

Plant and Soil Science Curriculum Guide

**Central Valley Consortium
Agricultural Education
Tech Prep**

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** These documents/appendices were inserted into this guide in their original form and therefore the page numbering which pertains to these documents is not truly accurate. The page numbering in this table of contents indicates where the new appendix begins. Most of the appendices are longer than one page. However, since we have included original copies, we did not want to alter them by arbitrarily placing page numbers at the bottom.*

SECTION ONE

Introduction



Introduction

Plant and Soil Science Tech Prep is a 4 year sequence that encompasses the last 2 years of High School, Junior Grade 11 and Senior Grade 12, and the first 2 years of Community College, Freshman Grade 13, Sophomore Grade 14. Expectations are that students will have been enrolled in agricultural education courses at the beginning of their high school tenure. Curriculum Grids have been developed to encompass these first two years of High School as well as the Tech Prep Sequence Grades 11 through 14. These Grids have several expectations of the Tech Prep Identified Student:

1. Completion of the Basic Core I and II at the Freshman and Sophomore High School Level.
2. Completion of Applied Academics courses throughout the 4 years of High School.
3. Fulfillment of the Tech Prep Admissions requirements, including passing the Ag Basic Core with a "C" grade or better, a Student Portfolio containing a Letter of Introduction, Resume, Letter of Recommendation, job application, four work samples including the Ag Record Book, Supervised Practical Experience Evaluation, earn a score of "Proficient" or "Advanced" in the Ag Basic Core Written Scenario Evaluation.

Provisions will be made to accommodate special population groups and a procedure will be developed to remediate deficiency areas.

There are also Grids to accommodate the various options to High School students so that Tech Prep involvement is obvious and attainable. These options include:

College Prep/Tech Prep
Traditional Agriculture Program and Tech Prep
Sports and Tech Prep
Agricultural Mechanics and Tech Prep

All the grids provide options that allow a student to become involved in Work-Place Learning, fulfill University of California or California State University entrance requirements, as well as develop Tech Prep foundations to carry to the Community College Tech Prep Program.

Plant and Soil Science Tech Prep has been divided into 3 distinct courses at the high school level, Crop Science, Fruit Science and Soil Science. These courses are based on the Advanced Cluster Curriculum in Plant and Soil Science, developed by teams of California agriculture instructors led by Dr. James Leising through a special State Department grant with University of California, Davis. Grades 11 and 12 curriculum encompass the Plant and Soil Science Curriculum Units and provides the basic skills necessary to be successful in the Plant and Soil Science Field. These year long courses of study are also based on the Advanced Cluster Curriculum in Plant and Soil Science.

The state also provides Agriculture Performance Standards in Plant and Soil Science. Along with these Performance Standards are Integrated Activities that are used to teach and enhance classroom instruction. One of the tasks that was necessary was to identify which units of instruction fulfilled the Performance Standards and which of the Integrated Activities could be used to augment the classroom instruction. A complete explanation is included in "Developing Tech Prep Curriculum".

High School courses, using the Advanced Cluster and State Standards and Integrated Activities, taught correctly and with sufficient levels of instruction and skill development, may approximate an introductory course at the Community College level. In those cases, where a course articulation agreement is part of the Tech Prep Program, students may receive college credit for the course taken at the high school level. Schools must agree upon the methods of assessing competency in order for this to take place. When Tech Prep articulation functions as intended, it provides for eliminating duplication in the 4 year sequence for the specific career pathway. In addition, other college credit may be awarded for leadership activities, Supervised Practical Experience and Work-Place learning activities, and other areas where duplication is unnecessary.

At the Community College level, the student has many options. Suggested Technician Certificate programs in Plant and Soil Science could be in the areas of Crop Science, Fruit Science and Soil Science. Grids for these are provided. In addition, many students transfer to institutions that grant Bachelors Degrees. Tech Prep programs must provide educational foundations for success as students transfer. It is possible for a student to attain an Associate (2 yr.) degree, a Technician Certificate and then transfer to a University. This may take the student an extra semester but is well worth this level of accomplishment.

Work-Place Learning is an integral part of all Tech Prep Programs in Agriculture. As such, the specific Tech Prep Grid allows for time in the school day for these activities in the High School Senior year. The remaining grids offer options that allow a student to be involved in Tech Prep and meet other personal and educational objectives. For these students, there may not be sufficient time within the traditional school day to be involved in Work-Place Learning. In both of these cases, work-place learning can occur after the traditional school day is finished, on weekends, during vacations, and summer breaks. This can be facilitated through independent study or work experience classes which also allow students to earn graduation credits.

Work-place learning begins in the High School Freshman year with Supervised Practical Experience opportunities which is also a requirement of Ag Tech Prep. These are often entrepreneurial enterprises and usually continue throughout High School. Paid Work Experience (SPE) usually commences during the Junior Year and continues through college. At the Community College level, work experience that is directly related to the career path is required. The number of hours varies by program and institution. Work-place learning enhances the educational process and provides needed job survival skills. This procedure is outlined in the Work-Place Learning Guide, "Learning to Work-Working to Learn".

Finally, Tech Prep is a partnership between High Schools and Community Colleges, Teachers and Counselors and Administrators, Industry Representatives and Students and Parents. In order for success to be part of this formula, all parties need to cooperate and work toward a common goal. There are always sufficient reasons why something won't work and individuals willing to point them out. Our task is to MAKE TECH PREP WORK. Curriculum is the most important aspect of this process. It must be current, industry validated, taught by instructors with high levels of expertise and industry experience, enhanced with work-place learning experiences, articulated between high schools and community colleges. Curriculum and the entire educational process must benefit our students with lifelong career options. This is education's role. Sometimes we forget the real function of education...

SECTION TWO

Curriculum

2. Developing Tech Prep Curricula

The following is an explanation of the procedure that was followed in identifying, developing, implementing, and field testing the Plant and Soil Science Curriculum.

The following definitions will be helpful:

State Standards--Agriculture Performance Standards developed by the state and validated by industry in each of the three career paths or clusters. These are the student expectations after having completed specific courses in agriculture.

Integrated Performance Activities--Agriculture Integrated Activities that are used to enhance classroom instruction and are a hands-on, problem solving approach to education. They were developed to provide methodology to fulfill the State Standards and can be tied closely to them.

Ag I Core--The Basic Core, the state agriculture curriculum intended for the High School Freshman (Grade 9) year. This is a broad overview of all agriculture industries. It is a compilation of curriculum unit outlines complete with objectives, methods, enhancements, and assessments.

