Perris Union High School District
Course of Study

A. COURSE INFORMATION

Course Title:
Environmental Horticulture Science
New
X Revised

Transcript Title/Abbreviation:
(To be assigned by Educational Services)

Transcript Course Code/Number:
208251/208252
(To be assigned by Educational Services)

Subject Area:
- ❑ Social Science
- ❑ English
- ❑ Mathematics
- X Laboratory Science
- ❑ World Languages
- ❑ Visual or Performing Arts
- ❑ College Prep Elective
- ❑ Other

Is this classified as a Career Technical Education course?
X Yes
No

Grade Level
- ❑ MS
- ❑ HS
- ❑ 5
- ❑ 6
- ❑ 7
- ❑ 8
- ❑ 9
- X 10
- X 11
- X 12

Required for Graduation:
- ❑ Yes
- X No

Meets UC/CSU Requirements?
- X Yes
- ❑ No

Was this course *previously approved by UC* for PUHSD?
X Yes
No
(Will be verified by Ed Services)

Credential Required to teach this course:
Career Technical Education - Agriculture + Natural Resources
Single Subject - Agricultural
To be completed by Human Resources only.

Signature Date 11/29/18

Meets "Honors" Requirements?
Yes
X No

Meets "AP" Requirements?
Yes
X No

Submitted by: Maggie Martsos
Site: Heritage High School
Date: 11/29/18

Unit Value/Length of Course:
- ❑ 0.5 (half year or semester equivalent)
- X 1.0 (one year equivalent)
- ❑ 2.0 (two year equivalent)
- ❑ Other:

Approvals	Name/Signature	Date
Dir. of Curriculum & Instruction		12/3/18
Assistant Sup. of Ed. Services		
PUHSD Board		

Title:	Edition:
Author:	ISBN:
Publisher:	Publication Date:
Usage: ❑ Primary Text ❑ Read in entirety or near	

Supplemental Instructional Materials *Please include online, and open source resources if any.*

Introduction to Plant Science
Revised Edition (College of the Desert)
Published: 2007
Publisher: Delmar/Cengage Learning
Author: Parker
ISBN: 1418045799

Biology
Published: 2007
Publisher: Pearson Education, Inc.
Author: Kenneth R. Miller and Joseph S. Levine
ISBN: 0618725105

Biology of Plants
Seventh Edition (December 17, 2004)
Publisher: W. H. Freeman
Author: Peter H. Raven, Ray F. Evert, Susan E. Eichhorn
ISBN: 0716710072

Sunset Western Garden Book
2007 - Sunset Publishing Corporation
ISBN: 0376039167

Sunset Western Landscaping
1997 - Sunset Publishing Corporation
ISBN: 9780376390516

Vascular Plant Taxonomy
4th Edition - 1996
Kendall/Hunt Publishing Company
Authors: Dirk R. Walters and David J. Keil
ISBN: 0787221082

Retail Nurseryman's Manual
Prepared by California Association of Nurseries and Garden Centers
ISBN: 1879906414

Nursery/Landscape Curricular Code
Prepared by the California Agriculture Teacher's Association
(Not a book, no ISBN number--found online at www.calagteachers.org)

Estimated costs for classroom materials and supplies (REQUIRED). *Please describe in detail.*
If more space is needed than what is provided, please attach backup as applicable.

Cost for class set of textbooks: $6,646.68 Class Set of 36 = $170.95 each (cengagebrain.com) + Sales Tax of 8% = $492.48 each Grand Total = $6,646.68	Description of Additional Costs: Transplanting lab costs (plants, soil, containers) Plant dissection lab costs (slides, specimens) Western Garden Books (class set) Seeds Irrigation supplies for farm project expansion Landscape drafting tools and materials Field trip tour registration (landscape and garden tours) Specimen pressing lab costs Insect collection lab costs Google SketchUp student/teacher fees for landscape design projects
Additional costs: Transplanting lab: $2,500 Plant dissection lab: $500 Western Garden Books: $700 Seeds: $400 Irrigation supplies: $500 Landscape drafting tools and materials: $2,000 Field trip registration: $2,000 Specimen lab: $1,000 Insect collection lab: $2,000 Google SketchUp: $2,000	
Total cost per class set of instructional materials:	$20,246.68

Key Assignments (REQUIRED):

Please provide a detailed description of the Key Assignments including tests, and quizzes, which should incorporate not only short answers but essay questions also. How do assignments incorporate topics? Include all major assessments that students will be required to complete

Safety Procedures Test - The mandatory test on safety procedures is utilized to ensure all students are attentive during the laboratory orientation and to ensure the safety and health of all students. Students will identify the major equipment used in the lab and describe the "Do" and "Don't" in the lab. Student must earn a 95% on the test to be allowed to work in the lab (retakes will be allowed).

Agriscience Fair Project - Gives students an opportunity to utilize the scientific method and apply as it as they develop their own experiment; they will test a hypothesis, develop a procedure, record their data, and publish their

conclusions. The students will write a research paper, which provides background knowledge on the reasoning for their hypothesis. Students are to create a science fair display that showcases their inquiry. Students will also submit a written 10-15 page report of their research and testable hypothesis, procedures, data, results, and conclusion.

Careers in Horticulture Presentation - Students will read and discuss the article: "The Future Can Start in the Garden" by Cynthia Domenghini, NGA Staff (http://www.kidsgardening.org/article/future-can-start-garden). Through this article, students will get inspired about jobs they traditionally have not considered in horticulture. Students will conduct research regarding a particular career and create a presentation. Students can choose the means of oral presentation and display (PowerPoint, internet-based, newscast, etc.). Creativity is encouraged as to how to present. All information must be cited with the appropriate APA format. The purpose of this activity is to encourage students to consider horticulture as a career to expose students to a field they may have not considered before.

Industry Field Trip - For this activity, students will travel to the Living Desert Zoo and Botanical Gardens in Palm Desert, CA, or a similar botanical garden or horticulture industry event. Here, students will have the opportunity to interact with industry professionals in a variety of occupations. Students will be able to glean what a day in the life of someone that works in the horticulture industry is like, and observe what responsibilities they would have in such a career. As a class, students will tour the horticulture facilities used to grow the plants used at any botanical gardens or parks visited. Lastly, at certain venues, students will be allowed to explore the grounds and/or gardens in teams while they complete a scavenger hunt on plant life and items found in these areas (with prior approval from site officials). Students will look for plants suitable and aesthetically pleasing for growing in their own yards. Students will practice writing plant binomial nomenclature, classifying plants, and identifying plant families and the characteristics they found appealing.

Research Paper - This is a thesis-driven exploration of thoughtful reading on a particular subject. The reading material may come from several sources. The purpose is to find and compile data, to participate in an exploration of the data, to make original observations, to show relationships between data, and to make evaluations on a subject. Students will write papers on various subjects throughout the year that will reinforce the main concepts in horticulture.

