

Updated on 12/29/20

# **SYLLABUS: HCS 4300 (IN-PERSON) HYDROPONIC CROP PRODUCTION**

**Credit hours: 2**

**Sections: In-Person**

**Semester to offer: Spring 2021**

## **Course overview**

### **Instructor**

Instructor: Dr. Chieri Kubota

Office: 330 Howlett Hall

Email address: kubota.10@osu.edu

Phone number: 614-292-3175

Office hours: By appointment

### **Location and times:**

Monday: 1:50PM – 2:45PM (Howlett Greenhouse 117)

Wednesday: 1:50PM – 2:45PM (Howlett Greenhouse 117)

### **Course description**

This course will offer students foundational understanding of the greenhouse food crop production technologies and practices and introduction to the science behind them. Lectures will overview the history and basic principles of greenhouse crop production using soilless (hydroponics) approach. Additionally, students will learn conventional/advanced production technologies. Students will be introduced to the concepts of interactions between plants and their microenvironments created by different production systems and climate control systems. Laboratory course (HCS 4301) affiliated with this course is optional.

### **Prerequisites**

- HCS 2202 (or HCS 2202E) Form and Function in Cultivated Plants
- HCS 2260 Data Analysis and Interpretation or equivalent

## Course learning outcomes

By the end of this course, students will develop the breadth of understanding of the greenhouse hydroponic crop production and science behind the technology development.

## Learning objectives addressing departmental learning objectives

This course will:

1. Help students develop competency in critical thinking and research (Dept. Objective 1), through discussion based on available data.
2. Help students to understand the concept of sustainability (Dept. Objective 2) in greenhouse soilless production systems.
3. Integrate fundamentals of physical and biological sciences (Dept. Objective 3) in introducing the foundational knowledge of controlled environment crop production practices and systems.
4. Encourage students to disseminate information through professional forms of communication (Dept. Objective 4).

Departmental Learning Goals and Objectives for Sustainable Plant Systems (SPS):

<https://hcs.osu.edu/undergraduate/majors/sps-program-learning-goals-objectives>

## Lecture structure

There are two sections in this course: one is a conventional in-person format where students are required to be in the classroom during the designated class hours; the other is an asynchronous 100% online section using the recorded lectures in the classroom. Both sections are offered in the same semester. **This syllabus is for in-person section.** You will have the access to powerpoint lecture slides, reading materials as well as recorded lecture videos available on Carmen. Note: the first two weeks of the semester will be all online due to the COVID pandemic restrictions. **During these on-line weeks, students are requested to present in the Zoom classroom live.**

## Course materials

No textbook is required. All materials will be posted on Carmen.

## Course technology

Should you need assistance with technology, please contact the IT Resources for Students webpage: <https://ocio.osu.edu/audience/students/>; phone: 614-688-4357

Baseline technical skills necessary for this online course are:

- Basic computer and web-browsing skills
- Navigating Carmen
- Streaming video
- Internet access

Necessary equipment is:

- Computer with current Mac (OS X) or PC (Windows 7+) with high-speed internet connection

## Grading and faculty response

This course will be graded using the OSU Standard format. Students' attendance and participation in class is expected.

### Faculty feedback and response time

#### Grading and feedback

For exams and homework assignments, you can generally expect feedback within **7 school days**.

#### E-mail

I will reply to e-mails within **24 hours on school days**.

#### Discussion board

Discussion board in Carmen will be used for the course, mainly for communicating with students online. You are encouraged to use this discussion platform to post questions to participate in online discussion. I will check and reply to messages in the discussion boards every **24 hours on school days**.

### Grades

Student's final grade will be based on 400 points total. There will be two exams, each worth 100 points and homework assignments of 100 points total. Participation is also recorded.

Evaluation items	Dates	Points
Participation	All lectures (see schedule)	100
Homework Assignments	Assignments # 1 - # 5	100

<b>Midterm Exam</b>	<b>See schedule</b>	<b>100</b>
<b>Final Exam</b>	<b>See schedule</b>	<b>100</b>
<b>Total</b>		<b>400</b>

## Class participation

Participation will be counted and evaluated based on your actual log-in in the virtual classroom. If you miss class due to an emergency, illness, or technical difficulty, you should contact me (the instructor) as soon as possible.

- **Office hours: BY APPOINTMENT**  
I have an open-door policy and you are always welcome to see me when I am available. Please contact by email and make an appointment.

## Course assignments

Students will be asked to complete five individual assignments throughout the semester. All assignments will be graded (20 points per assignment). Assignments are typically given in a form of review questions relevant to specific key information you learned in the class. The questions are a short-answer or an essay type. All assignments are submitted in a form of word processed document. Please submit a Word or PDF file to the designated submission folder in Carmen. Please always indicate your name on the top of the first page. Hand-written documents are not accepted unless handwriting is an absolute necessity (such as drawing a diagram) due to limitation in computational drawing skill (or software). Please cite your sources (statement, figures and tables) unless they are your original. Any journal citation (reference) style is accepted, as long as you maintain consistency within your writing.