Ag II Core--A continuation of the Ag I Basic Core with increasing levels and student expectations. It is designed to be taught at the High School Sophomore (Grade 10) year. It is also a compilation of curriculum unit outlines complete with objectives, methods, enhancements, and assessments.

Advanced Clusters--The three career specific advanced curriculum areas with attendant units of instruction. The curriculum is narrowed to a single career area, of greater depth and expectations, but follows the same format as the Ag I and Ag II Basic Cores. It is intended to be taught in the High School Junior (Grade 11) and Senior (Grade 12) years.

Assumption of Industry Validation--It is unclear exactly how much industry validation occurred in the development of the above. Industry advisory was included in the process through the agriculture instructors who developed the curriculum units. To date there has been no disagreement as to the validity of these units or standards/activities by the Industry Advisory Committees associated with this Tech Prep Consortium.

Local enhancement--Additional activities and/or curriculum that is specific to a particular program and/or is not provided in the advanced cluster.

Supervised Practical Experience (SPE), Supervised Agricultural Experience (SAE), and Supervised Occupational Experience Programs (SOEP), are all synonymous terms that explain the project aspect of FFA and work-place learning. These activities are integral to the instructional program and are extensions of the classroom. Students may be involved in Entrepreneurial Enterprise Ownership Projects and/or Work Experience Projects. In both cases the activities should be directly related to the student's career pathway and are closely monitored and supervised by the agriculture instructor.

Steps Followed in Developing the Plant and Soil Science Tech Prep Curriculum

Step 1

Identify that a curriculum exists and validate that it is appropriate for Ag Tech Prep Programs. Resulted in adopting the California State Agriculture Curriculum, Plant and Soil Science Advanced Cluster.

Step 2

Identify if there existed a set of adopted standards that could be used in curriculum direction and assessment. Resulted in adopting the State Agriculture Performance Standards in Plant and Soil Science.

Step 3

Identify if any other materials had been developed to enhance the educational and validation process. Resulted in adoption of State Agriculture Integrated Activities in Plant and Soil Science.

Step 4

Articulate (match) the State Standards and the Integrated Activities into logical pairs or groups.

Step 5

Articulate the State Standards, Integrated Activities, and Advanced Cluster Curriculum Units. This validates what curriculum units fulfill which standards and provides integrated activities for inclusion with the teaching unit. This many-faceted approach builds higher student competency levels and critical-thinking problem-solving skills.

Step 6

Identify additional integrated activities that can be used with the curriculum to attain completion of State Standards.

Step 7

Identify if the curriculum breaks itself down into logical groups of units and subsequent courses of instruction. The Plant and Soil Science Curriculum is divided into three courses: Crop Science, Fruit Science and Soil Science.

Step 8

Identify if the time allocated for teaching each unit is reasonable given the inclusion of integrated performance activities and local enhancements. After reviewing the curriculum, it was apparent that the time allocated to each unit was not sufficient to cover the material. It was determined that each of the three courses would be better taught as year long courses.

Step 9

Identify if any additional curriculum units were needed to complete the State Standards expectations. None were identified.

Steps followed in developing the Plant and Soil Science Tech Prep Curriculum continued...

Step 10

Take each course and sequence units of instruction into a logical sequence of increasing complexity and expectations.

Step 11

Identify additional integrated activities for either new units or to enhance already developed curriculum units of instruction. Identify any local enhancements that will enrich the curriculum for specific programs.

Step 12

Field-Test curriculum units, integrated performance activities, and assessment tools. Develop Written Scenarios, Work Samples, additional units of instruction, additional integrated activities, and generally identify if the curriculum functions as intended in the time frame allowed.

Step 13

Make adjustments to the curriculum to reflect the field-test evaluations.

Step 14

Identify if the course curriculum and materials are of sufficient scope, level, expectations, to approximate an available community college course.

Step 15

Articulate the Advanced Cluster courses with specific college courses. Identify which college courses can be approximately duplicated through instruction at the secondary level. Develop skill lists and objective expectations for the college course for student assessment and certification. Augment the existing high school units with additional curriculum, integrated activities, local enhancements and skill expectations to fulfill the college course objectives and requirements.

Step 16

Provide a system for developing high school and community college course articulation agreements.

Step 17

Document this process so that others may use this model for development of Plant and Soil Science Tech Prep Programs. Provide adaptability so that other individuals and institutions may choose portions of this process and developed materials to augment their existing programs. At the same time, provide a complete model that schools can use to develop a new Plant and Soil Science program with little additional resources needed.

Tech Prep Curriculum Flow Chart

Career Path Cluster Performance Standards for Plant and Soil Science

B.1 Plant Classification

Students will understand the principles of plant classification and identify plants using a simple botanical key.

B.2 Plant Cell Components

Students will understand cell functions and will identify and describe cell components. They will understand the principles of plant inheritance, which will include the structure and role of nuclear and cytoplasmic DNA.

B.3 Plant Physiology and Growth

Students will understand the principles of plant physiology and growth. They will describe the factors which influence plant growth including water, nutrients, and air.

B.4 Plant Reproduction

Students will understand the difference between sexual and asexual reproduction in plants. They will demonstrate techniques for successful plant propagation. They will understand the concepts of ploidy, diploid-somatic cell, haploid-reproductive and multiploid cells.

B.5 Plant Pathology and Pests

Students will understand basic plant pathology and pest problems and their respective economic impacts. They will identify the types of pathogens and pests that affect plants. They will describe the symptoms of disease and insect damage and methods of management including genetic resistance.

B.6 Soil and Water Management

Students will understand the effective management practices used in irrigation, drainage, tillage, soil and water conservation. They will describe the practices necessary to effectively manage, and conserve soil and water.

B.7 Cultural and Harvest Practices

Students will understand crop management and production practices. Students will demonstrate local cultural techniques including pruning, fertilization, planting, irrigation, harvesting safety, and marketing practices.

B.8 Equipment Management

Students will know how to maintain and repair tools and equipment used in plant production operations. They will demonstrate the skills necessary to service and repair equipment and maintain tools.

B.9 Biotechnology

Students will understand the principles of tissue culture and gene transfer in plant breeding as compared to conventional plant improvement and resistance procedures. They will understand the concepts of haploid plants obtained via anther/microscopic culture, protoplast fusion and gene transfer. They will understand the concept of ploidy, diploid-somatic cell, haploid reproductive and, multiploid cells.

B.10 Record Keeping

Students will demonstrate an understanding of the principles of record keeping utilizing a variety of methods and systems. They will explain the differences between production and financial records.

