HORTICULTURE and CROP SCIENCE 5450
PRINCIPLES of VEGETABLE CROP PRODUCTION and PHYSIOLOGY

Autumn Semester - 2019

Lecture Time and Location: Tuesday and Thursday, 2:20-3:40 PM, room 333 Kottman Hall (Columbus) and room 108 Williams Hall (Wooster)

A. Instructor*:

Dr. Matt Kleinhenz
Professor, Extension Specialist (Vegetable Production Systems)
122 Gourley Hall
The OSU-OARDC (OSU-Wooster Campus); Wooster, OH
Email: kleinhenz.1@osu.edu
Phone: 330-263-3810
Office Hours: by appointment

* Instructor Kleinhenz may be assisted by others providing guest lectures and other contributions.

B. Course Description:

In HCS 5450, we consider the big topics of vegetable production and physiology for two overall reasons. First, these topics require attention given: a) the high, everyday importance of vegetables to people in business, health, social, and other contexts, b) the range and amount of resources (material, natural, human) required to provide healthy, pleasing-to-eat, and safe vegetables to consumers with ever-greater efficiency, and c) the profound, super-interesting ways vegetable plants respond to their environments. Being familiar with the business, production, physiology, ecology, etc of vegetables is worthwhile on its own. Still, when we study those aspects, we soon discover they are connected to other current and emerging issues we care about, such as environmental sustainability and food security.

As a student in HCS 5450, you should expect to become more familiar with:
1. Major biological and non-biological factors that govern the efficiency and outcomes of vegetable crop production and major issues associated with the process;
2. Connections among crop botany, physiology, production practices, and yield and quality;
3. Physiology and production information as it developed and shared within and between the industry and scientific communities; and
4. The range of approaches to commercial vegetable production, settings in which it occurs, resources (including types of knowledge and talents) it requires, and risks and rewards it offers. Discussions in HCS 5450 cover conventional, organic, sustainable approaches. Also, while HCS 5450 emphasizes soil-based outdoor and semi-protected settings, specific examples of soil-less, climate-controlled, greenhouse production are also included.

Actively participating in HCS 5450 may also help enhance your long-term learning and professional skills.
C. **Prerequisites:**

HCS 2200, HCS 2202, Chem 1110 or 1210, Biology 1101; or Grad standing or permission of instructor.

D. **Materials Required for each Class Session**

1. Basic scientific calculator. It must possess a memory function, be able to express large numbers in scientific notation, and to perform all basic mathematical operations.
2. A pen or sharp pencil.
3. A notebook; notes, 'scratch' paper.

*Note:* in-class assignments frequently require completing calculations (much easier with a calculator).

E. **Student Learning Objectives**

Using approaches described in Section F, by course end, students will be able:

1. To describe the anatomy, morphology, physiology, biochemistry, and taxonomic association of major vegetable crops in technical terms.
2. To describe how crop biology (physiology, formation of harvested units) influences crop production.
3. To describe where, when, and major aspects of how vegetable crops are grown and marketed commercially.
4. To describe the major resources (inputs) used to produce vegetables commercially.
5. To describe specific real-world and potential crop production-marketing relationships.
6. To describe how the efficiency of commercial vegetable production systems can be calculated and to complete example calculations.
7. To provide specific examples of how crop botany (genetic predispositions), growing conditions, and grower decisions and actions influence vegetable crop physiology, yield, and quality and the efficiency of production systems.
8. To provide specific examples of major strengths, weaknesses, threats, and opportunities in commercial vegetable production, emphasizing Ohio and U.S. production.
9. To employ information from publicly-available technical resources (especially publications, recordings) in addressing production-related questions.
10. To describe how their skills, experience, and knowledge prepare them for careers (research, education, industry) within the private and public sectors and related to commercial vegetable production.
F. Overall Approach to Instruction and Learning

Instructors will:

1. Abide by University and course codes of conduct.

2. Provide students with required and auxiliary resource material directly – for example, by email or Carmen – or steer students to material by email and/or comments in class.

3. Discuss selected portions of required and auxiliary resource material in class, answering student questions and providing additional input related to the background, interpretation, and use of resource material.

4. Deliver lectures on course-related topics.

5. Coordinate in-class discussions and activities.

6. Administer, grade, return, and answer questions about assignments.

7. At predetermined dates shared with all students, examine and assign a score for each student’s workbook and assess and assign a score for each student’s participation in and learning through the course.

