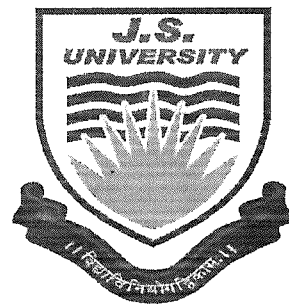


# **J.S. University, Shikohabad**

Established by UP Govt. Act No. 07 of 2015


Recognized by U.G.C. under section 2 (f) of Act-1956



## **VALUE ADDED COURSE**

### **Hydroponics and Controlled Environment Agriculture: Modern Techniques for High-Yield Crop Production**

**Faculty of Agricultural Sciences**

	J.S. University, Shikohabad Faculty of Agricultural Sciences	Value Added Course
		AY:

## **Hydroponics and Controlled Environment Agriculture: Modern Techniques for High-Yield Crop Production**


### **Learning Objectives:**

This course focuses on the principles and practices of hydroponics and controlled environment agriculture (CEA) for high-yield crop production. The course will cover topics such as plant nutrition, water and nutrient management, hydroponic systems design and management, and environmental control. Additionally, the course will cover modern technologies and innovations in hydroponics and CEA such as vertical farming, aquaponics, and LED lighting. By the end of the course, students will have the skills and knowledge needed to design and manage hydroponic and CEA systems for high-yield crop production.

### **Course Outcomes:**

Upon completion of this course, students will be able to:

1. Understand the principles and practices of hydroponics and CEA for high-yield crop production.
2. Manage plant nutrition and water supply in hydroponic systems.
3. Design, construct and maintain hydroponic systems to optimize crop yield.
4. Control environmental factors such as temperature, humidity, lighting, and CO<sub>2</sub> levels to promote plant growth.
5. Understand modern technologies and innovations in hydroponics and CEA such as vertical farming, aquaponics, and LED lighting.

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**Duration:** 8-10 weeks (depending on the pace of the student)

**Intake:** 60 students

**Course Modules (Syllabus):**

**Module-1**

**Introduction to Hydroponics and CEA**

- Overview of hydroponics and CEA
- History and evolution of hydroponic systems
- Types of hydroponic systems
- Advantages and disadvantages of hydroponic and CEA systems

**Module-2**

**Plant Nutrition and Water Management**

- Principles of plant nutrition
- Nutrient management and fertilization in hydroponic systems
- Water management and irrigation techniques
- Hydroponic nutrient solutions and additives


**Module-3**

**Hydroponic System Design and Management**

- Designing and constructing hydroponic systems
- System components and materials
- System maintenance and management
- Troubleshooting and problem-solving

**Module-4**

**Environmental Control in CEA**

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- Understanding the impact of environmental factors on plant growth
- Temperature and humidity management
- Lighting technologies and management
- CO2 enrichment and other environmental control strategies

**Module-5**

**Innovations in Hydroponics and CEA**

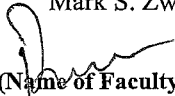
- Vertical farming techniques
- Aquaponics systems
- Integration of renewable energy sources

**Assessment:**

- Weekly quizzes and assignments
- Final project on designing and implementing a hydroponic or CEA system.

**Reference books:-**

1. "Hydroponics Food Production: A Definitive Guidebook for the Advanced Home Gardener and the Commercial Hydroponic Grower" by Howard M. Resh
2. "Hydroponics: The Essential Guide to Hydroponic Gardening for Growing Fruit, Vegetables and Herbs at Home" by Andy Jacobson
3. "Vertical Farming: Plant Factory Market Shares, Strategies and Forecasts, Worldwide 2014-2020 by Wintergreen Research
4. "Indoor Kitchen Gardening: Turn Your Home into a Year-round Vegetable Garden- Microgreens-Sprouts-Herbs-Mushrooms-Tomatoes-Peppers & More" by Elizabeth Millard
5. "The Science of Controlled Environment Agriculture" edited by Michael E. Mickelbart, Mark S. Zwart and Chieri Kubota

  
(Name of Faculty)

**Course Coordinator**

Mr. Sunil  
Kumar

  
(Name of Faculty)

**Dean of Faculty**

Academics

  
(Name of Faculty)

**Director General**

Dr. Anur  
Kumar