B.11 Interpersonal Leadership Development

Students will recognize the traits of effective leaders and participate in leadership training activities associated with the FFA, including public speaking, leading group discussions, working within a committee, conducting business meetings, and problem solving.

B.12 Supervised Practical Experience Project

Students will understand the relationship between a supervised practical experience project (SPE) and their preparation for a career in agriculture. They will engage in a supervised practical experience employing skills and knowledge learned in the classroom. Students will maintain an on-going recordbook.

Career Path Integrated Performance Activities for Plant and Soil Science

California Agriculture Curriculum Academic Framework Reference Key

Introduction:

The California Agriculture Curriculum is designed to enable students to explore and prepare for careers in agriculture while reinforcing core academic skills in the areas of English-Language Arts, History and Social Science, Mathematics and Science. Most of the performance standards also apply academic performance standards from the various academic frameworks. The following key has been developed to identify the areas in which the California Agriculture Performance Standards and Integrated Activities also meet program standards in English-Language Arts, History and Social Science, Mathematics, and Science.

A unique identification system has been developed to index the standards in the academic core frameworks. The academic core areas are identified by a three letter code as listed below. The science framework is divided into the areas of Physical, Earth, and Life Science and are identified individually.

ELA	-	English-Language Arts
HSS	-	History-Social Science
MAT	-	Mathematics
PHS	-	Physical Science
EAS	-	Earth Science
LIS	-	Life Science

Each framework is divided into sections designated by capital letters, and individual performance standards within each section are assigned numbers. For example:

ELA: B-1 refers to English-Language Arts, section B, standard I. The text of the standards can be found in the pages which follow. The text of ELA: B-1 reads: "Students draw on their past and present experiences as they listen, speak, read, and write."

Resources:

English-Language Arts: Model Curriculum Guide, California State Department of Education, Sacramento, CA: California State Department of Education, 1988.

History-Social Science Framework. History-Social Science Curriculum, Framework and Criteria Committee, Sacramento, CA: California State Department of Education, 1987.

Mathematics Model Curriculum Guide. California State Department of Education, Sacramento, CA: California State Department of Education, 1987.

Science Framework for California Public Schools: Kindergarten Through Grade Twelve. Science Curriculum Framework and Criteria Committee, Sacramento, CA: California State Department of Education, 1987.

B. Plant and Soil Science

B.1 Fruit Tree Judging

Given three or four classes of fruit trees (four trees per class), and a scorecard from the California Agriculture Teachers Association Curricular code, students individually place trees in each class. Students use the following criteria: size of tree including its trunk circumference, height and branch spread; framework scaffolding and symmetry; pruning technique; health and vigor; and condition of fruiting structures. Students present oral reasons to the instructor or peers along with the completed scorecard.

Related Standards:

Career Performance: 1, 3, 4

Career Path Cluster: B.1,7

ELA B.2; C.1, 2, 6; D.1; E.1

B.2 Tree or Vine Pruning

Given four unpruned trees or vines, each of the students prune three of these trees or vines within a pre-determined period of time. Students prune the fourth tree or vine for the teacher while explaining their actions.

Related Standards:

Career Performance: 1, 3, 4, 5

Career Path Cluster: B.3, 5, 7

ELA B.2; C.1, 2, 6; D.1, 2

LIS A.4

B.3 Plant Collecting for Classification

Students collect and properly mount ten agronomic plants from the local area and identify each in correct descending order by Kingdom, Division, Class, Order, Family, Genus, and Species. Students then utilize the collection to discuss the importance of taxonomy in varied agricultural fields and explore career opportunities which utilize taxonomy.

Related Standards:

Career Performance: 1, 3, 4, 6

Career Path Cluster: B.1

ELA B.2; C.1, 2; D.1

MAT F.1, 3

LIS A.3

B.4 Soil Evaluation and Management Laboratory

Students are each given a soil sample and information about the climate, topography, soil depth, and soil classification from which the sample was drawn. Students write a report in which they discuss the most effective management techniques for the soil sample. Each paper is to address soil conservation techniques, irrigation practices, and recommendations for economically viable crops to be cultivated. An oral presentation is given before a panel of agriculturalists in which the students explain the reasons for their choice based upon the soil information and discuss cultural and harvesting practices of the recommended crop. Time is allowed for questions and answers at the end of the presentation.

Related Standards:

Career Performance: 1, 3, 7

Career Path Cluster: B.3, 6, 7

ELA B.2; C.1, 2; D.1

LIS C.3, 4

B.5 Pest Identification and Management Laboratory

Students are placed in teams of three or four and perform a weekly sweep of a local crop for pests. Using microscopes and entomology books they identify insects by name and categorize them as beneficial or harmful. Students develop a weekly graph to show changes in insect populations over time. Individually, students prepare a pest management program including a timeline. A Pest Control Advisor then reviews their recommendations, discusses the proposed actions, and offers alternative solutions. The instructor (or pest control advisor if available) share these recommendations with the class in the form of a class discussion.

Related Standards:

Career Performance: 2, 3, 4
 Career Path Cluster: B.3, 5, 7
 ELA B.1,2; C.1, 2; D.1, 2, 5
 MAT A.1, 2, 3, 4; E.1, 2, 3, 4, 5
 LIS A.3, 4; C.4

B.6 Plant Cell Components

Using the school site as a model of a cell, students choose buildings, objects, and/or people to represent the different components of the cell (e.g. nucleus equals office or principal.) Students then draw their representations of the components and, in a question and answer session, justify the rationale behind their choices.

Related Standards:

Career Performance: 3, 4
 Career Path Cluster: B.2, 3
 ELA B.2; C.1, 2; D.1, 2
 LIS B.1

B.7 Plant Propagation Lab

With a partner, students plant the seeds of a given plant along with cuttings from a mature example of the specie. In a journal, students individually record pertinent data (i.e. planting date planting depth, cutting height and other observations). Data is collected for a period of at least 6 weeks. Students present their graphed results in a short oral report, explaining the importance of sexual and asexual propagation to the agriculture industry.

Related Standards:

Career Performance: 1, 2, 3, 4
 Career Path Cluster: B.3, 4, 7
 ELA B.2; C.1, 2; D.1, 2, 5
 MAT A.1, 4; B.1
 LIS A.2

B.8 Pesticide Labels as Safety Tools

Given sample pesticide labels, students identify the major components of the pesticide and categorize the components by level of toxicity (danger, warning, caution). Students then choose one label, and with further research, give an oral presentation on its toxicity and methods of application. During the presentation, students demonstrate the use of safety equipment appropriate for the material.