Plant Identification - A skill of many botanists is to identify and classify plants by scientific name. Students will be presented with 5 plants a week, oftentimes not knowing the names of the plants beforehand. Through their own individual practice and inquiry, they are to develop their own ways of remembering each plant's name, based on identifying characteristics. Students must be able to identify the specimen in writing and verbally. Students will also be able to explain characteristics of the plant and their use in an ornamental landscape. Students will be tested on plant identification every week. The test will be cumulative, with each week's quiz having another possible 5 plants added to the test bank. These plants are identified by the California Association of Nurseries and Garden Centers in their *Retail Nurseryman's Manual* as vital to know for horticultural professionals in California. The California Agriculture Teachers' Association uses the same list of plants in the Nursery/Landscape Curricular Code, which set the rules and expectations for the national Career Development Event in the FFA. Students will complete identification sheet in which they list the special characteristic of the plant, a way to use it in the landscape, and draw a sample of the plant.

Leaf and Flower Scavenger Hunt: A Pressing Specimens Assignment - Students will collect leaves and flower specimens from around the school, their homes, and community. Students are expect to find, press, and label the following leaf forms: oval, ovate, lanceolate, needle, round, linear, cordate, spatulate, and wedge-shaped. In addition, students will also find, press, and label leaves that showcase the following margins: entire, undulate,

crenate, dentate, serrate, and incised. Leaf arrangement will also be included in this assignment, with the following leaf arrangements found, pressed, and labeled: alternate, opposite, whorled, ternately compound, pinnately compound, bipinnately compound, and palmately compound. To add to the challenge, students must also find an examples of perfect, imperfect, dicot, and monocot flowers. All flowers will be pressed and all sexual organs labeled. Students will turn in a completed "Horticulture Specimens" portfolio showcasing the leaf forms, margins, and arrangements, as well as the flowers.

From Seed to Store - For this assignment, students will work in groups to grow bedding plants from seeds to a saleable product for our annual plant sale. Students will develop a soil media to use for the seedlings, sow the seeds, and transplant the seedlings to larger containers when appropriate. Throughout this project, students are expected to make weekly observations and to keep a log of such information in their California FFA Agriculture Record Book. Students will also fertilize as recommended by the instructor. Students will then be present during the plant sale to sell their product to the general public. All proceeds from the sale will return to the agriculture department to fund future education endeavors. Regardless, students will develop a marketing campaign to encourage the public to purchase what they grew from seeds.

Edible Garden Assignment - As a class, we will consider what is important when choosing a site for a vegetable garden. Students will draw to scale plans for the school garden. An introduction to soils will be vital here, since we will be planting the garden ourselves; therefore, a discussion of the difference between preparing heavy, clayey garden soil with that of a sandy garden soil is important. Before we plant, students will also take a soil sample and we will test it for nutrient deficiencies. Students will then develop a fertilizer program for our garden and for our soil type. After we prepare the soil, students will learn how to select varieties that would do best in our local area. During this assignment, students would have grown from seed (carrots, broccoli, lettuce, tomatoes, Swiss chard, and strawberries) earlier in the school year. We will transplant these during this assignment in our edible garden. We will also seed a bed and test which method is faster to get to market. Students will use a frost-free map and planting chart to determine planting dates so we do not lose any plants to low temperatures. We will prepare the raised beds and install an irrigation tape to provide water to our crops. Since some crops do not have to be planted annually from seed, it is my desire to have a small grape vineyard and citrus orchard already in place to add to the edible garden lab. Lastly, we will discuss various harvest methods used to harvest the produce in field. Throughout this project, students are expected to make weekly observations and to keep a log of their observations using the California Agriculture Record Book.

Landscape Design, Construction, and Maintenance Assignment - Students will receive hands-on experience in designing and constructing a 10' x 10' miniature garden. These gardens are installed inside the main entrance of the SoCal Fair and displayed and cared for during the duration of the fair.

All exhibitors must follow the following rules:

- All work on this project is to be done ONLY by the exhibitor (the student). Advisor and parents are welcome to offer suggestion, but all ideas for design and construction must be student-inspired.
- Exhibitor agrees to follow all suggestions provided by the Landscapes Advisor (the instructor). If student refuses or displays utmost disrespect, exhibitor's entry will be withdrawn from the fair. Student will still be responsible for materials fee.
- No horseplay of any kind will be allowed. If student is asked too many times to focus on the project, the entry will be withdrawn.
- All injuries, no matter how small, must be reported to the instructor.
- A minimum of 2 students will work on each landscape entry.

- Most of the plant material will be on loan from local nurseries. All exhibitors will care for all plants used in their landscape display.
- All landscape exhibitors will sign-up for a watering shift in which every plant used in the school's landscape displays will be watered, to ensure the proper care and appearance required by the fair board.
- All exhibits must have a final drawing detailing the plans and giving the public knowledge as to what plants were used. All plants must be properly identified by their common and botanical name.
- Each landscape must follow each of the following categories:
    - International landscape design
    - Landscape design featuring annual and perennial flowers of many varieties, with water
    - Landscape design featuring statue
    - Landscape featuring drought tolerant plants
    - Patio design
    - Fair theme
- Construction is scheduled for the week prior to the open of the fair.
- Exhibitors who also have a livestock entry are expected to attend all required livestock barn duties. Exhibitors that have livestock will be expected to care for their animals and will NOT be allowed to miss barn duties.
- All landscape exhibitors will be excused from school for the purpose of clean-up and return of all plant materials.
- Thank you letters to all sponsors will be expected from all exhibitors as well as updating the California FFA Ag. Record Book in able to receive fair premium checks.

Insect Collection - To provide students with a learning opportunity in which they will create a display of local insects. This activity will help students practice science skills in a self-directed environment while acquiring a great deal of information about insects, their body structures, and how they function. This project can also help students develop an appreciation of living creatures and their importance in our environment. Students will be able to:

- Design and build a wood and plexiglass display box.
- Make a killing jar.
- Make a net to collect insects.
- Catch, kill, and pin insects appropriately so they may be used for display.
- Identify 30 local insects and their body structures.
- Make labels for insects on a word processing program.
- Work cooperatively to design, build, and complete an insect display.

Students will present their collections to the rest of the class and explain their method of catching their insects.

Instructional Methods and/or Strategies (REQUIRED):

Please list specific instructional methods that will be use.

Each unit of this course is taught using the following instructional methods:

Warm Ups - These activities will take place during the first five minutes of class and serve as a transition activity to prepare students for what they will be learning that day in Environmental Horticulture Science.

Direct Instruction Using PowerPoint Presentations, Cornell Notes, and Cloze Notes - Our students participate in mini-lectures to provide students with explicit instruction in key learning on a regular basis. These lectures are

intended to preview learning material in advance of laboratory activities or to reinforce phenomenon following an exploratory experience. Students are always expected to take notes using either Cornell or Cloze formats and to be active, participants in the lecture.

