SYLLABUS: HCS 4301
HYDROPONIC CROP PRODUCTION LABORATORY

Credit hours: 1
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

Instructor: Mark Kroggel
Office: 233A Howlett Hall
Email address: kroggel.4@osu.edu
Phone number 614-292-3767
Office hours: By appointment

Location and times:
Monday: 3:00PM – 4:30PM (Howlett Hall GH Classroom 117 and greenhouse #181)
Wednesday: 3:00PM – 4:30PM (Howlett Hall GH Classroom 117 and greenhouse #181)

Note: as is the nature of greenhouse crop production, additional hours of crop management will be required for all students (both sections). For each week, 2-3 students will be assigned as ‘growers’ to conduct daily tasks needed for maintaining crops in greenhouse, closely working with the instructor.

Course description

Greenhouse laboratory course associated with the concurrent lecture course on Hydroponic Crop Production (HCS 4300: In-person or Online) will provide hands-on practices of greenhouse hydroponic crop production – leafy crops, micro-greens, tomato, and more using crop production facilities similar to commercial production settings.

Co-requisite
- Students registered for this laboratory must be registered for the lecture course HCS 4300 (Hydroponic Crop Production) concurrently in the same semester (HCS 4300 and
HCS 4301 may not be taken in separate semesters. The lecture portion (HCS 4300) can be taken either as in-person or online to accommodate your schedule.

**Course learning outcomes**

Through this course, students will gain hands-on experiences of producing crops using soilless/hydroponic systems, technologies as well as practices. Students will have opportunity to analyze environmental and crop data obtained in the greenhouse. Students will learn a problem-solving project approach through a team project that includes planning, designing, conducting and reporting.

**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).
5. Prepare students to apply fundamental knowledge base to horticultural business setting (Dept. Objective 5).

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

[https://hcs.osu.edu/undergraduate/majors/sps-program-learning-goals-objectives](https://hcs.osu.edu/undergraduate/majors/sps-program-learning-goals-objectives)

**Course structure**

The class will first meet at the Howlett Greenhouse classroom 117 for a short business meeting and then move to greenhouse for the hands-on activities. Students will learn practical aspects of greenhouse hydroponic food crop production by managing all aspects of production in the greenhouse. Because of the biological production system we are dealing with, there will be repetition of activities. Issues to be addressed associated with production will be different depending on outside climate, cultivar selection, and production system. Reading materials will be available in Carmen. As you will be working in the greenhouse, please wear appropriate clothing (comfortable, stable, closed-toe footwear, casual clothing)
Course materials
No textbook is required.

Course technical skills
Baseline technical skills necessary for this laboratory course are:

- Capability to work physically in greenhouse
- Basic computer and web-browsing skills
- Basic computer skills of using MS Word and MS Excel (or similar software).
- Navigating Carmen

Grading and faculty response
This course will be graded using the OSU Standard format. Students’ attendance and participation in laboratory as well as weekly tasks is expected. Late assignments are subject to a 10% late penalty per day late.

Faculty feedback and response time
This course will be graded using the OSU Standard format.

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 communicating with instructors and students in this laboratory for specific topics or problems noticed in the greenhouse. I will check and reply to messages in the discussion boards every 24 hours on school days.

Grades
Your final grade will be based on lab attendance, exercises, and a team project.
Participation

Participation will be counted and evaluated based on student’s actual physical presence in the lab as well as tasks associated with the greenhouse crop production. If you miss laboratory due to an emergency or illness, you should contact the instructors as soon as possible.

- **Office hours:** **BY APPOINTMENT**
  Please call or email instructors as needed. I have an open-door policy and you are always welcome to walk-in my office when I am around and not in the middle of conference calls or meetings. If you wish to make sure I am available to meet you, making an appointment is highly recommended. Please call or email instructors as needed.

### Daily maintenance tasks and responsibilities

The greenhouse is our living laboratory where we perform crop production in systems similar to what commercial growers use. This will be the platform for students to learn the practices, and to translate current technical practices into future innovation and research. Because of the nature of greenhouse crop production, daily maintenance is required, as plants do not cooperate with us in their schedule and do not observe weekends and holidays. Management tasks will be distributed among all students and completion of assigned tasks will be part of student’s grade. For each week, 2-3 students will be assigned as ‘growers’ to conduct daily tasks needed for maintaining crops in greenhouse, closely working with the instructor (responsibilities rotate from week to week).

### Laboratory reports

There will be two laboratory reports during the course. The lab reports are designed to provide updates of the crop production. The first report is a progress report during the assigned reporting periods, but the second report is a cumulative report, detailing information of all activities in the greenhouse production. Specific format and guidelines will be explained in the first class.

