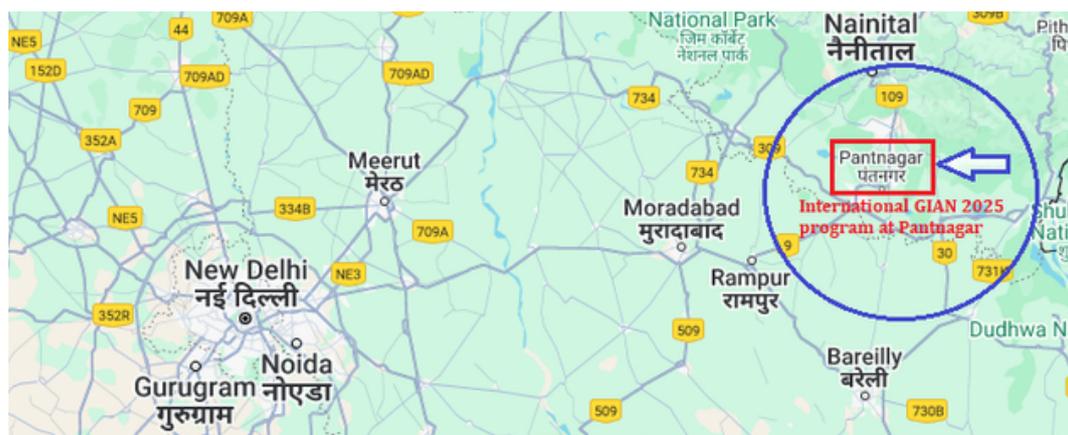
Please visit: <https://www.gbpuat.ac.in/>

## About CABM

The Centre for Agribusiness Management (CABM) at Govind Ballabh Pant University of Agriculture & Technology stands as a premier institution dedicated to managerial excellence in agribusiness and beyond. Established in 1996, CABM has played a pivotal role in enhancing the agricultural system by developing skilled, motivated, and committed techno-managers. With a keen eye on the evolving market landscape, the institute has expanded its offerings to include an MBA for Engineers and a Ph.D. in Management, alongside its core agribusiness programs. Beyond academics, CABM actively engages in research, consultancy, and Management Development Programs (MDPs) to address industry challenges and policy formulation. The institute equips students with managerial expertise, provides training for executives and policymakers, and offers consulting services to business organizations. Committed to shaping future leaders, CABM continues to set benchmarks in agribusiness education, striving to be the finest sectoral business management institution in India.

## How to reach Pantnagar

The university campus is located at a distance of 250 km from Delhi in Udham Singh Nagar district of Uttarakhand. The nearby towns are Rudrapur (16 km), Haldwani (25 km), Lalkuan (13 km) and Nainital (65 km). Two National Highways- NH 87 and Bareilly- Nainital highway touch the campus. Pantnagar Airport, operated by Airports Authority of India is located in the campus, 2.5 km west of main administrative building. Lalkuan railway station is the nearest railway station. Local rickshaws, auto-rickshaws connect various parts of the campus.



## Brief CV's of Expert

**Dr. Krishna Nemali** is an Associate Professor in the Department of Horticulture and Landscape Architecture at Purdue University. He is based at 625 Agriculture Mall Drive, Purdue University, West Lafayette, Indiana. He holds a Ph.D. and M.S. in Horticulture from the University of Georgia and a B.S. in Agriculture from Acharya N.G. Ranga Agricultural University, India. His professional experience spans academia and industry, including roles as an Assistant Professor and Extension Specialist at Purdue, a Controlled Environment Crop Physiologist at Monsanto, and a postdoctoral researcher at the University of California, Davis. He has been recognized for his contributions to teaching, extension, and entrepreneurship. He is an active member of professional societies such as the American Society for Horticultural Science and has served as Chair of the Indiana Flower Growers Association. His research focuses on smart agricultural technologies, particularly smartphone-based plant nitrogen estimation and controlled environment farming. He has also led multiple funded projects supported by agencies such as the Fred Gloeckner Foundation, the American Floral Endowment, and the Indiana State Department of Agriculture.