Lab and Inquiry Activities - As previously described, laboratory activities include a full scientific inquiry process where students generate hypotheses, follow procedures, collect data, and generate conclusions from that data. Students will be expected to report their findings in a lab report that requires students to report their results and data using the scientific method. Therefore, the students' lab reports will have the following sections: formulating hypotheses, collecting data, reporting their results, and using the data to validate or disprove the hypothesis they formed in a conclusion. Being that chemistry is a laboratory science area, the primary instructional strategy used to deliver curriculum are hands-on, performance-based methods, with experiential learning possibilities through the laboratory's events. This method of instruction allows students to practice the concepts and see them in action, which research suggests leads to improved retention and ability for application. Another key instructional strategy used is Interactive Learning, which allows students to manipulate content in various ways and form cognitive anchors. For example, there are opportunities for students to engage in role-playing, debates, discussion, and group projects. The following concepts within the content outline are supported by Interactive Learning: Organic vs. Inorganic, Best Propagation Procedures and/or Evolution of Plant Life.

Research Papers - It is a thesis-driven exploration of thoughtful reading on a particular subject. The reading material may come from several sources. The purpose is to find and compile data, to participate in an exploration of the data, to make original observations, to show relationships between data, and to make evaluations on a subject. Students will write papers on various subjects throughout the year that will reinforce the main concepts in Horticulture.

Small Groups - Frequently students work with peers or teachers in small groups to reinforce concepts and to ensure mastery. Small groups may engage in academic discourse around a particularly challenging problem or vexing application of a horticulture concept. Students who struggle on a particular warm-up may meet in a small group with the teacher while other students complete independent work. Small group instruction is a critical tool in differentiating curriculum for students.

Video Clips, Music, and Other Multimedia - To build students' understanding of how chemistry concepts can be recognized in the world, our high school students leverage technology to see examples of phenomenon that may be hard to replicate in the classroom or to provide experience in manipulating aspects of those phenomenons. These multi-media tools provide students with strong personal connections and help to provide necessary scaffolds for student learning.

Socratic Seminars and Discussion - At our high school, we believe that a key method of demonstrating competency and understanding of curriculum content is the ability to participate in academic conversations where students are able to discuss the content, use evidence to support their thinking and opinions, and to build on the conversations of others. Socratic Seminars and discussion provide opportunities to assess student understanding of the scientific concepts they have learned.

Student Reflections - Every week students complete a self-assessment to build internal understanding of their mastery of core concepts within the prior week's lessons, to build an individual plan for gaining mastery where it may not yet exist, and to link the learning of the week to prior concepts.

Vocabulary Manipulative (All Standards) - Manipulatives will be used to introduce vocabulary during every unit

of the course. These manipulatives will include terms and definitions on separate cards. Students will organize the cards so the term is matched with the proper definition. Manipulatives will also be used to help students balance equations.

Foldable (All Standards) - During each unit of study, students will create foldables using unit vocabulary and/or major concepts. Foldables are 3D graphic organizers. These foldables will also serve as a study tool for students.

Test Reflections and Corrections (All Standards) - Students will analyze their performance on all assessments. They will identify mistakes, make corrections, and determine why they chose incorrect answers. They will also write a short reflection on how they can improve their performance in the future.
E-Moments - These are creative ways of introducing and/or reviewing topics or vocabulary covered in class that often involve verbal or kinesthetic response by the students, rather than just having them do review worksheets or reading from a textbook. This could involve them playing review games, creating their own graphic organizers, writing short stories that illustrate a concept, or even acting out a key concept in a skit.

Assessment Methods and/or Tools (REQUIRED):

Please list different methods of assessments that will be used.

Student learning is continually assessed throughout the teaching of the unit through the following:

Daily, Informative Assessments - These assessments are used on to gauge students mastery of discrete concepts taught during a specific class period. Informal assessments during class period (thumbs up/thumbs down, fist of five, using equity cards to question students, exit tickets, etc.) will be frequently used during every unit of study. Homework and problem sets will be regular assignments as well.

Warm-Ups (Daily Journals) - Review prior learning at the start of each lesson. Students complete this as soon as the bell rings so teacher can take attendance.

Weekly Quizzes - These assessments are administered to gauge student mastery of integrated concepts after several days of instruction. These assessments are both formative and summative, providing early information regarding gaps in students' ability to integrate learning across discrete concepts and providing evidence of student mastery. There will be approximately 2-3 quizzes per unit of study. Assessments will include a mixture of comprehension and applied problem-solving depending on the content of instruction in the preceding weeks.

Weekly Reflections - Every week, students will submit a written reflection in which they must identify 25 facts from memory, **reflect on** how the laboratory experiment permitted them to further learn the learning objectives for the week and **also ask qu**estions about the content as they reflect on their learning. Students enrolled in the regular college prepar**atory cours**e are only expected to write a reflection for every chapter just prior to the chapter assessments.

Research Papers - Research papers will be evaluated against the rubric set forth by the California Ag. Teachers' Association Curricular Code for the statewide Agriscience Fair. Students must demonstrate their ability to research and translate their thoughts, utilizing technical scientific language while keeping the scientific method in mind. Students must demonstrate an ability to read non-fictional material, as well as incorporate their own knowledge and

data to make their papers stronger. There are several writing assignments throughout the school year to prepare students for the upcoming Common Core and Next Generation Science Standards. Students will also be required to write a research paper in which they research current and relevant applications of chemistry in the vast field of agriculture, food, and environmental sciences. Students will report their findings to the class in an oral presentation. One research paper must be completed every semester.

Unit Exams - These assessments are administered to gauge students mastery of an entire unit of study for summative evaluation purposes. Unit exams include assessments of student mastery of vocabulary, ability to solve problems, and to explain the chemistry concepts that are core to the unit of study. Questions will include comprehension, applied problem-solving and integrative knowledge to assure that students understand the unit of study in all of its complexity.

Semester Final Exams - Twice a year, students will complete a cumulative exam which requires students to demonstrate mastery of core concepts learned in each unit. The semester 1 exam will address Units 1, 2, and 3. The semester 2 exam will address all units, with a greater proportion of questions coming from the second semester content.

Supervised Agricultural Experience - All agricultural students must have a Supervised Agricultural Experience (SAE) project. Students with an SAE learn by doing. With help from their agricultural teachers, students develop an SAE project based on one or more SAE categories:

- *Entrepreneurship* - Own and operate an agricultural business.
- *Placement* - Get a job or internship on a farm or ranch, at an agriculture-based business, or in a school or factory laboratory.
- *Research and Experimentation* - Plan and conduct a scientific experiment. (e.g. Determine whether the phases of the moon affect plant growth, or test and determine the efficacy of different welding methods.)
- *Exploratory* - Explore careers in agriculture by attending an agriculture career fair, or creating a report or documentary on the work of a veterinarian.