Related Standards:

Career Performance: 3, 4, 5, 7
 Career Path Cluster: B.5, 7
 ELA B.2; C.1, 2; D.1, 2, 5

B.9 Crop Analysis

Using the local community as a laboratory, students working in teams of three or four are given a crop which is not growing at an optimal level. After spending time in the field, the students write a report on possible causes of this lack of productivity, and steps to correct the situation. A Farm Advisor is then invited to visit the class and discuss with them what steps he/she would advise and the economics of the proposed solutions. Following the Farm Advisor's visit, students orally present and justify their recommendations to the teacher acting as the property owner.

Related Standards:

Career Performance: 2, 3, 4, 6
Career Path Cluster: B.5, 6, 7
ELA B.1, 2; C.1, 2; D.1, 2
LIS A.2

B.10 Pesticide Emergency Response

Given a hypothetical situation in which a person has been exposed to a dangerous pesticide, students work in groups of two or three to role play emergency procedures dealing with first aid including evaluating the situation, calling 911, giving an exact location, and preventing further injury.

Related Standards:

Career Performance: 1, 2, 3, 4, 5
Career Path Cluster: B.5, 7
ELA B.2; C.1, 2

B.11 Vegetable Evaluation

Given four classes of four plates of vegetables each student individually evaluates and places class (using the score sheet on page B 9-7 of the California Agriculture Teachers Association Curricular Code). Students present oral justifications for their placings. Students write a report discussing the plate that they placed last. This report should primarily deal with the reason they placed the plate last and what the producer could possibly have done culturally to improve the marketable quality of the vegetables in question.

Related Standards:

Career Performance: 1, 3, 4
Career Path Cluster: B.3, 5, 6, 7, 10
ELA B.2; C.1, 2; D.1, 2
LIS A.4

B.12 Soil Judging

Using the California Agriculture Teacher's Association approved soil judging scorecard, students pair off and evaluate a soil profile and justify their findings to the instructor or class. Following this activity, students individually judge soil profiles at three different locations and return their completed scorecard to the instructor.

Related Standards:

Career Performance: 1, 2, 3, 4
Career Path Cluster: B.6, 7
ELA B.2; C.1, 2; D.1, 2

B.13 Photosynthesis and Light

In groups of two to four, students vary the amount of light a group of plants receives. Students predict plant responses at the onset of the project. In a journal, students individually record pertinent data during the four-week trial. All plant responses are graphed and an analysis of the results, relative to the photosynthetic process, is included in a written report.

Related Standards:

Career Performance: 1, 2, 3, 4
Career Path Cluster: B.2, 3
ELA B.2; C.1, 2; D.1, 2, 5
MAT B.1-4
PHS A.3; D.1; G.1
LIS A.1, 2, 4; B.1; C.1, 2, 3

B.14 Soil Science Activity

Students in groups of 3 or 5 compare and contrast drainage and water holding capacity for several soil types from their local area or prepared soil mixes. Using information and suggestions from local agriculturists students

determine the effects of adding various organic and inorganic soil amendments on drainage and water holding capacity. Students deliver an oral presentation using their graphs and make suggestions for possible soil improvement in their area.

Related Standards:

Career Performance: 2,3, 4, 7

Career Path Cluster: B.3, 5, 7

ELA B.2; C.1, 2; D.2

MAT A.1; B.1, 2

B.15 Pest Management Activity

Students in groups of 2 or 3 work together to develop a perspective on how pest management has changed over the past 30 years (or so) for a particular crop in their area. Students address the changing laws surrounding various pesticides and their application, as well as the use of non-chemical means of pest management, and how those methods are being used. Using information from local agriculturists, students attempt to anticipate upcoming changes and regulations in pest control. This information is submitted in the form of a report, with each student being responsible for a designated portion of the research.

Related Standards:

Career Performance: 1, 2, 3, 4, 6, 7

Career Path Cluster: B.5, 6

ELA B.2; C.1, 2; D.1, 2

EAS B.4

LIS C.4

B.16 Vegetable Quality Activity

Students choose a vegetable and identify, evaluate and compare and contrast field damage and mechanical damage. Students explain how the damage is caused, the effect of the damage on sales, and ways in which it may be prevented. Students illustrate the problem with drawings and graphs and deliver a presentation to the class.

Related Standards:

Career Performance: 1, 3, 4

Career Path Cluster: B.3, 5, 6, 7

ELA B.2; C.1, 2; D.1, 2, 5

HSS G.1

B.17 Rose Pruning

Given 2 unpruned rose bushes, each of the students prune the roses within a period of 10 minutes. Students prune the two roses for the teacher while explaining their actions.

Related Standards:

Career Performance: 1, 3, 4

Career Path Cluster: B.3, 7

ELA B.2; C.1, 2; D.1, 2, 5

B.18 Pruning Activity

Given a landscaped area, each of the students prune two different species of plants in 15 minutes. Students prune the two plants for the teacher explaining their actions.

Related Standards:

Career Performance: 1, 3, 4

Career Path Cluster: B.1, 3, 5, 7

ELA B.1; C.1, 2; D.1, 2

B.19 Equipment Servicing Activity

Using a small engine the students will service air filters, change oil, and spark plug(s), and make general observations of maintenance needs including loose bolts, shields, hand hoses.

Related Standards:

Career Performance: 1, 3, 5, 7
Career Path Cluster: B.8, 10
ELA C.2

B.20 Propagation/Gene Transfer by Seed and Cuttings

Students germinate a cross pollinated viable seed and, from the same plant, asexually propagate a vegetative part. They collect data on plant development and resemblance to parent plant. Students present their findings in written and/or oral reports. Students may work individually or in groups.

Related Standards:

Career Performance: 2, 3, 4, 7
Career Path Cluster: B.4, 9, 10
ELA C.2
MAT B.1, 2
LIS B.2

B.21 Tissue Culture

Using commercially produced material, students prepare tissue cultures. Students grow cultures to marketable plants. Following the scientific method, students collect, analyze and evaluate data (i.e. growth rate, number of plants produced, and plant development). Students report the process back to the class in an illustrated presentation.

Related Standards:

Career Performance: 1, 2, 3, 4, 7
Career Path Cluster: B.3, 4, 7, 9, 10
ELA B.2
MAT B.1, 2
LIS B.2, 4

B.22 Record Keeping

Students produce a crop of chrysanthemums to sell, keeping financial and operational records. The students utilize the California Vocational Agriculture Record Book to maintain these records.