**Dr H J Shiva Prasad** is presently with the Department of Civil Engineering, College of Technology, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar of Uttarakhand State, India (A Government of Uttarakhand State University) as Professor of Civil Engineering. He has been assigned additional duties as Director, International Affairs of the university. He got more than thirty eight (38) years of teaching different institutions/universities/organisations and industrial experience at TATA Consulting Engineers (TCE). He has more than fifty five publications of National and International Journals / Conferences to his credit. He has organised thirty five (35) training / workshop programmes for the faculty of engineering colleges, field engineers funded by DST, AICTE-ISTE, Science Academies, TEQIP WORLD BANK project etc and attended more than fifty five (55) workshops, training programmes organized by Science Academy, DST, DOE, AICTE, ISTE, ICH, and NORAD. He was an elected member of council of management of Indian Water Works Association (IWWA) during 1997-98 and worked as Secretary cum treasurer of ISTE Chapter, College of Technology, GBPUA&T Pantnagar for six years. He is a life member of professional bodies like IAHS, ISH, IWWA, IWRS, IAH, ISTE. He has visited many countries also on academic assignments.

**Dr. Ranjan K. Srivastava** is a distinguished Professor in the Department of Horticulture at the College of Agriculture, Govind Ballabh Pant University of Agriculture and Technology. He holds a Ph.D. with a specialization in Floriculture and Plant Tissue Culture. His research interests encompass floriculture and plant tissue culture, leading him to spearhead several significant projects. Notably, he has been involved in the All India Coordinated Floriculture Improvement Project focusing on tuberose, gerbera, gladiolus, and rose, funded by ICAR, New Delhi. Additionally, he has contributed to disseminating improved horticultural technologies to enhance the livelihood security of farmers in Uttarakhand through initiatives funded by IFAD-ILSP, Dehradun. Dr. Srivastava has also played a role in assessing the State of Environment of Uttarakhand in a consultancy project for the Uttarakhand Government. His scholarly contributions include publications on genetic divergence in carnations and in vitro plant regeneration of *Citrus aurantifolia*, reflecting his commitment to advancing horticultural science.

**Dr. Ashutosh Singh**, a Professor at College of Agribusiness Management at GBPUA&T Pantnagar, has over 25 years of experience in academia and industry. He specializes in postgraduate and doctoral teaching, curriculum development, and agribusiness research. Actively involved in collaborative projects with TSU and USDA, he focuses on agricultural waste management and value-added product promotion. He has developed course materials and self-learning content for agribusiness education. Dr. Ashutosh Singh has presented research at esteemed forums, including the Asian Productivity Organization in Bangkok and the AAEA Joint Annual Meeting in Florida. His work includes guiding postgraduate and Ph.D. research on agribusiness policies and marketing strategies. Recognized for his contributions, he continues to shape the field through research, innovation, and policy development.

**Dr. Reetika Bhatt**, a distinguished alumnus of G.B. Pant University, Pantnagar, is an accomplished academic and professional with over eight years of experience as an Assistant Professor at the College of Agribusiness Management, Pantnagar. Building on a strong foundation in Agribusiness and Finance, she has consistently demonstrated exceptional academic excellence throughout her career. Dr. Bhatt is highly regarded for her enthusiasm, dedication, and leadership, and has made significant scholarly contributions through research papers, publications, and editorial roles. With over a decade of combined experience in banking and academia, Dr. Bhatt's impact is felt across both academic and professional spheres, shaping the future of agribusiness management.

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## Greenhouse Management and Technology

**Date: 28 July, 2025 to 8 August, 2025**

### International Expert:

**Dr. Krishna Nemali**

Associate Professor, Department of Horticulture and Landscape Architecture, Purdue University, West Lafayette, Indiana.

Email: [Knemali@purdue.edu](mailto:Knemali@purdue.edu)

Web Link: <https://www.purdue.edu/hla/sites/cea/>

### Course Coordinator :

**Dr. Ashutosh Singh**

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### Local GIAN Coordinator:

**Prof. H.J. Shiva Prasad**

Professor, Department of Civil Engineering, College of Technology, GBPUAT

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### Course Co-Coordinator:

**Dr. Reetika Bhatt**

Assistant Professor, CABM, GBPUA&T, Pantnagar [www.gbpuat.ac.in](http://www.gbpuat.ac.in)

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Whatsapp no.: +91 6396389763

Last date to register: **8 July 2025**

Confirmation of participant: **10 July 2025**

Payment of Registration fee: **15 July 2025**

Scan to register:



Google form:

<https://forms.gle/RZdFdvmgqmEV1FE8>

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Faculty/Researchers from Academic/Research Institutions	INR	4000	
Participants from Industry Gov., Engineers, Consultants, etc	INR	5000	
Participants from abroad	\$	50	

**Organised By:**



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GBPUA&T, Pantnagar  
Uttarakhand, India.

[www.gbpuat.ac.in](http://www.gbpuat.ac.in)