Students must submit their California Agriculture Record Book as evidence of completion of their SAE requirement. Students' final grade will depend 10% on the completion of their SAE project. All students enrolled in an agricultural class must have a Supervised Agricultural Experience (SAE) project that relates to agriculture. Students can choose from a variety of projects and students get prior approval from the instructor to see if a project demonstrates quality, quantity, and relevance to agriculture. Students must submit an Agriscience Fair Project as their SAE. This Agriscience Fair Project is vast (10-15 pages in the final report, display, and presentation) and students must utilize both semesters to complete their projects. Agriscience Fair Projects will then be submitted to the several yearly, state-wide FFA Agriscience Fair Project competitions in the spring months.

FFA Participation - Since all students enrolled in an agricultural education course are considered FFA members, all students are required to attend 3 distinctly different FFA activities per semester. This participation is worth 5% of the semester grade. All students will be provided with a FFA calendar listing all FFA activities offered. Students can meet this requirement by participating in monthly meetings, joining a committee, attending a leadership conference, joining and completing in a judging team or being a chapter officer.

COURSE PACING GUIDE AND OBJECTIVES (REQUIRED)				
Day(s)	**Objective**	**Standard(s)**	**Chapter(s)**	**Reference**
1 week	**Horticulture Introduction and Careers:** Students will gain a basic understanding of horticulture and the careers available in the field of horticulture.	Ag. CTE Anchor Standards 3.0-3.9	Chapter 1	Retail Nurseryman's Manual
2 weeks	**Plant Classification and Binomial Nomenclature:** Students will be able to classify plants into the major categories and use the naming and nomenclature protocol of plants.	Ag. CTE Standards F1.0-F1.5, ELA Standards 9-10.3, 9-10.4, 9-10.5, 9-10.7, 1-12.4	Chapter 2	Nursery/Landscape Curricular Code, Vascular Plant Taxonomy
2-3 weeks	**Plant Cells and Genetics:** Class will compare eukaryotes and prokaryotes cells, with special interest placed on eukaryotic plant cells. As a class we will then describe the basic chemical composition of cells. We will review the cell organelles and highlight the important organelles that differentiate animal cells from plant cells.	Ag. CTE Standards G2.0-G2.6, ELA Standards 9-10.5, 11-12.3	Chapter 3	Vascular Plant Taxonomy
2 weeks	**Plant Structures and Functions:** Students will recognize the 4 main parts of plants and describe the function of each.	Ag. CTE Standards G3.0-G3.6, ELA Standards 9-10.3, 9-10.5, 9-10.7, 11-12.3	Chapter 3	Vascular Plant Taxonomy
2 weeks	**Propagation By Seed:** Students will explain the major structural difference between dicot and monocot seeds and how they grow and function. They will differentiate between indirect and direct seeding methods.	Ag. CTE Standards G4.0-G4.3, ELA Standards 9-10.3, 9-10.5, 9-10.7, 11-12.3	Chapter 6	Biology of Plants
2-3 weeks	**Clonal Propagation:** Students will select plants suitable for propagating by use of cuttings and determine if the maturity of wood is correct for optimum rooting. In addition, students will perform division and separation of plants and differentiate between the two.	Ag. CTE Standards G4.0-G4.3, ELA Standards 9-10.3, 9-10.5, 9-10.7, 11-12.3	Chapter 9	Biology of Plants

1 week	**Grafting, Layering, and Budding:** Students will perform the propagation technique to complete a T-bud and a chip bud. Students will perform the layering process and follow the eight steps involved to successfully produce a new plant.	Ag. CTE Standard G4.2, ELA Standards 9-10.3, 9-10.5, 9-10.7, 11-12.3	Chapters 10, 11, and 12	Biology of Plants, Retail Nurseryman's Manual
1 week	**Micropropagation:** Students will learn how to take sterilized terminal shoots and/or leaf buds and place them on a sterile agar gel.	Ag. CTE Standards G4.2 and G11.1, ELA Standards 9-10.3, 9-10.5, 9-10.7, 11-12.3	Chapter 7	Biology of Plants
3-4 weeks	**Edible Gardens:** Students will learn to differentiate between warm and cool season vegetables, principles of planting and harvesting vegetable, nut and fruit crops. As a class, we will consider what is important when choosing a site for a vegetable garden. Students will draw to scale plans for the school garden.	Ag. CTE Standards G10.0-G10.4, ELA Standards 9-10.3, 9-10.4, 9-10.5, 9-10.7, 11-12.3, 1-12.4	Chapters 38, 39, 40, and 41	Sunset Western Garden Book
4 weeks	**Landscape Design, Maintenance, and Plant Selection:** Students will describe the three major fields within the landscape profession. Students design their own landscape using computer aided design (CAD) as they balance the use of plant and hardscape products. Students will submit their design and construction to the local annual county fair for evaluation by a judge and exhibition to the public.	Ag. CTE Standards F10.0-F10.5, ELA Standards 9-10.3, 9-10.4, 9-10.5, 9-10.7, 11-12.3, 1-12.4	Chapter 34 (and bits and pieces of Chapters 25-33)	Sunset Western Garden Book
2 weeks	**Temperature Response, Growth Regulators, Retardants and Rooting Hormones:** Students will know the germination temperature for five plants. Students will also identify and explain the temperature differences and the hardiness zones of the United States.	Ag. CTE Standards G11.4, G3.4, G3.6, ELA Standards 9-10.3, 9-10.4, 9-10.5, 9-10.7, 11-12.3	Chapter 5	Biology of Plants
3 weeks	**Pests and Diseases:** Students will understand the life cycles of insects, invertebrates and arachnids that can harm a plant. Students will review the labels on pesticides, insecticides and herbicides and determine the correct ratios used by professionals to avoid toxicity for the plants, animals and humans.	Ag. CTE Standards G5.0-G5.5, F4.0-F4.4, ELA Standards 9-10.4, 9-10.5, 9-10.7, 11-12.3,	Chapters 16-20	Biology of Plants

		1-12.4		
2 weeks	**Soil Chemistry and Water: Stu**dents will know the differences in a soil profile from place to place and how soil horizons can differ as well. Students will also describe the relationship between soil properties and plant growth.	Ag. CTE Standards F5.0-F5.5, G6.0-G6.4, G7.0-G7.3, ELA Standards 9-10.3, 9-10.4, 9-10.5, 9-10.7, 11-12.3, 1-12.4	Chapter 4	Biology of Plants
1 week	**Pruning: Stu**dents will describe reasons for pruning and the 4 types of pruning styles. Along with this, students will have to demonstrate the proper angle placed on a stem when pruning.	Ag. CTE Standards F9.2, F9.3, F10.3 and F10.4, ELA Standards 9-10.3, 9-10.4, 9-10.5, 9-10.7, 1-12.4	Chapter 33	Retail Nurseryman's Manual
2 weeks	**Fertilizers: Stu**dents will research the best fertilizer practices we will need to utilize in able to receive the best yields.	Ag. CTE Standards F6.0-F6.4, G3.3, G3.6, ELA Standards 9-10.3, 9-10.4, 9-10.5, 9-10.7, 11-12.3, 1-12.4	Chapter 38	Retail Nurseryman's Manual
2 weeks	**Turfgrass:** Students will list reasons for establishing and maintaining a lawn. The class will differentiate between warm season and cool season grasses and the 3 ways turf grasses are started in the United States. After this, as a class, we will follow a procedure a seed our own lawn.	Ag. CTE Standards F7.0-F7.3, ELA Standards 9-10.3, 9-10.4, 9-10.5, 9-10.7, 1-12.4	Chapters 35, 36, and 37	Retail Nurseryman's Manual