Related Standards:

Career Performance: 1, 3, 4
Career Path Cluster: B.10
ELA B.2; C.1, 2; D.1, 2
HSS G.1
MAT A.1, 2, 3, 4

B.23 Supervised Practical Experience Discussion

In career pathway groups, students reevaluate their career goals and discuss their Supervised Practical Experience in relation to their career goals.

Related Standards:

Career Performance: 1, 2, 3, 4, 6, 7

Career Path Cluster: B.11, 12

ELA B.2; C.1, 2; D.1, 2

B.24 Crop Management Activity

Students select a crop (tree, row, or field) and develop a management plan for one year of operation. Included will be a complete budget comprised of production costs and income expectations. A report will be submitted (video, written, oral, slide).

Related Standards:

Career Performance: 1, 3, 4

Career Path Cluster: B.3, 5, 6, 7, 8, 10, 11; C.1, 3, 6

ELA B.2; C.1, 2; ; D.5

HSS G.1

Sequenced Units

Plant and Soil Science Suggested Sequence of Advanced Cluster Curriculum Units

Plant and Soil Science Course (Grade 11 or 12)

- 7100 Botanical Classification**
(CLF7101) Plant Classification
- 7150 Plant Cells**
(CLF7151) Plant Cells
- 7200 Physiology and Growth**
(CLF7201) Functions of Plant Structure
(CLF7202) Basic Plant Growth Req.
(CLF 7203) Monocots and Dicots.
(CLF7204) Climatic Factors Affecting Plant Growth
(CLF7205) Seed Germination
- 7250 Plant Reproduction**
(CLF7251) Sexual Reproduction
(CLF7252) Asexual Reproduction
- 7300 Photosynthesis & Respiration**
(CLF7301) Photosynthesis and Respir.
- 7350 Plant Pathogens and Pests**
(CLF7351) Integrated Pest Mgt.
(CLF7352) Plant Pathology
(CLF7353) Insect Biology
(CLF7354) Weed Control
(CLF7355) Safe & Eff. Use of Chem.
(CLF7356) Insect Control
- 7400 Soils**
(CLF7401) Introduction to Soils
(CLF7402) Soil Forming Factors
(CLF7403) Horizon Text. & Struct.
(CLF7404) Basic Soil Components
(CLF7405) Soil Organisms
(CLF7406) Organic Matter
(CLF7407) Soil Environment
(CLF7408) Soil Compaction
(CLF7409) Soil Moisture
(CLF7410) Soil Water

(CLF4111) Soil Classification System
(CLF7412) Mgmt. Practices for Sandy & Organic Soils

7450 Plant Growth

(CLF7451) Micronutrients
(CLF7452) Sources of N, P and K
(CLF7453) Nut. and Plant Growth
(CLF7454) Reading the Label
(CLF7455) Soil Amendments
(CLF7456) Uses of Fertilizers
(CLF7457) Symptoms of Deficiencies
(CLF7458) Determining of Nutrient Def.
(CLF7459) Methods of Application

7500 Soil Tillage, Land Preparation and Conservation

(CLF7501) Tillage, Land prep. and Conservation
(CLF7502) Use of Herbicides
(CLF7503) Crop Residues and Green Manures
(CLF7504) Root Interaction with the Soil
(CLF7505) Erosion

7550 Irrigation

(CLF7551) Irrigation and drainage
(CLF7552) Irrigation
(CLF7553) Irrigation Measurements
(CLF7554) Soil Water

7660 Pruning

(CLF7601) Purposes of Pruning
(CLF7602) Pruning Terms
(CLF7603) Use and Maintenance of Equipment
(CLF7604) Pruning Systems
(CLF7605) Time of Pruning
(CLF7606) Establishing Scaffolds
(CLF7607) Treating Pruning Wounds
(CLF7608) Pruning Grapevines
(CLF7609) Pruning Evergreen Fruit Trees

7650 Harvesting California Crops

(CLF7651) Harvesting Crops in CA

<p style="text-align: center;">PLANT AND SOIL SCIENCE INDUSTRY SKILLS</p>
--

A. CROPS AND SOILS SKILLS

Physical Skills

1. Repair and operate forage crop mowers
2. Adjust hay rake
3. Make irrigation ditches
4. Control weeds
 - a. Cultivation
 - b. Spraying
 - c. Clipping
5. Fumigate
6. Select and apply fertilizers
7. Select and apply insecticides and pesticides
8. Irrigate
 - a. Furrow
 - b. Flood
 - c. Sprinkler
9. Thin fruit and crop plants
10. Take soil samples
11. Operate special machinery
 - a. Hay baler
 - b. Spray rig
 - c. Potato digger
 - d. Walnut shaker
 - e. Manure spreader
 - f. Lime spreader
 - g. Ensilage cutter and field chopper
 - h. Corn picker
12. Use surveying instruments
13. Plant trees and crops
14. Prepare flats for seed planting
15. Mix soil for seed plants
16. Regulate thermostats for hotbeds
17. Land level
18. Build fences
19. Transplant from hotbeds or flats to field
20. Plant cover crops
21. Control rodents with poison
22. Apply mulches
23. Treat seeds
24. Prepare seed beds
25. Use hot caps
26. Plow and cultivate
27. Test seed for germination
28. Fill a silo
29. Test temperature of hay in storage
30. Estimating probable yields
31. Selecting and using harvesting equipment and techniques
32. Estimating moisture content of seeds,

- forage and ensilage
- 33. Using pasture renovation techniques
- 34. Terracing with farm implements
- 35. Using soil sampling tools
- 36. Selecting and applying legume inoculants
- 37. Selecting and using soil reaction testing equipment
- 38. Selecting and using soil fertility testing equipment
- 39. Using moisture testing equipment
- 40. Selecting and using side-dress, top dressing, and ridging techniques
- 41. Applying fertilizer materials
- 42. Using tillage equipment
- 43. Setting plant equipment for desired rate and depth of planting
- 44. Using planting equipment and techniques
- 45. Using cultivating equipment
- 46. Using weed control equipment and materials
- 47. Rogue undesirable plants
- 48. Clean home grown seed
- 49. Set up a tool bar
- 50. Determine seed and fertilizer needed for a given acreage

Managerial Skills

- 1. Estimating capacities of grain bins and corn cribs
- 2. Estimating capacities of various types of silos
- 3. Selecting and using rodent control equipment and materials
- 4. Grading seeds and forages
- 5. Selecting and preparing seed and crop samples
- 6. Planning a pasture rotation
- 7. Estimating pasture carrying capacity
- 8. Laying out a contour line
- 9. Identifying and correcting drainage problems
- 10. Collecting and preparing soil samples for testing
- 11. Identifying types of soils
- 12. Identifying and evaluating soil structures and textures
- 13. Measuring depth of soil layers
- 14. Measuring level of water tables
- 15. Identifying types of erosions
- 16. Determining land use classification of soils
- 17. Preparing a farm map
- 18. Preparing a soils map
- 19. Planning a cropping system