8. Respond to student questions and concerns.

Students will:

9. Abide by University and course codes of conduct.

10. Attend class, take notes, and ask and answer questions.

11. Participate in in-class discussions and activities.

12. Review course content and resource material outside of class -- preparing to discuss and use it in class and on assignments.

13. Complete and submit assignments on time.

14. Expect assignments and in-class questions and activities to require independent information retrieval and synthesis outside of class, communicated in oral and written formats.

15. At predetermined dates shared by the instructor, examine their participation in and learning through the course and submit an overall score regarding the same to be combined with the instructor’s score.

16. Share questions and concerns with instructors.
G. Policy on Electronic Devices:

1. Tablet or laptop use is permitted during class (lecture). However, these devices must be off, closed, stowed, or sleeping during assignments and at other times indicated by the instructor.
2. Cell phone use is not permitted at any time during class meetings. Cell phones must be off, set to vibrate, or stowed throughout each class session.

H. Course Texts:

Text-based information for which students will be directly responsible (e.g., assignments, in-class questions) will be found in readings and other resources provided or assigned by the instructor(s). Instruction will follow those resources, not chapters in other texts. Still, many excellent reference texts are available and consulting them can help students understand assigned readings more fully. Selected reference texts are listed below.


Numerous resources (often free) provided by the local-international Cooperative Extension, industry, and NPO/NGO communities.

I. Course Grading:

1. The standard, university-wide, percentage-letter grade scale is used.
   - 93-100: A;
   - 90-92.9: A-;
   - 87-89.9: B+;
   - 83-86.9: B;
   - 80-82.9: B-;
   - 77-79.9: C+;
   - 73-76.9: C;
   - 70-72.9: C-;
   - 67-69.9: D+;
   - 60-66.9: D;
   - below 60: E
2. Points are earned for correct answers on and fulfilling the requirements of assignments (in- and out-of-class types) and the course workbook. Also, at predetermined dates announced in advance, each student will be invited to provide the instructor with a self-assessment score representing their perception of their engagement in and learning through the course. This self-assigned score will be combined with a score of the same given by the instructor.

3. Points are not earned directly for class attendance. However, some material is presented and some assignments are administered only during scheduled class time. Similarly, engaging in class discussion provides students and the instructor with important insight on student learning. Therefore, regular attendance clearly promotes scoring as well as possible.

4. **Note:** *no midterm exams requiring the full class period to complete will be given. Also, a final exam will not be given.* Instead, points will be earned only through assignments, and questions given in class and the course workbook. Some assignments will be completed entirely in class while others will require time outside of class.

5. It is necessary to prepare for and complete some assignments OUTSIDE of class. Typically, reading and other types of studying are required to score well. The amount of studying required differs among students. However, completing most reading assignments and reviewing other course material is likely to require approximately 7 hr/week.

Assignments include mixtures of matching, true/false, multiple choice, fill in the blank, labeling, short answer, and essay questions. Question topics draw from the content of lectures, class discussions, assigned readings and ALL components of visual aids used in the course.

**J. Expectations of Academic Conduct**

Students are trusted to act ethically and in good faith on assignments. Breaches of that trust will be reported through appropriate channels to the University Committee on Academic Misconduct. The OSU Student Handbook thoroughly covers the subject of academic misconduct and its treatment; please consult the Handbook for further information. Academic misconduct will not be tolerated.
HCS 5450 – PRINCIPLES of VEGETABLE PRODUCTION and PHYSIOLOGY

AUTUMN 2019 CLASS CALENDAR

Note 1. It is possible to participate in HCS 5450 class meetings while in 333 Kottman Hall (Columbus) or room 108 Williams Hall (OARD, Wooster). In fact, on any given day, the instructor will lead class activities from either location. Students are asked to interact with the instructor and other students regardless of their location. Some practice may be necessary. The instructor will attempt to involve students at the other location. Students should also work at listening to and being heard by people at the other location.

Note 2. The schedule shown below is approximate. Topics and dates on which topics are discussed may change. Changes will be announced in class and by email.