C. HONORS COURSES ONLY
Indicate how much this honors course is different from the standard course.

D. BACKGROUND INFORMATION

Context for course (optional)

As we enter into the realm of "College and Career Readiness" in public education, the author of this course believes that a strong focus for our high school is to further develop pathways that support our local workforce. Riverside County alone is a very productive agricultural area, and is an important part of California's $44.7 billion agriculture sector. As recently as 2013, agriculture contributed $2.77 billion to Riverside County's economy, and provided over 15,000 jobs. Riverside County is especially prolific in the production of citrus crops, wine grapes, dry land crops (like alfalfa), poultry, dairy products, and, most importantly to this course, ornamental nursery crops. The nursery industry in this immediate area brings in multiple billions of dollars every year, and because of this, it seems fitting to have a class in which students can enroll and learn about the myriad of jobs available in the horticulture, crop, and plant sciences. There are many different jobs available in this industry, and training students with knowledge and skills to take jobs in a constantly-growing industry is beneficial to the students as well as vital to the continuation of Riverside County's agricultural industry.

History of Course Development (optional)

Our high school district prides itself on preparing students to meet the demands of the 21st century through the use of interactive, technology-filled curricula. Along with the new technological advances being put into place so that our students can compete in the workforce and be successful on the upcoming Smarter Balanced Common Core State Standards Assessment, our high school and district has a strong history in investing in Career Technical Education. Students in our department have shown great interest in this horticulture pathway. The author of this course has been teaching the principles and science of horticulture outside school time to enable students to compete statewide in Nursery/Landscape FFA contests. Under the guide of the same teacher, students have submitted several entries in the areas of horticulture and landscape design, construction and management to the local county fair. Our submissions have been successful both years this teacher has worked in the district, and we have won many 1st and 2nd place ribbons.

Many students wish to participate in the horticulture pathway, but because of there is no class being offered that meets the UC requirements for an elective course, the agriculture department cannot meet the demands of many of those students at this time. This class will serve as the introductory course to our Ornamental Horticulture Pathway. In addition, we hold an articulation agreement with a local community college for students to receive college credit in horticulture for enrollment and successful completion of coursework with the current horticulture class that we offer. With the addition of this course, we seek to meet the needs of the college-bound student who has an interest in plant sciences, while offering them a course that counts as a college-approved elective. This course has been created with the direction and leadership of the agriculture program at Indio High School as well as the College of the Desert, and mimics the rigor of a college-level horticulture science course.

Prerequisite(s) (REQUIRED):

Algebra I - Required (Must receive a passing grade)
Plant and Animal Science or Freshman Advanced Ag. Biology - Required (Must receive a passing grade)
Ag. Biology - Required (Must receive a passing grade)
Ag. Chemistry - Recommended (Can be taken prior to this class or concurrently)

Corequisite(s) (REQUIRED):

Ag. Chemistry - Recommended (Can be taken prior to this class or concurrently)

Brief Course Description (REQUIRED):

Environmental Horticulture Science will provide the students with theories and principles related to environmental and ornamental horticulture. This is a college preparatory course, designed to successfully expose students to both the environmental and botanical nature of horticulture. This course is intended to develop an appreciation of horticulture, incorporate scientific methods and biological principles within the environment, understand plant functions and uses, and recognize the diversity of life and the interrelationships among organisms in nature. This course is designed to develop knowledge and skills in the following areas: basic botany; classification and identifying horticultural plants; using soil and other plant-growing media; propagating horticultural plants; basics of growing horticultural plants in greenhouse and landscape settings; and landscape maintenance. Improving workplace skills will be a focus. Participation in FFA student organization activities is required.

B. COURSE CONTENT

Course Purpose (REQUIRED):
What is the purpose of this course? Please provide a brief description of the goals and expected outcomes. Note: More specificity than a simple recitation of the State Standards is needed.

The purpose of this course is to equip students as a part of our Ornamental Horticulture pathway. The goal is to build a foundation in the area of plant science, biochemistry, and horticulture, in which students can build upon as they continue to build their skills in the areas of science. It is also the hope of our department that students would like to further their education in science to support the agricultural industry in feeding, clothing, housing, and protection of the natural resources of the world. This course would enhance the technical science knowledge and skills needed to carry out the applied science of horticulture. Due to the emerging Common Core State Standards in writing and literacy, students will be required to enhance their literacy skills in researching and reading comprehension of informational text. Students will also express themselves through technical scientific writing as they complete research papers and an agriscience fair project. Environmental Horticulture is designed to provide students with the theories and principles related to environmental horticulture science. Emphasis is placed on horticultural terminology, plant identification, plant physiology, and entomology. This course will also prepare those students planning on majoring in agricultural sciences at a 2-year and/or 4-year college or university.

Course Outline (REQUIRED):
Detailed description of topics covered. All historical knowledge is expected to be empirically based, give examples. Show examples of how the text is incorporated into the topics covered.

Unit 1: Horticulture Introduction and Careers

This unit serves as the introductory unit to the class. From this unit, students will have a basic understanding of horticulture and careers within the field of horticulture. After this unit, students will be able to: (1) Define agriculture, agronomy, silviculture, and horticulture terms. (2) Describe the major divisions in the horticulture industry. (3) Explain various career options and business within the horticulture industry. (4) Define and identify the major areas of the horticulture industry; horticulture, ornamental horticulture, olericulture, pomology, floriculture, nursery, landscape, turf, and aquaculture. (5) Explain the importance of the horticulture industry to the California economy and society as a source of food, fiber, aesthetic, and functional uses. (6) Discuss how the correct use of horticulture and plants has an impact on the environment. (7) Identify skills needed and career opportunities in horticulture. At the end of the unit, students will participate in a multi-day research project on a horticultural career of their choice and will present their findings to the class. Students will begin by taking an aptitude/personality test to help them focus on certain strengths that they might bring to a career. Then, they will pick several careers related to the horticulture industry, and narrow their top choices down to one particular career by cross-examining their personal strengths. Students will have a set of job basics that they are expected to research for their chosen career, and their presentations will be evaluated by both the teacher and their peers using a rubric.

