

H 581, 3 credits -- Controlled Environment Agriculture

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Texts: Greenhouses: Advanced Technology for Protected Horticulture, Joe J. Hanan, CRC Press, 1998, ISBN 0-8493-1698-7  
Greenhouse Engineering, 1994, NRAES-33

Prerequisites: H 310 Greenhouse Management or instructor approval

<u>Student Requirements</u>	<u>Scores</u>	<u>Grading System:</u>
<u>Examinations:</u>		
Exam I	150	A 891-1000
Exam II	150	B 791-890
Exam III	150	C 691-790
Final	150	D 591-690
Off line assignments	150	F #590
On-line quizzes	50	
Research paper	100	
Design project	<u>100</u>	
	<b><i>Total 1000</i></b>	

Course Description: Technical aspects of controlled environment systems for producing horticultural crops including: greenhouse design, environmental control, hydroponic production, nutrient delivery technology, and water management.

Objectives: Upon successful completion of this course, the student will be able to:

- Understand the complexities of a greenhouse design and integrated environmental control technologies for biological systems;
- Design, build and operate hydroponic nutrient delivery system for growing horticultural crops; and
- Understand water quality and water quantity issues relevant to water management in a modern greenhouse
  
- Students will complete a research paper. They will be provided with a list of current issues or current topics of interest to controlled environment agriculture. The graduate students will then complete a literature review on this subject.

**Outline:**

- Module 1: Engineering** (5% of course time - 1 lecture)
- Introduction to controlled environment agricultural systems
  - Structural design, greenhouse glazing, and orientation
  - Layout and crop movement
  - Heating and cooling systems
  - Radiation, supplemental light
- Module 2: Environment Management** (10% of course time - 3 lectures)
- Greenhouse temperature management
  - Ventilation and humidity control
  - Energy conservation systems
  - Environmental control technology
  - Environmental control strategies
- Module 3: Water and Nutrient Management** (30% of course time - 8 lectures)
- Water handling systems
  - Nutrient delivery technology
  - Water quality treatment systems
  - Water sanitation systems
  - Water containment and recirculation systems
- Module 4: Production Techniques** (15% of course time - 4 lectures)
- Hydroponic culture for food crops
  - Hydroponic culture for floral crops
  - Nutrient film technique
  - Organic greenhouse production
- Module 5: Crop Production Techniques** (30% of course time - 8 lectures)
- Tomato production
  - Lettuce production
  - Culinary herbs
  - Floral crops
  - Fruit crops
  - Mushrooms
- Module 6: Integrated Pest Management** (10% of course time - 3 lectures)
- Pollinators
  - Insect control
  - Disease control
  - Organic pest management
  - Integrated pest management

Lectures are scheduled for 1 hour 15 minutes. The time devoted to scheduled lecture times also allows for three examination periods, with the addition of a final exam. On-line students will devote similar time to each module as would have been spent in traditional lectures. Additional expectations include off-line projects.

The system Design Project is an assignment where the student will study and design a greenhouse system, such as a water treatment and delivery system.