20. Identifying types, kinds, and varieties of crops
21. Identifying parts of plants
22. Identifying weeds (seeds and plants)
23. Selecting varieties of crops to plant
24. Selecting plant seeds
25. Applying for field inspection and seed certification
26. Selecting and using seed treatment devices and materials
27. Selecting and using seed cleaning equipment
28. Selecting and using seed storage and sanitation facilities
29. Selecting and using devices to determine purity of seeds
30. Selecting and using seed germinators
31. Selecting and using seed soaking equipment
32. Identifying mineral deficiencies from plant characteristics
33. Calculating fertilizer requirements
34. Determining readiness-to-till
35. Estimating quantity of seed requirements
36. Selecting distance between rows and between plants to use
37. Identifying and controlling crop diseases and insects
38. Estimating stage of maturity of crops
39. Know state laws on insecticide application
40. Know how to read soil maps
41. Know how to identify some major crop diseases
 - a. Mildew
 - b. Scale
 - c. Crown rot
 - d. Brown rot
 - e. Root rot
42. Lay out test plots and control plots
43. Take a representative sample of grain
44. Figure amounts of fertilizers to apply
45. Figure costs of fertilizers
46. Know kinds of fertilizer needed
47. Plant so crops will pollinate
48. Know how to identify insect damage
49. Know how to detect crop maturity
50. Know where to get information when solving a problem

HORTICULTURAL (FRUIT PRODUCTION) SKILLS

Physical skills

1. Operate dusting machine
2. Make irrigation ditches

3. Control weeds
 - a. Cultivation
 - b. Spraying
 - c. Shredding
4. Fumigate
5. Select and apply fertilizer
6. Select and apply insecticides
7. Apply irrigation water by:
 - a. Furrow
 - b. Flood
 - c. Sprinkler
8. Train and prune trees by hand, mechanically
9. Thin fruit
10. Graft
11. Bud
 - a. "T" budding
 - b. Patch budding
12. Take soil samples
13. Operate special machinery
 - a. Spray rig
 - b. Walnut shaker
 - c. Manure spreader
 - d. Lime spreader
 - e. Almond huller
 - f. Automatic grader
 - g. Automatic grape picker
 - h. Squirrel pruner
14. Prune vines
 - a. Cane method
 - b. Head method
 - c. Cordon method
15. Girdle grapes
16. Start wind machines
 - a. Stationary
 - b. Portables
17. Light orchard heaters
18. Wire trees
19. Shape trees and vines
20. Plant trees
21. Build arbor and trellis
22. String wire
23. Pack fruits
24. Knock almond and other nuts
25. Setting grape stakes
26. Dry fruit-natural and artificial
27. Turn raisins
28. Sulfur fruit
29. Layering
30. Plant cover crops, sod crops
31. Control rodents with poison

32. Renovate old trees
33. Harvest fruit crops by hand, mechanically
34. Prevent pre-harvest drop
35. Thin with chemicals
36. Load for safe transportation
37. Plow and cultivate
38. Operate regular machinery
 - a. Tractor
 - b. Disk
 - c. Chisel and sub-soil
 - d. Ridger
 - e. Scraper
 Pruning Almonds
 - a. Cutting suckers
 - b. Cutting dead wood
 - c. Thinning limbs
39. Bulk handle fruit
40. Make hardwood cuttings
41. Select and apply herbicides

Managerial Skills

1. Know state laws on insecticide application
2. Know how to read soil maps
3. Know how to sort fruits
4. Know how to sort nuts
5. Know how to identify local varieties of fruits and nuts
6. Know how to identify some major crop diseases and pests.
 - a. Mildew
 - b. Scale
 - c. Crown rot
 - d. Brown rot
 - e. Bacterial canker
 - f. Oriental fruit moth
 - g. Twig Boer
 - h. Bark canker
7. Figure amounts of fertilizers to apply
8. Figure costs of fertilizer
9. Kinds of fertilizer needed
10. Recognize common varieties of grapes in this area
 - a. Thompson seedless
 - b. Grenache
 - c. Carignane
 - d. Zinfandel
 - e. Tokays
 - f. Palominoes
 - g. Malagas, Red, and White
 - h. Ruby Cabernet
11. Control diseases and insects

- a. Mildew
 - b. Scale- San Jose
 - c. Aphids
 - d. Worms- Orange Naval
 - e. Red Spider
 - f. Little leaf
 - g. Brown rot
 - h. Peach twig borer
 - i. Leaf curl
 - j. Sunburn
 - k. Nematode
 - l. Virus
12. Know state insurance laws
 - a. Compensation
 - b. Social Security
 13. Know labor laws
 - a. Child labor laws
 - b. Female labor laws
 14. Laws of fruit packing
 - a. Quality
 - b. Size
 - c. Weight
 15. Plants so crops will pollinate
 16. How to use cover crops
 17. Soil culture
 18. Grading fruits
 19. Judge and identify fruits
 20. Select, exhibit for show or fair
 21. Safety measures
 - a. Ladders- picking, thinning, and pruning
 - b. Poison sprays: Parathion, Malathion, TEPP, Copper, Sulfur
 - c. Poison dusts: Lime, Zinc, Bordeaux, Winter Oil, Emulsion Oil
 - d. Special farm machinery--squirrel pruner, hullers, spray rig nut shaker, grape picker, portable orchard heater
 - e. Storage of smudge pot oil, fuel for tractor
 22. Protect young trees
 - a. Tree protectors
 - b. White Latex paint
 23. Cooperative marketing
 24. Contracts with independents
 25. Use of virus-free stock
 26. Use of proper root stocks
 27. Tree planting patterns
 28. Figure headland space
 29. Determining trees per acre
 30. Use of sprinklers
 - a. Frost protection
 - b. Cooling
 - c. Irrigation

d. Fertilizing

SECTION THREE

Community College

Articulated Course

Community College Plant and Soil Science Course Objectives

Topical content Outline (Potential CC/HS Articulated Courses)

PL-SC 200 - Introduction to Plant Science

Catalog Description:

Introduction to plant science including structure, growth processes, propagation, physiology, growth media, biological competitors, and post-harvest factors of food, fiber, and ornamental plants.