Unit 2: Plant Classification and Binomial Nomenclature

From careers, we transition into plant classification and the naming system used to name plants. Students will be able to classify plants into the major categories and use the naming and nomenclature protocol of plants. As a class, we will differentiate between scientific and common plant names and explain the binomial system of naming plants. Students will explain why scientific plant names are used and explain the difference between genus, species, and variety. Students will also use family, common, and scientific binomial names when describing plants. Emphasis will be placed on the difference between gymnosperms and angiosperms. On the first day of class, students will be presented with a mystery plant. The expectation will be set that, throughout the course of this unit, they will not only learn what the name of this specific species is, but will also learn how to better identify unknown plants in general. Students will begin this project on the first day by noting certain characteristics about branching, leaf arrangement, leaf shape, flower shape, and more. This will be followed by instruction from the teacher on how to identify certain traits. Finally, students will learn how to properly use a dichotomous key through an inquiry-based activity in which the mystery plant from the beginning of the unit is one of the plants listed. Students will solve the mystery of the unknown plant by the end of the unit.

Unit 3: Plant Cells and Genetics

An understanding of plant growth begins with an understanding of plant architecture. The architecture or structure has a hierarchy - biochemicals, cells, tissues, and organs. Class will compare eukaryotic and prokaryotic cells, with special interest placed on eukaryotic plant cells. As a class, we will then describe the basic chemical composition of cells. We will review the cell organelles and highlight the important organelles that differentiate animal cells from plant cells. Students will draw and label the parts of a plant cell and mitosis. Special focus will be placed on plant cellular multiplication, especially on the three cells found in plants: epidermis, parenchyma, and sclerenchyma cells.

Lastly for plant cells, students will learn about the importance and differentiate between xylem and phloem cells. At this time, students will be given an introduction to xylem and phloem, we will elaborate on the importance of their role in Units 5 and 7. In this unit, students will also revisit genetics with special emphasis on using Punnett squares by being provided with more than two traits to cross. We will also explain the basic principles of genetics, how mutations are helpful and how mutations are created. Lastly, we will explore how and why people improve plants. As an inquiry-based activity for this unit, students will use strawberries grown on the school farm. Students will be prompted to recall how organisms traits' are determined, and how cultivated crops can differ in appearance from wild crops. Students will then go through a lab that teaches them how to extract DNA from pulverized strawberries, which will review the concepts of DNA structure and function in determining a plant's genotype and phenotype.

Unit 4: Plant Structures and Functions

In this unit, students will recognize the four main parts of plants and describe the function of each.

We will begin exploring plant parts and functions by analyzing leaf parts, arrangement, type, and identification features. Since leaves are the primary source of photosynthesis and respiration, we will analyze how the chloroplast and stoma work together to convert carbon dioxide and water into glucose and oxygen. Students will be expected to know the balanced chemical formula for the process of photosynthesis and respiration. Emphasis will be placed on carbon fixation and the Calvin Cycle; these contribute to the stages of photosynthesis.

After the leaves, we analyze the stem of a plant. In this unit, students describe the structure and functions of stems and their part, including specialized stems, vascular systems, meristematic tissues, and growth. Special focus will be placed on how the external stem structure function and internal stem structures (xylem and phloem) transport food and water. At this point, we will also analyze the major structural difference between dicot and monocot stems and how they grow.

Stems naturally lead us into the roots of a plant. Therefore, for this section of the unit, students will identify the plant root parts, their functions, and their basic physiology. Lastly, the class will analyze the sexual reproduction of higher level plants (flowers), flower parts, types, and functions.

Each day of this unit, students will be given a new, real plant to observe. The inquiry-based content for this unit will come into play with this realia. Students will start off the unit by being asked the question: "what are the parts of the plant, and how can we use differences in these parts in different species to tell plants apart from each other?" Students will be required to make a note of its leaf type, leaf arrangement, flower arrangement, root or stem system type, depending on the day. This will act as a sort of informal assessment for students to evaluate their own knowledge. Students will also be required to write about how that part works and how they properly identified that part.

Unit 5: Propagation By Seed

Now that we have explored the major components of plants, we will create/propagate new plants. Students will be posed the following question at the beginning of this unit to drive their inquiry over labs and lessons: "How can we reproduce plants?" We will begin our propagation units with using seeds as a source of propagation. In this unit, we will explain the major structural difference between dicot and monocot seeds and how they grow and function. We will differentiate between indirect and direct seeding methods. We will so prepare a medium for seeds, sow seeds, and provide the proper conditions for germination. The class will also transplant seedlings into flats and/or pots. Before transplanting the class will also water, fertilize, and harden off seedlings. At the outset of this unit, students will be

posed a real-world scenario: they are working as a nursery manager in a large wholesale nursery. They need to generate a huge shipment of new plants that the nursery has never grown before using propagation. First, the students will need to research several (predetermined) methods of propagation. Students will formulate a hypothesis about which technique, based on their individual research, will work best to propagate this plant. Then, through a series of interactive labs, students will try out each method of propagation. At the end of the unit, students will evaluate the validity of their hypothesis.

Unit 6: Clonal Propagation

In this unit, students will select plants suitable for propagating by use of cuttings, and determine if the maturity of wood is correct for optimum rooting. To demonstrate clonal propagation, over the course of one week, we will propagate leaf, root, softwood, semi-hardwood, and/or hardwood cuttings by:

- Collecting wood from the parent plant
- Making the actual cutting
- Treating the cutting with the proper rooting hormone when necessary
- Prepare the rooting medium and place in the medium
- Analyzing actual growth

In addition, students will perform division and separation of plants and differentiate between the two in the school greenhouse to create large crops of plants in a real-world commercial greenhouse setting. Plants can reproduce by specialized plant structures (bulb, corm, tuber, tuberous root, and rhizomes); students will learn how to recognize them, define each, and explain how they function in reproduction. Students will take what they learned in the last unit to inform their hypotheses as to which type of clonal propagation will work best in producing healthy young plants, as they will have the opportunity to try out multiple types of clonal propagation in labs. Their inquiry in this unit will be centered around figuring out which method is the most effective for certain types of plants.

Unit 7: Grafting, Layering, and Budding

An important means to reproducing and to guaranteeing the success of a fruit, nut, and/or vegetable is grafting. In this unit, we will revisit vascular tissue (xylem and phloem) and how vital they are in the process of grafting. As an interest approach to this unit, students will be posed the question, "Without the use of selective breeding, how could we produce the best possible specimens that create high-quality crops?" Students will learn that grafting means that plants that this technique is used upon have the best traits of several different varieties of the same plant. Before students are allowed to graft for themselves, we will have a classroom discussion as to why grafting is vital in the horticulture and crop science industries. Students will also learn first to differentiate between the scion and the stock. Before creating grafts themselves, students will be properly taught how to safely use grafting equipment and the proper technique for grafting. Students will be required to wear the proper personal protective equipment during all labs in this unit. Three types of grafts that students will be able to successfully "take" will be: whip (tongue) graft, side veneer graft, and cleft graft. Once grafting is mastered, we will focus on budding. Students will name at least three plants commercially propagated by budding, and list the seven steps in the budding process. During a classroom lab, students will perform this propagation technique to complete a T-bud and a chip bud. The last topic for this unit will be layering. Students will perform the layering process and follow the eight steps involved in successfully producing a new plant.

