

Schedule is subject to change

## **January 2017 UA/CEAC Intensive Hydroponic Greenhouse Crop Production Course**

1951 East Roger Road, Tucson, AZ 85719

<http://ceac.arizona.edu/> 520-626-9566

### **EMPHASIS ON TOMATOES: Instructor – Stay Tollefson, Ph.D.**

The tomato course will use the PLS 217 class manual as a reference.

Course materials: Flash drive with PLS 217 manual, power points  
Folder with handouts, loupe & supplies

### **MONDAY January 2, 2017 – Tomato**

- 3:00 – 5:30 pm Check-in at the CEAC – CEAC Classroom
- 5:00 – 5:30 pm Brief tour of the CEAC / CAC facilities
- 5:30 – 6:30 pm Light dinner at CEAC – CEAC Classroom
- 6:30 – 8:00 pm Introduction to CEA and Hydroponics – CEAC Classroom
- A little history (Chapter 1)
  - The plant and its needs (Chapters 2, 3)
  - Basic hydroponic systems (Chapter 5)

### **TUESDAY January 3, 2017 – Tomato**

- 9:00 – 9:15 am Discussions and questions from previous day – CEAC Classroom
- 9:15 – 10:00 am A bit about plant propagation (Chapter 6) – CEAC Classroom
- 10:00 – 11:00 am Tour of the Controlled Environment Agriculture Center (CEAC) including:
- Mist house (more on plant propagation)
  - Teaching Greenhouse (intro to the greenhouse, control systems, experiment, greenhouse set-up) (Chapter 3)
  - Tomato plant rep assignments for the course
- 11:00 – 12:00pm Greenhouse set-up (Chapter 3) – CEAC Classroom
- Basic components including environmental settings
  - Crop layout
  - Crop scheduling
- 12: 00 – 1:00 pm Lunch provided – CEAC Classroom
- 1:00 – 2:00 pm Crop maintenance – Emphasis on tomatoes (Chapter 3) – CEAC Classroom
- Training & pruning
  - Physiological disorders – leaves, stems, trusses (briefly, fruit)
  - Factors controlling plant architecture

Schedule is subject to change

- 2:00 – 4:00 pm Plant work: crop training & pruning – CEAC Teaching Greenhouse
- Finding the tomato head – Stem clipping & pruning
  - Nodes, internodes and location of leaves & clusters on the stem
  - Leaning & Lowering – proper techniques
- 4:00 – 5:30 pm Controlling plant architecture – CEAC Teaching Greenhouse
- “Steering” your plants to success (Chapter 3)
  - Exercise: recognizing vegetative vs reproductive characteristics
- 5:30 pm Dinner on your own

**WEDNESDAY January 4, 2017 – Tomato**

- 9:00 – 9:15 am Discussion and questions from previous day – CEAC Classroom
- 9:15 – 10:00 am Crop registration forms – CEAC Classroom  
What to measure & what it means
- 10:00 am – 12:00 pm Crop registration – measurements – CEAC Teaching Greenhouse  
Analysis of measurements
- 12:00 – 1:00 pm Lunch provided – CEAC Classroom
- 1:00 – 2:30 pm Flowers, pollination and the fruit – CEAC Classroom
- Bee hives / bee management (Chapter 7)
  - Cluster maintenance (Chapter 8)
  - Fruit problems (fresh fruit & Chapter 3)
  - Harvest / grading / storage (Chapter 8)
- 2:30 – 4:00 pm Harvesting and grading – CEAC Teaching Greenhouse
- Individual versus cluster (TOV) harvesting
  - Fruit categories including fruit problems
  - Weighing & record keeping
  - Types of packaging
- 4:00 – 5:30 pm Flowers to fruit – CEAC Teaching Greenhouse
- Exercise: Pollination % calculations – are the bees working?
  - Cluster maintenance – pruning & clipping
- 5:30 pm Dinner on your own.

Schedule is subject to change

**THURSDAY January 5, 2017 - Tomato**

- 9:00 – 9:15 am Discussions and questions from previous day – CEAC Classroom
- 9:15 – 12:00 pm Plant protection – CEAC Classroom (Chapter 4)
- Introduction to the pests: Insects, Mites & Diseases
  - Integrated pest management (IPM)
- 12:00 – 1:00 pm Lunch provided – CEAC Classroom
- 1:00 – 2:00 pm Plant work – CEAC Teaching Greenhouse
- Leaves & leaflets – Removing lower leaves, how and why.
- 2:00 – 4:00 pm Plant protection / Keeping plants healthy – CEAC Teaching Greenhouse
- Exercise: Pest ID & scouting
  - Record keeping for pest problems
- 4:00 – 5:30 pm A bit about business – CEAC Classroom
- Costs & sources for tomato production items
  - Introduction to GHP / GAP certification notebooks for tomato
- 5:30pm Dinner on your own

**FRIDAY January 6, 2017 – Tomato**

- 9:00 – 9:15 am Discussion and questions from previous day
- 9:15 – 11:00 am Plant nutrition basics – CEAC Classroom
- Tomato nutrients & deficiencies (Chapter 9)
  - Nutrient delivery systems (Chapter 10)
- 11:00am – 12:00 pm TOUR: Nutrient delivery systems in different greenhouses
- 12:00 – 1:00 pm Lunch provided
- 1:00 – 3:00 pm Nutrient recipes & calculations (Chapter 10) – CEAC Classroom
- Exercise: nutrient solution calculations
- 3:00 – 4:00 pm Making the concentrated solutions – CEAC Teaching Greenhouse
- Components (keeping things separate), weighing & mixing the tanks
- 4:00 – 5:30 pm Group Ex. - What's the problem here? Plus Q & A – CEAC Classroom
- 5:30 pm Dinner on your own

Schedule is subject to change

**SATURDAY January 7, 2017 – Combined Tomato & Lettuce**

- |                  |  |
|------------------|--|
| 9:00 – 11:00 am  | Greenhouse Basics (Tollefson) <ul style="list-style-type: none"><li>• Greenhouse site selection (Chapter 11)</li><li>• Greenhouse designs &amp; materials (Chapter 12)</li><li>• Environmental control – including sizing heaters &amp; fans (Chapter 13)</li><li>• A bit about greening the greenhouse (Chapter 14)</li></ul> |
| 11:00 – 12:00 pm | Round table discussion with greenhouse engineers<br>Includes professors of Agricultural & Biosystems Engineering Department at The University of Arizona and CEAC / CAC personnel (as available): <ul style="list-style-type: none"><li>• Will include Gene Giacomelli, Ph.D. and Murat Kacira, Ph.D.</li></ul>                |
| 12:00 – 1:00 pm  | Lunch provided & <i>Round table continues</i> – CEAC Classroom   |
| 1:00 – 2:30 pm   | Environmental control requirements (Tollefson & Lewis) <ul style="list-style-type: none"><li>• Set-points (both tomato &amp; lettuce)</li><li>• How the environment effects the plants and vice versa</li><li>• Real-time monitoring – CEAC/tomatoes live</li><li>• Deciphering your greenhouse – “Virtual Grower”</li></ul>   |
| 2:30 – 4:30 pm   | Food safety & GHP/GAP certification (Lewis) <ul style="list-style-type: none"><li>• Safe production &amp; handling procedures</li></ul>  |
| 4:30 – 5:45 pm   | Organic Hydroponic Production (Tollefson)  |
| 6:00 – 8:00 pm   | Dinner provided by CEAC for all attendees of BOTH groups <ul style="list-style-type: none"><li>• Dinner speaker: Merle Jensen, Ph.D.</li></ul>   |