

**HCS 5460- Fruit Crop Physiology and Production**  
**Autumn Semester 2018**  
*Lecture/Activities Syllabus*

Class Location: 334 Kottman Hall, Columbus, 109 Williams Hall, Wooster

Units: 3

Classes: Two 80 min. lectures/labs (Mon. & Wed. 2:20 - 3:40 PM)

Principal Instructors:

Dr. Gary Gao	Dr. Diane D. Miller	Dr. Joseph C. Scheerens (coordinator)
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Texts:

Galletta, G.J. and D.G. Himelrick. 1990. Small Fruit Crop Management. Prentice-Hall Inc., Englewood Cliffs NJ.

Rieger, M. 2006. Introduction to Fruit Crops. Haworth Food and Agricultural Products Press, Binghamton, NY.

Scheerens, J.C. 2007. Temperate Fruit and Nut Crops. Pp. 368-410 *In*: Hartmann's Plant Science, Growth, Development and Utilization of Cultivated Plants (4<sup>th</sup> Edition, M.J. McMahon, A.M. Kofranek and V.E. Rubatsky, eds.) Prentice Hall Inc., Upper Saddle River, NJ.

Westwood, M.N. 2009. Temperate Zone Pomology (3<sup>rd</sup> Edition). Timber Press, Portland, OR.

Additional reference material will be placed on reserve at the OSU Agric. Library. Internet sources of information will be suggested from time to time.

Course Description

Contemporary fruit crop production principles/practices and their physiological bases as affected by environmental and economic factors.

## Course Objectives

The primary objective of H&CS 5460 is to prepare students for decision-making positions within the fruit industry. Central to this effort, the students explore tree, vine and small fruit crop physiology and relationships among crop physiological status, horticultural manipulation, cultural management, economic determinants and maximized production of superior products.

As a result of participation in H&CS 5460, the student will acquire the following:

1. An understanding of the physiology, structure and taxonomy of the economically important temperate zone woody perennial, tree, vine and small fruit-producing plants and their associated fruits or nuts.
2. A knowledge of tree, vine, small fruit and nut cultivar and/or rootstock characteristics and their impact on production, harvest, fruit quality and marketability.
3. A thorough understanding of the genetic, physiological and environmental factors subtending tree, vine and small fruit crop growth and fruiting and their interrelationship with production and cultural management practices which will foster an ability to predict production outcomes and to solve production problems through horticultural means.
4. A recognition of the complexity of the tree, vine, small fruit and nut industries on local and global scales and of the economic considerations which influence successful fruit crop management strategies.
5. An appreciation for the evolution the fruit industry and its past and current impact on human society and for the opportunities and challenges facing the industry in the 21st Century.

## Course Prerequisites

H&CS 2201 or 2202 (or equivalent)

## Course Organization and Approach

Classroom Activities:

*Lectures* will address the interrelationship between the physiology and cultural management of tree, vine, small fruit and nut crops. Aspects of establishment, growth, development, maturation, fruit production, harvesting and post-harvest quality enhancement will be considered. Specific topics related to the history, structure and function of the fruit industry will also be introduced.

*Laboratory Sessions* will reinforce or augment student appreciation for key aspects of fruit crop physiology, culture and industry. Laboratory sessions will offer a hands-on experience

(e.g., the apple cultivar lab) or will offer students the opportunity to explore aspects of production and management that are important to the economic viability of a fruit-growing enterprise (e.g., *Project* work sessions B see discussion below).

Projects:

*A Group Production Facility Design Project* will promote planning skills, integrate physiological, cultural and economic aspects of the course comprehensively, and explore the practical application of course content. Students will work in teams to design a site-specific fruit production enterprise, considering all pertinent materials, operations and costs for a three- to five-year period. Students will be expected to develop an abbreviated business plan, site plan, and detailed operational projections. They will present their designs in both written and oral formats. The instructor will act as a facilitator, during this exercise to ensure that each design team receives all of the tools and experiences needed to succeed.

**OR**

*An Individual Experimental Design Project* that will focus on genetically or physiologically based set of hypotheses that explore optimal cultural parameters for improved fruit production, post-harvest handling or end-product quality. Students who undertake this project option will be required to explore all relevant scientific literature, formulate testable hypotheses based on this literature, provide a clear rationale for conducting the research and delineate all relevant methodology that would be used to accomplish the study (including field plot designs, field plot care during the experimental process, genetic analysis, physiological measurement techniques, laboratory procedures, quality evaluations, and/or statistical analysis).

*An Essay Project* will ensure that students understand the basis of Objective #3 and how it relates to the decision-making process of fruit producers.

*A Glossary Project* that will illustrate practical crop-specific nomenclature that is associated with fruit crops and/or the fruit industry.

*A Mapping/Timeline Project* that illustrates where individual fruit crops are grown in the United States, identifies our major global competitors and specifies potential harvest seasons for each production region.

*A Fruit Lecture Project (Final Exam)* where students demonstrate a thorough understanding of the types of information needed prior to beginning production of an unfamiliar fruit crop. The crop chosen can be tropical, subtropical or temperate and must not be one that was studied in class.