Unit 8: Micropropagation - Tissue Culture

Tissue culture is the newest approach to plant propagation. Students will learn how to take sterilized terminal shoots and/or leaf buds and place them on a sterile agar gel. The new plants will then be treated as seedlings and will be transplanted into a media and lightly misted for roots to develop. At the outset of this unit, students will be posed the following question, "How has propagation evolved in the 21st century to fit in with modern technology?" Students will then research the process of micropropagation to kickstart their inquiry into this unit; they will also research the supplies and conditions needed to perform these procedures. Before conducting a micropropagation of their own, students will learn how to properly maintain a sterile environment and how to sterilize tools; then, students will care for their micropropagated plants over the course of several weeks, seeding them from initial propagation to ultimate transplanting.

Unit 9: Edible Gardens

Southern California is home to a wealth of agricultural production, with a variety of crops produced just in the Perris area alone. Therefore, no horticulture course is complete without applying our knowledge towards the production of edible products. In this unit, students will learn to differentiate between warm and cool season vegetables, as well as principles of planting and harvesting vegetable, nut, and fruit crops. Our guiding question for this unit will be, "How can we grow crops in the most efficient and environmentally-responsible way possible?" As a unit-long project, students will be responsible for making all management decisions that would best take care of the crops they choose to grow at our school farm. As a class, we will consider what is important when choosing a site for a vegetable garden. First, students will draw to-scale plans for school planter beds that they themselves will be manage. An introduction to soils will be vital here, since we will be using different soils and fertilizers, and therefore a discussion of the difference between preparing a heavy, clayey garden soil with that of a sandy garden soil is important. Before we plant, students will also take a soil sample and we will test it for nutrient deficiencies. As problems with soil and nutrients arise while their crops are growing, students will be required to research the symptoms first before proposing a solution to the problem to the class. The students' individual projects in their planter beds will drive their own individual inquiry in this unit, as they learn how to care for their specific crops. Students will then develop a fertilizer program for our planter beds and soil types. After we prepare the soil, students will learn how to select varieties that would do best in our local area. During this unit, students will take the already-sown seeds (carrots, broccoli, lettuce, tomatoes, Swiss chard, and strawberries) from earlier in the school year and transplant them into the edible garden. We will also seed a bed and test which method is faster to get crops to a marketable size. Students will use a frost-free map and planting chart to determine planting dates so we do not lose any plants to low temperatures. We will prepare the raised beds and install an irrigation tape to provide water to our crops. Since some crops do not have to be planted annually from seed, it is our desire to have a small grape vineyard and citrus orchard already in place to add to the edible garden lab. Lastly, we will discuss various harvest methods used to harvest the produce in field. Due to the nature of this unit and this project, this experience will take several months to complete, with students working on their planter beds during class time at least one, if not more, days per week.

Unit 10: Landscape Design, Maintenance, and Plant Selection

Following the edible gardens unit will be the landscaping design and maintenance unit. In this unit, students will describe the three major fields within the landscape profession (landscape architects, landscape contractors, and landscape maintenance contractor). Students will also list the main objectives and principles of a good residential

landscape. This unit will be primarily focused on plants and how one uses them in a landscape; one cannot ignore the hardscape (path, paving, patios, water features, etc.), however, which is incorporated into a landscape. Therefore, design principles will be taught as students design their own landscape using computer-aided design (CAD) as they balance the use of plant and hardscape products. Students will first be prompted to research and report to the class what the main principles of design are. The students will then spend time collaborating with each other, and, using the principles of design they researched, will create their own design for a landscaped area. The designs students create will actually be constructed under the supervision of the teacher on record. Students will submit their design and construction to the local annual county fair for evaluation by a judge and exhibition to the public. As students select plants for their landscapes, we will discuss how to select bedding, shrubs, and trees that would be best suited to their overall design themes and/or goals. Students must maintain their landscape display during the duration of the fair, otherwise students forfeit their premium award money for having an entry at the fair. The maintenance requirement will also be used as a teachable moment as we showcase technical knowledge and skill necessary for landscape maintenance. This project-based learning experience will take a month to complete, with students being given class time to both learn principles of design, how to operate CAD software, and to prepare their designs. Student construction and installation of landscapes will also take several full days of work and maintenance to upkeep.

Unit 11: Temperature Response, Growth Regulators, Retardants, and Rooting Hormones

Not all plants are alike. They vary greatly as to the temperature they tolerate or even require to germinate, grow, and survive the winter. Temperature affects the productivity and growth of a plant; therefore, students will be expected to discuss the effect temperature has on plant dormancy. We expect students to know the germination temperature for five plants. Students will also identify and explain the temperature differences and the hardiness zones of the United States, and after being prompted with the question, "How do plants differ in the warmth and coldness requirements they need to grow well?", they will complete guided inquiry activities to find out the answer to that question. Lastly, we will discuss the damage frost can do to plant tissue.

We will then discuss plant growth regulators and how they modify plant physiological processes. Positive influences on major agronomic crops include:

- Preventing lodging in cereals
- Preventing preharvest fruit drop
- Synchronizing maturity to facilitate mechanical harvest
- Hastening maturity to decrease turnover time
- Reducing labor requirements

We will discuss how plant growth regulators, retardants, and hormones are naturally occurring or synthetically produced compounds and ways and when to apply such obstacles for the benefits of the plants. As a lab in this unit, students will expose several plants of the same species, over the course of a week, to different environmental factors, such as extreme heat, extreme wind, extreme cold, and plant growth hormones. Students will first form a hypothesis as to which treatment they feel will produce the most severe results. Students will then evaluate plant appearance before and after the trials, and come to conclusions as to which plant parts were affected most by each treatment, and why this caused it the results it did.

Unit 12: Pests and Diseases

In this unit, students will come to understand the life cycles of insects, invertebrates, and arachnids that can harm a plant. This unit will also expose students to diseases that plants can develop and how to manage and cure the situations. Lastly, an undesired plant in any given area is a weed; therefore, management of weeds will also be part of this unit. Emphasis will be placed on control of plant pests and diseases through natural, biological, and inorganic means. Students will first be asked to take a closer look at the planter beds they have been managing for the past few weeks, and examine what signs of insects or pests they see on their own crops. Students will research and then explain orally and in writing what biological control, a weed, and integrated pest management mean. I expect students to know at least three insects, one plant disease, and one weed that can be effectively controlled without man-made chemicals. Safe applications and EPA laws surrounding the use of pesticides, insecticides, and herbicides will be emphasized. As a class, we will also describe the six ways an insect can be killed by insecticide. The life cycle of insects is studied because timing insecticide application determines the effectiveness of the population control. Students will review the labels on pesticides, insecticides, and herbicides, and then determine the correct ratios used by professionals to avoid toxicity for the plants, animals, and humans. Based on their own inquiry into their individual pest problems, students will develop non-toxic, biological insecticides at our school site to combat common pests, but only if needed. Most pest and diseases are attracted to plants that are already suffering from poor health. We will keep a healthy crop and this is the first prevention method in combating all pests and diseases. During their unit-long project, students will first be posed the question: "How can we keep our planter beds pest-free?" Students will be required to make a collection of five different preserved insect specimens, as well as three different weeds or diseases, from each of their planter beds, thereby identifying the organisms in their planter bed's "cropping system." Students will then research management of each pest species and present their findings to the class, who, along with the teacher, will evaluate the feasibility of this management plan according to a rubric.

