

Syllabus Fall 2021
BE 483/583 Controlled Environment Systems
Tuesday 1:00 – 2:50; Thursday 1:00 – 1:50
CEA Building & Greenhouses, Campbell Ave. & Roger Road

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Please Review -- University Classroom Covid Safety Requirements

[Academic Instruction Resources | University of Arizona Provost](#) - *This resource provides the latest information regarding University of Arizona Stage 3 Instruction, Summer Academic Plans, and operational updates as we plan for increased in-person instruction in fall 2021.*

[Face Coverings | COVID-19 \(arizona.edu\)](#) – *“Based on the current health conditions and aligned with CDC guidance as well as our commitment to deliver in-person learning at the University of Arizona, we will require face masks be worn.....”*

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Description of Course

Controlled Environment Systems BE 483/583 -- An introduction to the technical aspects of design and operation, with environmental control, hydroponic crop production, plant nutrient delivery systems, in greenhouse and other controlled environment facilities.

Course Prerequisites or Co-requisites

Engineering or technical horticultural course background in math and sciences, or with special permission of BE student advisor Dava Jondall davaj@arizona.edu or instructor.

Instructor and Contact Information

Dr. Gene A. Giacomelli
Professor & Former Director Controlled Environment Agriculture Center
Department of Biosystems Engineering
Shantz Building, Room 504
CEA Building, Room 104, 1951 E. Roger Road, Ph: 520 621-1094
giacomel@ag.arizona.edu cell phone 520 990-0202

D2L:

Open Door Policy – office hours up to 15 minutes before class, or arrangement in advance by email.

Course Format and Teaching Methods

Lecture only, with demonstration events, in-class discussion, and D2L web-delivered content.

Course Objectives

Learn the science and engineering of controlled environment plant production systems (CEPPS).
Learn the procedures, techniques and available resources for the design, evaluation, operation and general understanding of CEPPS.
Learn of crop production systems; nutrient delivery systems; microclimate heating, ventilation, cooling, humidifying, supplemental lighting and CO₂ enriching systems; monitoring and control systems; energy conservation and alternate energy systems; mechanization and labor management systems; glazing systems; and types of structures.

Expected Learning Outcomes

The 483 and 583 students will:
Differentiate the generalized processes of each of the sub-systems of a CEPPS.

Apply design concepts and principles of CEPPS operation to draw conclusions about a given design. Integrate the biological aspects of plant production with systems design for the establishment of a successful CEPPS operation.

The 583 students will be able to demonstrate his/her knowledge about greenhouse design by preparing a design analysis report of an operational greenhouse, and will begin to gain understanding of control of the greenhouse environment to enhance plant growth by 'Plant Empowerment'.

Makeup Policy for Students Who Register Late

Students who register after the first class meeting may make up missed assignments within 1 week, with permission of instructor.

Course Communications

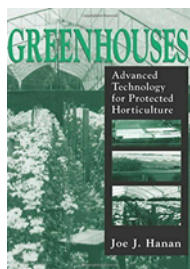
Communication will be conducted online by official UA e-mail and through D2L.

Attendance policy

Attendance is important to obtain complete understanding of the course materials and to participate in class discussions. Provide knowledge of any planned/required absences by email or text to instructor.

Optional Texts or Readings

Greenhouses: Advanced Technology for protected Horticulture. By Joe J. Hanan
[optional, will make a good reference book]



Chapter 1: Overview of Intensive Crop Production and CEA Systems
Chapter 2: Structures: Locations, Styles and Covers
Chapter 3: Radiation and Chapter 7, CO₂
Chapter 4: Temperature
Chapter 5: Psychrometrics (pps. 271-276, 342-360)
Chapter 6: Water
Chapter 8: Climate Control

Class discussion will include similar information to the chapters by Joe J. Hanan.

Assignments and Examinations: Schedule/Due Dates

Assignment via D2L required for each subject topic; mid-term and final exam; unannounced quizzes if necessary; Assignments due 1 week after being assigned; No revision and resubmission of assignments. Late assignments by 24 hours with 10% grade penalty.

Mid-term exam – on or about Tuesday, October 26 [to be determined] 1:00 – 2:50PM CEAC Classroom

Final Examination or Project

Final Exam – <https://www.registrar.arizona.edu/students/courses/final-exams> Tuesday, December 14, 1:00 – 3:00PM CEC Classroom

Final Exam Regulations,

<https://www.registrar.arizona.edu/courses/final-examination-regulations-and-information>

Design Analysis Report – Submit on day of final exam (for 583 students only!)

Grading Scale and Policies

	<u>483 UG</u>	<u>583 graduate</u>
Assigned homework	10%	5%
Mid-term exam	25%	20%
Class assignments	25%	25%
Class Discussions	10%	10%

Final exam	30%	25%
Design Analysis project	0%	15%

Grading scale: A=90-100, B=84-89, C=78-83, D=70-77, E=less than 70

Assignments due 1 week from being assigned; Lecture notes will be provided, and lecture topics and discussions will follow notes and readings in advance of class, as well as discussion on handouts, problem examples, and on textbook and reference readings. Late assignments by 24 hours with 10% grade penalty.

583 Students: Students registered as 583 will complete the Design Analysis Report. This report will demonstrate their understanding of greenhouse design and operation and their ability to evaluate through engineering analysis of the systems within a greenhouse on campus. 583 students will help lead class discussions on topics of class focus.

Incomplete (I) or Withdrawal (W):

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete> and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively.

Dispute of Grade Policy

The acceptable time period for disputing a grade on a paper, project, or exam is within 1 week of receiving the grade.