## Exams

There will be two exams (midterm and final exams). Final exam is not a cumulative exam. Exam questions will be short answer and essays and will be derived based on the knowledge you gained from the lectures. Exams are open-book 'take-home exams'. The exam will be available between 8AM and 8PM on the exam day, and you will need to download the exam questions and will need to submit your answers by uploading them to Carmen in 120 min (2 hours). You must work on the exam without anybody's help and the instructor will be available for clarifications via phone, text, or email during your exam time.

## Missed exams & late assignments

**Make-up exams** will be given only for a reasonable excuse. Accepted excuses are limited to documented personal illness, death in the family, or other problems beyond your control. You

must inform me **within 24 hours** of a missed exam that you have a valid excuse. **Late assignments are subject to a 10% late penalty per day late.**

## Grading scale

This course will be graded based on the total points earned as a percentage of total points possible and letter grades assigned as follows:

93–100: A	73–76.9: C
90–92.9: A-	70 –72.9: C-
87–89.9: B+	67 –69.9: D+
83–86.9: B	60 –66.9: D
80–82.9: B-	Below 60: E
77–79.9: C+	

## Other course policies

### Academic integrity policy

The Ohio State University’s *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: “Any activity that tends to compromise the academic integrity of the University, or subvert the educational process.” Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University’s *Code of Student Conduct* is never considered an “excuse” for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

**If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct.** If COAM determines that you have violated the University’s *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- The Committee on Academic Misconduct web pages ([COAM Home](#))
- *Ten Suggestions for Preserving Academic Integrity* ([Ten Suggestions](#))
- *Eight Cardinal Rules of Academic Integrity* ([www.northwestern.edu/uacc/8cards.htm](http://www.northwestern.edu/uacc/8cards.htm))

## Accommodations for accessibility

### Requesting accommodations

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options.

To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

## 2021 Course topics and schedule (tentative)

Week	Dates	Topics, Readings	Assignments, Deadlines
1	Jan 11	Soilless/hydroponic production overview I – Basic principles	
	Jan 13	Soilless/hydroponic production overview II – History, background, and basic principles	
2	Jan 18	Martin Luther King Day (no class)	
	Jan 20	Quick review of aerial environmental factors affecting plant growth	
3	Jan 25	Nutrient solution dynamics in hydroponics – EC, pH and volume (input and output)	
	Jan 27	Interaction between substrate and nutrition in hydroponic solution – overview	Review questions #1 due on Feb 3
4	Feb 1	Postharvest physiology and systems – overview	
	Feb 3	Leafy green production physiology and technology I – Growth stage and requirements	

5	Feb 8	Leafy green production physiology and technology II – Production systems, species and cultivars	
	Feb 11	Leafy green production physiology and technology III – physiological disorders	
6	Feb 15	Leafy green production physiology and technology IV – microgreens and baby green production	Review questions #2 due on Feb 22
	Feb 17	Invited leafy greens grower talk: Ethan Snyder (Old Souls)	
7	Feb 22	Midterm Exam	
	Feb 24	Instructional Break – No class	
8	Mar 1	High-wire crop production physiology and technology I – Growth stage and requirements, transplant production	
	Mar 3	High-wire crop production physiology and technology II – Cultivar types, growing systems, sink/source and crop management	
9	Mar 8	High-wire production physiology and technology III – Environmental physiology and disorders; other vine crops	Review questions #3 due on March 15
	Mar 10	Invited tomato grower talk: Vania Villarroel and Octavio Perez Rodriguez (Nature Fresh)	
10	Mar 15	Strawberry production physiology and technology I – Growth stage, photoperiodic flowering response	
	Mar 17	Strawberry production physiology and technology II – Transplant types, dormancy/chilling, production systems	
11	Mar 22	Production systems Strawberry production physiology and technology III – Physiological disorder	
	Mar 24	Invited berry grower talk: Ian Justus	Review questions #4 due on March 31
12	Mar 29	Emerging CEA – Indoor farming	

	<b>Mar 31</b>	Instructional Break – No class	
	<b>Apr 2</b>	Conversion Day (Wednesday class instead of Friday) [TBA]	
<b>13</b>	<b>Apr 5</b>	Designing nutrient solutions and formula I	
	<b>Apr 7</b>	Designing nutrient solutions and formula II	Review questions #5 due on April 14
<b>14</b>	<b>Apr 12</b>	Emerging CEA – Cannabis production under controlled environment: Ian Justus (Connected Cannabis)	
	<b>Apr 14</b>	Discussion - Evaluation of new crops to greenhouse production	
<b>15</b>	<b>Apr 19</b>	Introducing to CEA Research	
	<b>Apr 21</b>	Final Exam	