Unit 13: Soil Chemistry and Water

In this unit, we will study the medium that plants need for anchoring and meeting their nutritional needs. The guiding question for inquiry in this unit will be "How does soil affect the way that plants grow, and how can we amend a soil that is poor?" A discussion of soil and how it is created is vital before we can discuss soil chemistry and soil water capacity. Students will know the differences in a soil profile from place to place and how soil horizons can differ as well. A review of chemistry will be included in this unit as we discuss soil pH and the ability to change a soil's pH to help a crop in need. Students will also describe the relationship between soil properties and plant growth. Since most plants obtain their water from the soil, water relations are important to discuss when talking about soils. Therefore, concepts such as field capacity (FC), permanent wilting point (PWP), and permeability need to be addressed. Additional soil chemistry concepts included in this unit are cation exchange capacity (CEC) and sodic/alkaline soils. In an effort to demonstrate that water is a precious resource, students will be exposed to xeriscaping. Students will describe the basic concept of xeriscaping and other ways soil can be improved to conserve water. By the end of this unit, students will identify plants that can be used in a xeriscape setting. The use of mulches and how to calculate the volume of mulch needed to cover a landscape bed is also important in this unit. Students will calculate how much mulch will be needed to cover our edible garden. Lastly, we will also create soil medium that is used commonly used in the industry. As an interactive unit-end lab, students will be given several components of man-made soil mixes (including several man-made fertilizers as well as organic materials), and given a set of parameters, will be asked to create an ideal mixture of those materials to suit a specific plant's needs, based on what they know about soil characteristics. This will require research the day before the lab is performed, and as such, this will be a multiple-day lab.

Unit 14: Pruning

Let's put to use the small grape vineyard and citrus orchard described earlier in the edible garden unit. Annually, this orchard will need to be pruned and we would like to use that time for a teachable moment once again. As a class, students will describe reasons for pruning and the 4 types of pruning styles. Along with this, students will have to demonstrate the proper angle placed on a stem when pruning during several class periods out on the school farm, and will be responsible for the pruning decisions for one tree per student, which will require both practice and research on the student's part on how and when to properly prune their specific plant. Timing is important when pruning, so this unit might have to be moved ahead to ensure proper pruning and procedure for the benefit of the orchard. Pruning techniques will also be discussed for the following ornamentals:

- Deciduous spring flowering shrubs
- Summer flowering shrubs
- Broadleaf evergreens
- Conifers

Unit 15: Fertilizers

Using our edible garden as our laboratory, students will learn about the macro- and micronutrients needed for successful plant growth. Taking the data from the soil samples the students took earlier in the year, students will develop a fertilizer plan for their garden plots. Students will need to adjust their plans based on the plants they have planted in the garden. Some crops require more nitrogen, while others require more potassium. Students will research the best fertilizer practices for their specific crops that they will need to utilize in able to receive the best yields. Both organic and inorganic applications will be discussed and as a class, we will decide whether or not to have an organic or inorganic fertilizer application program for each planter bed. The class will work as a group, this time around, to make management decisions about fertilizing each crop.

Unit 16: Turfgrass

Southern California is home to many country clubs, resorts, public parks, and hotels with their own premium golf courses. Home owners in this immediate area also continue to have lawns at their homes, so lastly, we will explore the career opportunities for students in turfgrass management. For this unit, students will first list reasons for establishing and maintaining a lawn. Then, as a class, we will explore how one would establish proper drainage and what materials are used to increase the organic matter in a new lawn. The class will differentiate between warm season and cool season grasses, and the 3 ways turf grasses are started in the United States. After this, as a class, we will follow a procedure to seed, and then maintain, our own lawn. All management decisions and practices will be performed by the students, based on the information they gathered and researched independently throughout this unit. They will be informed at the outset of the unit that they will need all the information coming to properly manage their own lawn.

Writing Assignments (REQUIRED):
Give examples of the writing assignments and the use of critical analysis within the writing assignments.

Agriscience Fair Project - Gives students an opportunity to utilize the scientific method and apply as it as they

develop their own experiment; they will test a hypothesis, develop a procedure, record their data, and publish their conclusions. The students will write a research paper, which provides background knowledge on the reasoning for their hypothesis. Students are to create a science fair display that showcases their inquiry. Students will also submit a written 10-15 page report of their research and testable hypothesis, procedures, data, results, and conclusion.

Careers in Horticulture Presentation - Students will first take a personality and/or aptitude test to determine their strengths. Then, they will read and discuss the article: "The Future Can Start in the Garden" by Cynthia Domenghini, NGA Staff (http://www.kidsgardening.org/article/future-can-start-garden). Through this article, students will get inspired about jobs they traditionally have not considered in horticulture. Students will conduct research regarding a particular career and create a presentation. Students can choose the means of oral presentation and display (PowerPoint, internet-based, newscast, etc.). Creativity is encouraged as to how to present. All information must be cited with the appropriate APA format. The purpose of this activity is to encourage students to consider horticulture as a career to expose students to a field they may have not considered before.

Research Paper - It is a thesis-driven exploration of thoughtful reading on a particular subject. The reading material may come from several sources. The purpose is to find and compile data, to participate in an exploration of the data, to make original observations, to show relationships between data, and to make evaluations on a subject. Students will write papers on various subjects throughout the year that will reinforce the main concepts in horticulture.

Student Reflections - Every week students complete a self-assessment to build internal understanding of their mastery of core concepts within the prior week's lessons, to build an individual plan for gaining mastery where it may not yet exist, and to link the learning of the week to prior concepts.

In-Class Lab Write-Ups - Students will be expected to form a hypothesis for every guided inquiry activity or lab that we do in class. This means writing up their procedure, their materials list, and conducting research on their particular question before doing the experiment in class. After each experiment or activity concludes, students will be expected to summarize their findings and data in a full lab report, using a rubric created by the teacher to help them remember which crucial components to include in their report. Students will be instructed how to use proper APA formatting when citing sources and how to write scientific papers (compared to expository essays).

INSTRUCTIONAL MATERIALS (REQUIRED)	
Textbook #1	
Title: Introductory Horticulture	Edition: 7th Edition (or current edition)
Author: H. Edward Reiley and Carroll L Shry, Jr.	ISBN: 1435480392
Publisher: Delmar Publishers	Publication Date: 1997
Usage: X Primary Text X Read in entirety or near	
Textbook #2	