Scheduled Topics/Activities (Weekly)

Overview of Intensive Crop Production and Controlled Environment Agricultural Systems
 Greenhouse Structural Design, Glazing, Location, Orientation, Layout and Traffic Patterns
 Environmental Control - Lighting, CO₂– Enrichment
 Environmental Control – Automated Systems
 Environmental Control – Psychrometrics
 Environmental Control – Ventilation and Cooling
 Environmental Control – Heating Systems
 Environmental Control – Floor Heating
 Energy Conservation Systems and Energy Sources
 Greenhouse Crop Production Systems – irrigation and fertigation
 Integrated Crop Production Systems, Plant Culture Techniques, Nutrient Delivery Systems
 Mechanization, Automation and Intelligent Mechanisms

Some lectures may be provided remotely or by online videos.

Bibliography

Additional references, texts and journal publications assigned as supplemental reading, and provided as optional purchase and as PDF within D2L:

NRAES-33, Aldrich and Bartok, "Greenhouse Engineering"

ACME, The Greenhouse Climate Control Book

NRAES-4, Trickle Irrigation

NRAES-56, Water and Nutrient Management for Greenhouses

NRAES-3, Energy Conservation for Commercial Greenhouses

E-130, Environmental Control of Greenhouses, Rutgers University

E-208, Soil Heating Systems for Greenhouse Crop Production, Rutgers University

Journals: Proceedings of National Agricultural Plastics Conferences; International Society on Soilless Culture; ACTA Horticulturae; HortTechnology; Transactions of the ASAE

Classroom Behavior Policy:

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

Additional Resources for Students

UA Academic policies and procedures are available at <http://catalog.arizona.edu/policies>

Student Assistance and Advocacy information is available at <http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

Confidentiality of Student Records

<http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

University-wide Policies

Links to the following UA policies are provided here, <https://academicaffairs.arizona.edu/syllabus-policies>:

- Absence and Class Participation Policies
- Threatening Behavior Policy
- Accessibility and Accommodations Policy
- Code of Academic Integrity
- Nondiscrimination and Anti-Harassment Policy

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor

MEMORANDUM of April 1, 2020 per Neel Ghosh, Chair, Undergraduate Council

RE: Undergraduate and Graduate Syllabus Template Updates

Campus Pantry

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live and believes this may affect their performance in the course, is urged to contact the Dean of Students for support. In addition, the University of Arizona Campus Pantry is open for students to receive supplemental groceries at no cost. Please see their website at: campuspantry.arizona.edu for open times. Furthermore, please notify me if you are comfortable in doing so. This will enable me to provide any resources that I may possess.

Title IX

The University of Arizona is committed to removing educational barriers created by sex discrimination and sexual harassment. Sex discrimination under Title IX can include acts of violence based on sex, such as sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) has experienced or experiences any of these incidents, you have options for help at the University. The University of Arizona has staff members trained to support you in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, helping with legal protective orders, and more.

Please be aware that UA faculty and instructors who work with students are required to report allegations of sex discrimination to the Title IX Office. This means that if you tell me about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking that involves another student or employee, or that happens on campus or in a UA program, I must share that information with the Title IX Coordinator. Although I have to make that notification, you will have choices regarding whether or not you want to pursue a formal complaint against anyone on campus. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.

If you wish to speak to someone privately, you can contact any of the following on-campus resources:

☎ Counseling & Psych Services (CAPS), <https://health.arizona.edu/counseling-psych-services>, 520-6216490, 520-570-7898 (after hours)

☎ Oasis Sexual Assault, Relationship Violence, and Trauma Services, <https://health.arizona.edu/counseling-oasis> (same phone as CAPS)

☎ Campus Health, <https://health.arizona.edu/home>, (520) 621-6490 ☎ University of Arizona Ombuds, <https://ombuds.arizona.edu/>, (520)-626-5589

☎ Title IX section on sexual assault support & resources (<https://titleix.arizona.edu/title-ix/sexualharassment-violence>) has more information, as well as a link explaining options if you have a concern, need assistance/support, or would like to file a complaint.

Preferred Gender Pronoun

This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is on the class roster, please let me know. Feel free to correct instructors on your preferred gender pronoun. If you have any questions or concerns, please do not hesitate to contact me directly in class or via email (instructor email). If you wish to change your preferred name or pronoun in the UAccess system, please use the following guidelines: Preferred name: University of Arizona students may choose to identify themselves within the University community using a preferred first name that differs from their official/legal name. A student's preferred name will appear instead of the person's official/legal first name in select University-related systems and documents, provided that the name is not being used for the purpose of misrepresentation. Students are able to update their preferred names in UAccess. Pronouns: Students may designate pronouns they use to identify themselves. Instructors and staff are encouraged to use pronouns for people that they use for themselves as a sign of respect and inclusion. Students are able to update and edit their pronouns in UAccess. More information on updating your preferred name and pronouns is available on the Office of the Registrar site at <https://www.registrar.arizona.edu/>.

Safety on Campus and in the Classroom

Familiarize yourself with the Classroom in the CEA Building.

Watch the video available at <https://ua-saem-aiss.narrasys.com/#/story/university-of-arizona-cert/activeshooter>

Campus Reentry Plan

As we move closer to the start of the semester, it is important that everyone is informed, particularly on how to keep themselves and others around them safe, once returning to campus. I encourage you to watch recordings of the UA President's briefings. Go to arizona.edu/live for both the live stream and previous weeks' updates. There is a clear plan, and procedures which must be followed. We are depending on you.