Note 3. Specific dates in the schedule below are marked with an “*”. This notation indicates that Instructor Kleinhenz will not be present for class and that either another instructor will lead the class or that students will be directed to use the class-time in another way. The planned absences are required for Instructor Kleinhenz to meet other job obligations.
<table>
<thead>
<tr>
<th>CLASS DAY</th>
<th>DAY-DATE</th>
<th>MAJOR TOPIC(S)/ACTIVITY(IES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICA = In-class Assignment; OCA = Out-of-Class Assignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>T 8/20</td>
<td>student and instructor introductions; discuss syllabus; complete course pre-test</td>
</tr>
<tr>
<td>2</td>
<td>R 8/22</td>
<td>vegetable crop classification criteria, systems; complete ICA 1 (group)</td>
</tr>
<tr>
<td>3</td>
<td>T 8/27</td>
<td>types of farms; discuss Reading 1 and complete ICA 2</td>
</tr>
<tr>
<td>4</td>
<td>R 8/29</td>
<td>major production settings, systems, and approaches and marketing terms and strategies</td>
</tr>
<tr>
<td>5</td>
<td>T 9/3</td>
<td>major stages of vegetable crop production; complete ICA 3</td>
</tr>
<tr>
<td>6</td>
<td>R 9/5</td>
<td>crop production-physiology linkages -- part 1 (plant structure and function, terminology)</td>
</tr>
<tr>
<td>7</td>
<td>T 9/10</td>
<td>crop production-physiology linkages -- part 2 (specific examples from research and farms provided by instructor and students as OCA 1/ICA 4)</td>
</tr>
<tr>
<td>8</td>
<td>R 9/12</td>
<td>propagules, stand establishment, and root systems -- part 1</td>
</tr>
<tr>
<td>9</td>
<td>T 9/17</td>
<td>propagules, stand establishment, and root systems -- part 2; discuss Reading 2 and complete ICA 5</td>
</tr>
<tr>
<td>10</td>
<td>R 9/19</td>
<td>propagules, stand establishment, and root systems -- part 3</td>
</tr>
<tr>
<td>11</td>
<td>T 9/24</td>
<td>irrigation -- part 1</td>
</tr>
<tr>
<td>12</td>
<td>R 9/26</td>
<td>workbooks check, course discussion, assessments</td>
</tr>
<tr>
<td>13</td>
<td>T 10/1</td>
<td>irrigation -- part 2; discuss Reading 3 and complete ICA 6</td>
</tr>
<tr>
<td>14</td>
<td>R 10/3</td>
<td>irrigation -- part 3</td>
</tr>
<tr>
<td>15</td>
<td>T 10/8</td>
<td>soil fertility/crop mineral nutrition -- part 1</td>
</tr>
<tr>
<td></td>
<td>R 10/10</td>
<td>no class; Autumn Break</td>
</tr>
<tr>
<td>16</td>
<td>T 10/15</td>
<td>soil fertility/crop mineral nutrition -- part 2</td>
</tr>
<tr>
<td>17</td>
<td>R 10/17</td>
<td>soil fertility/crop mineral nutrition -- part 3; discuss Reading 4; complete ICA 7</td>
</tr>
<tr>
<td>18</td>
<td>T 10/22*</td>
<td>no class; work on OCA 2</td>
</tr>
<tr>
<td>19</td>
<td>R 10/24*</td>
<td>no class; complete and submit OCA 2</td>
</tr>
<tr>
<td>20</td>
<td>T 10/29</td>
<td>microclimate management -- part 1</td>
</tr>
<tr>
<td>21</td>
<td>R 10/31</td>
<td>microclimate management -- part 2</td>
</tr>
<tr>
<td>22</td>
<td>T 11/5</td>
<td>workbooks check, course discussion, assessments</td>
</tr>
<tr>
<td>23</td>
<td>R 11/7</td>
<td>crop production-postharvest management linkages -- part 1</td>
</tr>
<tr>
<td>24</td>
<td>T 11/12</td>
<td>crop production-postharvest management linkages -- part 2; complete ICA 8</td>
</tr>
<tr>
<td>25</td>
<td>R 11/14</td>
<td>product quality -- part 1</td>
</tr>
<tr>
<td>26</td>
<td>T 11/19</td>
<td>product quality -- part 2; discuss Reading 5, other</td>
</tr>
<tr>
<td>27</td>
<td>R 11/21</td>
<td>food security and peoples’ roles in it</td>
</tr>
<tr>
<td>28</td>
<td>T 11/26</td>
<td>complete ICA 9 (repeat ICA 1 as group and report)</td>
</tr>
<tr>
<td>29</td>
<td>T 12/3</td>
<td>repeat course pre-test; complete ICA 10 based on Reading 6; workbooks check and submission, course discussion, assessments</td>
</tr>
</tbody>
</table>

* Note: Students are strongly encouraged to review the course Topic and Family books and assigned readings outside of class since doing so will assist them in multiple ways. These ways include being prepared for lectures and being able to complete the course workbook. The order of content in the Topic book follows the order of discussion topics listed above. Also, Readings 1-6 are often a compilation of separate articles.