## Course Evaluation

A student's grade for the course will be based upon his/her performance in the following areas:

*Laboratory Activities* (5%) – students will participate in events and then prepare short summary reports on laboratory exercises

*Design Project* (35%) – groups will be asked to design a fruit operation which includes an orchard (with at least one tree fruit species) and a vineyard or small fruit plot. They will be asked to propose and defend horticultural inputs (including cultivar choice) during the first three to five seasons of operation, and to consider investment costs and marketing strategies.

### **OR –**

Individuals will be asked to design experimentation aimed at improvement in fruit production or use. Students choosing this option will prepare documentation outlining their proposed work and to present (support) their experimental ideas/procedures to the class.

*Essay Project* (10%) – individuals will be required to write a one to two page essay exemplifying a **proactive** situation in fruit production wherein growers take advantage of the genetic or physiological traits of a fruit plant under specific environmental conditions to improve production or market share **OR** a **reactive** situation wherein the genetic or physiological traits of a fruit plant under specific environmental conditions dictate the proper cultural treatment to maintain adequate production under stressful conditions.

*Glossary Project* (15%) – students will be required to create a glossary that identifies and defines important terms introduced in lecture that pertain to the biology or culture of each crop studied in class.

*Mapping/Timeline Project* (10%) – Students will create an annotated atlas of major US production regions for each crop type, create harvest timelines and identify major global competitors.

*Fruit Lecture Project* (20%) – individuals will create a series of slides and lecture notes similar to those distributed in class for each lecture.

*Class Participation* (5%) – Participation credit will be given to students who attend class and participate fully in discussions and class events.

## Code of Conduct

In H&CS 5460, courtesy and respect for others will be given by all participants, including the instructor, teaching assistants and guests, in the class at all times. An environment that fosters free, non-confrontational expression of ideas will be maintained. When working on teams, each team member will assume full responsibility for their role as a member of that team. Academic misconduct or suspected academic misconduct will be handled according to policies of the Code of Student Conduct in the Student Handbook or Faculty Rule 3335-5-487.

## Lecture Schedule

Meeting time				Instructor	Activity
<b>Week 1</b>					
	Wednesday	Aug	21	Scheerens	Introduction/small fruits/environment
<b>Week 2</b>					
	Monday	Aug	26	Scheerens	Strawberry physiology and production
	Wednesday	Aug	28	Scheerens	Strawberry plasticulture
<b>Week 3</b>					
	Monday	Sept	2	Scheerens	Labor Day – No Classes
	Wednesday	Sept	4	Scheerens	Bramble physiology and production
<b>Week 4</b>					
	Monday	Sept	9	Scheerens	Bramble physiology and production
	Wednesday	Sept	11	Scheerens	Blueberry physiology and production
<b>Week 5</b>					
	Monday	Sept	16	Scheerens	Blueberry physiology and production Cranberry physiology and production
	Wednesday	Sept	18	Scheerens	Project planning session 1
<b>Week 6</b>					
	Monday	Sept	23	Scheerens	Grape physiology and production
	Wednesday	Sept	25	Scheerens	Grape physiology and production
<b>Week 7</b>					
	Monday	Sept	30	Scheerens	Lab 1- fruit and nut morphology
	Wednesday	Oct	2	Scheerens	New and underutilized small fruits
<b>Week 8</b>					
	Monday	Oct	7	Scheerens	Apple industry, apple improvement
	Wednesday	Oct	9	Scheerens	Apple floral biology and thinning
<b>Week 9</b>					
	Monday	Oct	14	Scheerens	Lab 2 – important apple cultivars
	Wednesday	Oct	16	No formal class	Project work in groups
<b>Week 10</b>					
	Monday	Oct	21	Scheerens	Apple rootstocks, budding and grafting
	Wednesday	Oct	23	Scheerens	Apple pruning and training
<b>Week 11</b>					
	Monday	Oct	28	Scheerens	Apple high density production systems
	Wednesday	Oct	30	Doohan	Fruit weed management

<b>Week 12</b>				
Monday	Nov	4	Ivey	Fruit diseases
Wednesday	Nov	6	Gao	Fruit insects
<b>Week 13</b>				
Monday	Nov	11		<b>Veterans Day - No classes</b>
Wednesday	Nov	13	Miller	Pear physiology and production
<b>Week 14</b>				
Monday	Nov	18	Miller	Stone fruit physiology and production
Wednesday	Nov	20		<b>Thanksgiving - No classes</b>
<b>Week 15</b>				
Monday	Nov	25	Miller	Nut crop physiology and production
Wednesday	Nov	27	Scheerens	New and underutilized temperate tree fruits
<b>Week 16</b>				
Monday	Dec	2	TBA	Growing fruit in controlled environments
Wednesday	Dec	4	Scheerens	Essay Projects due; class discussion
<b>Week 17</b>				
Wednesday	Dec	11	Scheerens	Presentation of Design Projects <sup>1</sup>
Friday	Dec	14	Scheerens	All assignments due

<sup>1</sup>Final exam period – Wednesday December 11<sup>th</sup> from 2:00 PM to 3:45 PM.