



# CONTROLLED ENVIRONMENT AGRICULTURE CLASS PROVIDES HANDS-ON EXPERIENCE IN A DYNAMIC INDUSTRY

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**I**n summer 2024, the University of Wyoming launched its first controlled environment agriculture class.

Put simply, controlled environment agriculture (CEA) is producing food in controlled environments, from traditional greenhouses to indoor farms. CEA aims to optimize space and resource use, and it can provide local, fresh produce to communities in remote areas.

The new summer course, currently funded by the Wyoming Innovation Partnership (WIP), offers a unique opportunity to start building a skilled CEA workforce in the state of Wyoming.

“Interdisciplinary classes like this are key to shaping the next generation of growers, and this could actually attract CEA businesses to our state,” says Carmela Guadagno, associate director of the UW Center for CEA and director of the UW Plant Growth and Phenotyping Facility (PGPF).

## INTERDISCIPLINARY EXPERIENCES

Guadagno coordinated the first summer CEA course in collaboration with a team of UW faculty members who helped teach and plan lab activities. Participating departments and programs included Electrical Engineering

and Computer Science, Botany, Plant Sciences, Family and Consumer Sciences, and Accounting and Finance, as well as the School of Computing, the Center for Blockchain and Digital Innovation, and the Science Initiative.

The class also featured guest lectures delivered by Wyoming CEA business representatives and collaborating institutions, including Wyoming and New Mexico community colleges.

“This course offered a multidisciplinary approach to the CEA industry, which is highly appealing for aspiring entrepreneurs like me,” says Romy Agrawal, a student in UW’s computer science master’s program who plans to start an agri-tech company.

During the inaugural summer course, students gained hands-on experience with hydroponics in the PGPF greenhouses. Students also developed individual CEA research projects with host labs in different departments on campus.

Finally, the class partnered with Plenty, a vertical farming business based in Laramie. Through this partnership, students experienced the entire production cycle of commercial hydroponic produce and met with industry researchers during a two-week internship.

UW undergraduate student Jack McKinley deploys a camera onto a small gantry system at the Plant Growth and Phenotyping Facility. After taking the CEA class in 2024, McKinley has been working for Guadagno and Jian Gong, a research scientist in the School of Computing, to improve data collection in CEA. Photo courtesy of Carmela Guadagno.



Nine undergraduates and one graduate student in fields from agricultural economics to petroleum engineering participated in the new course. “We got a very diverse group of individuals that largely knew nothing about the industry or how their areas of study might be relevant,” says Mike Baldwin, facility manager for the PGPF, who served as co-instructor and lab coordinator for the 2024 course. “Coming out of it, more and more, the students are getting a feel for the diversity of jobs and roles within the industry, how these skill sets are applicable across the board.”

### TRAINING A WYOMING WORKFORCE

Several students were hired to continue work on research projects initiated during the CEA class. The course also sparked several interdepartmental collaborations between faculty members.

Jack McKinley, a student in the School of Energy Resources, says, “With everything I’ve learned in this class, when I graduate, I will look for open positions with companies like Plenty, rather than just jobs in the energy sector.”

As a result of the class, in summer 2025, McKinley found a two-month paid internship

with a collaborating CEA business in Ohio. Two other UW students secured paid internships with Wyoming producers.

Guadagno believes the course could expand Wyoming’s capacity to conduct cutting-edge, multidisciplinary research. “The class actually made [the students] feel different about agriculture and how Wyoming’s agriculture can change in the future with more potential job opportunities in the state,” she says.

A second cohort of students took the class in summer 2025. The Wyoming Innovation Partnership extended funding to provide students with stipends of \$1,300. Students from out of state were eligible to receive funding for lodging and food.

The second session of the course brought in more external lecturers from diverse CEA businesses. Program leaders hope to continue providing students with real-world experience and creating more job opportunities inside and outside Wyoming. ■

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 To learn more, contact Guadagno at [cguadagn@uwyo.edu](mailto:cguadagn@uwyo.edu).

Part of 2025’s CEA class. From left: Iqbal Hossain, Farshad Gorbanishovaneh, Leo Lybarger, Nathan Warner, Jalon Tyndall, Justin Wang, and Cliff Krug. This year the class had a total of 10 students: two students from Sheridan College and Central Wyoming College, one out-of-state student, and seven UW students. Photo courtesy of Carmela Guadagno.