Objectives - The student will:

- A. Categorize the roles of higher plants in the living world.
- B. Describing the structural components of higher plants
- C. Recognize the standard plant propagation methods.
- D. Describe sexual and asexual reproduction in higher plants
- E. Explain photosynthesis, respiration, and translocation in higher plants
- F. Describe the physical and chemical properties of soils.
- G. Hypothesize solutions for soil erosion problems.
- H. Describe the climatic influences on plant growth and development.
- I. Categorize the biological competitors of higher plants.
- J. Develop theories for the harvest, preservation, transportation, storage, and marketing of an economic plant.

Content

- A. The Role of Higher Plants in the Living World
 - 1. Fossil fuels
 - 2. Food chains
 - 3. Industrial products
 - 4. Lower forms of plant life
- B. Structure of Higher Plants
 - 1. The life cycle of a plant
 - 2. The cell
 - 3. Cell Structure
 - 4. The plant body
- C. Naming and Classifying Plants
 - 1. Climate
 - 2. Botanical names
 - 3. Botanical classifications
 - 4. Plant taxonomy
- D. Origin, Domestication, and Improvement of Cultivated Plants

1. Origin of cultivated plants
 2. Domestication of plants
 3. Crop plants
 4. Germplasm
 5. Genetic concepts in plant improvement
- E. Propagation of Plants
1. Propagation methods
 2. Sexual propagation
 3. Vegetative propagation
- F. Vegetative and Reproductive Growth and Development
1. Vegetative growth and development
 2. Reproductive growth and development
 3. Plant growth regulators
- G. Photosynthesis, Respiration, and Translocation
1. Photosynthesis
 2. Plant respiration
 3. Electron transport system
 4. Assimilation
- H. Soil and Soil Water
1. Factors involved in soil formation
 2. Physical properties of soil
 3. Chemical properties of soil
 4. Soil organisms
 5. Soil organic matter
 6. Soil water
 7. Water quality
- I. Soil and Water Management and Mineral Nutrition
1. Land preparation
 2. Irrigation
 3. Mineral nutrition
 4. Soil conservation

- J. Climatic Influences on Crop Production
 - 1. Climatic factors affecting plant growth
 - 2. Climatic requirements of some crop plants
 - 3. Weather and climate
 - 4. Climatic influences on plant diseases and pests

- K. Biological Competitors of Useful Plants
 - 1. Weeds
 - 2. Plant diseases
 - 3. Plant pests
 - 4. Nematodes
 - 5. Rodents
 - 6. Pesticide impacts on the environment

- L. Theories of Harvest, Preservation, Transportation, Storage and Marketing
 - 1. Harvesting
 - 2. Post-harvest preservation
 - 3. Storage of raw products
 - 4. Marketing of agricultural products
 - 5. Transporting commodities

The Pathway Specific Program Agreement

The Program Agreement

Of utmost importance in any Tech Prep articulation process is the agreement negotiated and established between the high school and community college. It establishes the responsibilities and provides the details of the working articulation procedure. It identifies the courses and outlines the competencies to be articulated. It establishes procedures for on-going review and evaluation and is signed in good faith by the executives of each institution. The guiding principle of the articulation agreement is to assure the program "in the best interest of the student" recognizes past learning experiences and minimizes repetition of instruction.

To establish a Tech prep curricular agreement, it is essential that the secondary school is using the State approved Model Curriculum Frameworks for the given pathway. The frameworks have been field tested, have the validation of the industry and assure the community college that the student has received instruction in the pathway specific competencies. The community college curriculum can then be developed or modified if necessary to prevent unnecessary repetition of instruction.

Granting of post secondary credits may vary from one community college to another and is a negotiable issue at the local level. Most community colleges require the student to complete at least one additional class in the same pathway before granting credits for the articulated high school program. Generally, students having completed the secondary portion of the four-year pathway sequence are granted "advanced standing" or "continuing student" status prior to registration for their first semester at the community college.

Additional information and specifics in developing articulation agreements can be found in the "Articulation System Guide" developed by the Central Valley Consortium for Agriculture Education Tech Prep.

The following pages show an example of a Program Agreement and certificate of Completion.

Sample Program Agreement

_____ Community College agrees to grant _____ units of credit for PL SC 200, Introduction to Plant Science, to the student meeting the following requirements:

1. Possesses the knowledge and understanding and has demonstrated the ability to perform the skills of the Advanced Core Curriculum of Plant and Social Science as determined by the high school agricultural teacher.

2. Has proven mastery of the following pathway specific competencies:

- Categorize the roles of higher plants in the living world.
- Describe the structural components of higher plants.
- Recognize the standard plant propagation methods.
- Describe sexual and asexual reproduction in higher plants.
- Explain photosynthesis, respiration, and translocation in higher plants.
- Describe the physical and chemical properties of soil.
- Hypothesize solutions for soil erosion problems.
 scribe the climatic influences on plant growth and development.
- Categorize the biological competitors og higher plants.
- Develop theories for the harvest, preservation transportation, storage, and marketing of an economic plant.

3. In addition, the student will:

- Have a basic understanding of agricultural concepts and skills.
- Appropriately complete a job application.
- Use language in accordance with standards of acceptable usage.
- Identify the main idea of an article or publication.
- Have a basic understanding of the research process.
- Demonstrate proficiency in basic mathematical computations.
- Effectively deliver an oral presentation.
- Communicate effectively with individuals and groups.
 nstrate basic computer proficiency.
- Have a basic understanding of record keeping.
- Have the ability to work effectively in a group.
- Have a basic understanding of the metric system.

4. Has received the recommendation of the secondary school agriculture teacher.

5. Presents a portfolio which includes a minimum of:

- A letter of introduction
- Personal resume
- A completed scenario with a "proficient" or better rating
- Two work samples
- Two letters of recommendation

Sample Certificate of Completion

In accordance with the signed Articulation Agreement between

_____ and _____ the below named student

(Community College (High School))

has successfully completed the agreed upon requirements and is hereby recommended for post secondary credits as indicated below with enrollment status of a continuing student.

_____ _____
 (Name of Student) (Social Security Number)

<u>High School Course Completed</u>	<u>Articulated Community College Class</u>	<u>Number of Credits</u>

The student has fulfilled the Tech-Prep Agriculture Pathway requirements of:

- Maintaining a B or better for the competency curriculum
- Successfully completing 80% of the specified competencies
- Maintaining a portfolio that the student is prepared to present to his post secondary agriculture department

On this ____day of____ 199__, the undersigned parties certify the above to be true and accurate.