<table>
<thead>
<tr>
<th>Evaluation items</th>
<th>Dates</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation</td>
<td>All labs (see schedule) and greenhouse maintenance tasks</td>
<td>33.3%</td>
</tr>
<tr>
<td>Exercises/quizzes</td>
<td>Weekly #1-#12</td>
<td>33.3%</td>
</tr>
<tr>
<td>Crop reports</td>
<td>See schedule #1 and #2</td>
<td>33.3%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>
Course assignments

Weekly Exercises/Quizzes
Students will be asked to complete exercises or quizzes relevant to the week’s laboratory topics by the end of laboratory period. Students must complete and submit the answers to exercise/quiz by the due date (see schedule) in order to receive a passing grade.

Late assignments
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:

<table>
<thead>
<tr>
<th>Percentage Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93–100</td>
<td>A</td>
</tr>
<tr>
<td>90–92.9</td>
<td>A-</td>
</tr>
<tr>
<td>87–89.9</td>
<td>B+</td>
</tr>
<tr>
<td>83–86.9</td>
<td>B</td>
</tr>
<tr>
<td>80–82.9</td>
<td>B-</td>
</tr>
<tr>
<td>77–79.9</td>
<td>C+</td>
</tr>
<tr>
<td>73–76.9</td>
<td>C</td>
</tr>
<tr>
<td>70–72.9</td>
<td>C-</td>
</tr>
<tr>
<td>67–69.9</td>
<td>D+</td>
</tr>
<tr>
<td>60–66.9</td>
<td>D</td>
</tr>
<tr>
<td>Below 60</td>
<td>E</td>
</tr>
</tbody>
</table>

Other course policies

Respecting intellectual property
Course materials are the property of the instructor. Students may not distribute provided course material without the permission of the instructor.

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 instructors.

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)

**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.

**Course schedule (tentative)**

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics, Readings, Assignments, Deadlines</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 11 and 13</td>
<td>No labs</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Jan 18</td>
<td>Martin Luther King Day (no lab)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Jan 20</td>
<td>Leafy green crop scheduling (online)</td>
<td>Weekly assignment #1 due on Jan 22</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th></th>
<th>Date</th>
<th>Activity</th>
<th>Assignment</th>
</tr>
</thead>
</table>
| 3 | Jan 25 and 27 | Setting up tomato, cucumber and pepper transplants  
Lettuce transplanting                                                                 | Weekly assignment #2 due on Jan 29 |
| 4 | Feb 1 and 3  | Group discussion on tasks in greenhouse; pollination; working with lysimeter  
Pollination; initial leaning and suckering tomato plants; lysimeter measurements; first weekly tomato growth monitoring | Weekly assignment #3 due on Feb 5 |
| 5 | Feb 8 and 11 | Working with environmental data; pest monitoring; planting density  
Pepper flower pruning; weekly tomato growth monitoring                                                                 | Weekly assignment #4 due on Feb 13 |
| 6 | Feb 15 and 17 | Working with high-wire crops, vine-twine and clipping; sucker (side shoot) management  
Weekly tomato growth monitoring  
Irrigation emitter evaluation; fruit pruning; weekly tomato growth monitoring | Weekly assignment #5 due on Feb 19 |
| 7 | Feb 22       | No lab (HCS 4300 midterm exam)                                                                                                          |              |
|    | Feb 24       | **Instructional Break – No class**                                                                                                      |              |
| 8 | Mar 1 and 3  | Harvesting leafy crops, quality evaluation, postharvest  
Vine management and light in the canopy  
DLI computation; Second leafy green transplanting; weekly tomato growth monitoring | Weekly assignment #6 due on Mar 5 |
| 9 | Mar 8 and 10 | Continue plant management/harvest  
Weekly tomato growth monitoring                                                                                                           | Weekly assignment #7 due on Mar 12 |
| 10| Mar 15 and 17| Harvesting cucumber and tomato  
Cucumber vine training; working with yellow sticky cards; weekly tomato growth monitoring                                                                 | Weekly assignment #8 due on Mar 19 |
<p>| 11| Mar 22 and 24| Lean and lower tomato plants                                                                                                           | Weekly assignment #9 due on Mar 26 |</p>
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Activity</th>
<th>Assignment Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Mar 29</td>
<td>Harvesting tomatoes and cucumber; weekly tomato growth monitoring</td>
<td>Weekly assignment #10 due on Apr 2</td>
</tr>
<tr>
<td></td>
<td>Mar 31</td>
<td>Instructional Break (no lab)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apr 2</td>
<td><strong>Conversion Day (Wednesday class instead of Friday) [TBA]</strong></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Apr 5 and 7</td>
<td>harvesting leafy crops and quality evaluation</td>
<td>Weekly assignment #11 due on Apr 9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>harvesting tomatoes; weekly tomato growth monitoring; removing cucumber plants</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Apr 12 and 14</td>
<td>Continue plant management/harvest; cucumber transplanting</td>
<td>Weekly assignment #12 due on Apr 16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>harvesting tomatoes; weekly tomato growth monitoring</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>April 19</td>
<td>Review of harvest data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>April 21</td>
<td>No lab (HCS 4300 final exam)</td>
<td>Crop Report #2 due on <strong>April 23</strong></td>
</tr>
</tbody>
</table>