High School Instructor

Signature

Typed Name

School and District

High School Administrator

Signature

Typed Name & Title

School and District

Student

Signature

Typed Name

School and District

***Note:**

Student's high school transcript must be attached.

SECTION FOUR

Field Testing

Field-Testing The Advanced Cluster In Plant and Soil Science

The Advanced Cluster Curriculum in Plant and Soil Science was field tested by three different schools. The Directory of the California Agricultural Core Curriculum, Advanced Core Cluster: Plant and Soil Science was used for the curriculum topics. Tomales High School instructor Bernard Gregoris evaluated the Soils, Plant Growth and Irrigation units; Tom Perez at Patterson High School tested the Botanical Classification, Plant Cells, Plant Pathogens and Pests and Pruning units; Grace Davis High School instructor Lloyd Bunch field-tested the Physiology and Growth, Plant Reproduction, Photosynthesis and Respiration, Soil Tillage, Land Preparation and conservation, and the Harvesting California Crops units.

Each of the instructors were asked to accomplish several activities in the field-testing process.

1. Evaluate each unit of instruction by teaching the unit and suggesting improvements where needed.
2. Identify if the time frame suggested in the advanced core is sufficient to teach the unit and make adjustments as needed.
3. Evaluate the state framework integrated activities that were used to reinforce the curriculum, determine the feasibility and appropriateness, and to develop any other activities that helped to support the curriculum.
4. Develop authentic assessment tools that included written scenarios, suggested work samples, and any other evaluatory instruments that would demonstrate student competency.
5. Develop any additional curriculum units that were missing from the advanced core if sufficient time was available.
6. Organize the curriculum into a course outline sequence based on this field-test process.

Evaluation Of The Field-Test Process and Results

The general evaluation of the field-testing process in Plant and Soil Science was a positive one. The process emphasized that for Tech Prep to be effective, adequate time must be allocated to teaching the curriculum and this curriculum must be reinforced with hands-on-learning of skills. The activities suggested by the state frameworks may not be appropriate in all school's situations but give a good outline and suggestions of the types of activities that would support the classroom instructional process. Many innovative and effective teachers will want to make changes and/or additions to enhance their local instructional program.

The Activity Log revealed that instructor reactions to the time factors, "Correct," "Too Much" or "too Little", were divided somewhat equally between the three responsibilities.

A wide variety of teaching methods and activities were used during the field test. Among these were examples, samples, hands-on activities, demonstrations, several types of visual aides, tours, calculations and experiments. These methods and activities were effectively balanced with class discussions, question and answer periods and some lecture time. This mixture precipitated admirable results in the test.

The assessment tools used were quizzes, discussion, oral questioning, problem solving, notebook grading and performance evaluation. These are some of the standard and accepted evaluation methods that may be enhanced by industry employee evaluation methods. These industry evaluation methods could be very useful teaching tools in the classroom.

Several comments from those involved in this process surfaced at various times:

1. Tech Prep participation sparked or generated new class projects, activities or ideas.
2. Some curricular content may not be applicable in all communities.
3. Other curricular and co-curricular activities demand some of the instructional time.
4. High school extra-curricular activities are time consuming.
5. The Spring of 1995 had many wet weather interruptions with schools being closed in some instances.

All of the factors experienced in the field-test span of time were within the normal realm of expectations. Following are a few examples of the weekly activity logs.

Curriculum Unit Evaluation (Field Testing)

WEEKLY ACTIVITY LOG #1

Field Test/School Site: Tomales High School
Curriculum Area Plant Science
Unit # covered: CLF7400
Unit title: Soils
Topic covered: Intro 7401, Soil Forming 7402, Horizon 7403 and Components 7404
Time recommended for unit was: 8 Hours
That time was: Too little
Actual time spent was: 11 Hours
Grade level taught: 10th
Rigor of this unit was: 11th
Activities Used: 1.) Lecture 2.) Examples referring to materials presented 3.) Sample of a parent material 4.) Used soil texture triangle, 5.) View a cut in a hillside (Horizons), 6.) Textured soils by hand
Assessment tools used: Quiz using texture triangle, will be using other assessment methods.
Additional comments: Curriculum covers a great amount of information which must be interpreted for students. Last three weeks we have been plagued with numerous school and weather related disruptions. Other curriculum/program activities deadline has delayed progress on the project for example record books, FarWest pilot project, finals, etc.

WEEKLY ACTIVITY LOG #2

Field Test/School Site: Tomales High School
Curriculum Area Plant Science
Unit # covered: CLF7400
Unit title: Soils
Topic covered: Organic matter 7406, Soil Erosion Problems 7407
Time recommended for unit was: 2 Hours
That time was: Too little
Actual time spent was: 2 Hours
Grade level taught: 10th
Rigor of this unit was: 12th plus
Activities Used: 1.) Discussion of information in unit 7406 2.) Test soil PH using different methods
Assessment tools used: Very technical information presented, students, were given a copy of lecture notes. I led a class discussion using oral questioning to check for understanding.
Additional comments: We have a compost bin constructed but is not being fully utilized at this time.

SECTION FIVE

Student Assessment

Introduction To Student Assessment In Tech Prep

What is Assessment? By definition*, assessment involves appraisal & evaluation. Assessment in education not only evaluates what a student understands or skills that he/she can demonstrate but additionally indicates the quality of instruction that was provided. So as we enter the age of "accountability" in education, assessment becomes extremely important to determine the level of a student's understanding and ability to complete a task, as well as the quality of instruction received. Too often in education, students are assessed using paper/pencil written examinations that involve multiple choice, true/false or short essay questions. Most of these assessment strategies utilize a student's short-term memory or ability to memorize facts. Therefore a more realistic approach to assessment has been selected for Tech Prep. Alternative assessment, performance assessment or authentic assessment are all terms that indicate this new approach to assessment.

Authentic Assessment (Performance assessment) is typically defined by a set of performance standards (instructional objectives). Students must show progress towards these standards. Authentic assessment may include many different types of testing approaches that are more typical of real - life settings and allow students to demonstrate their knowledge and skills through creating a product, demonstrating a skill or documenting a process.

Two different types of assessment have been selected for use in Tech Prep for Ag Education. They are Cumulative assessment; projects which develop over an extended time frame and have more than one component. The other form of assessment is administered or (on - demand) assessments which are short term examinations that determine a student's knowledge in a more specified area. We firmly believe that today's diverse student population can be better served by a flexible system of assessment that allows students to demonstrate a variety of knowledge and skills.

The cumulative form of assessment selected for use in Tech Prep is the Portfolio and the administered form of assessment used in Tech Prep is the Written Scenario.

*Websters

Work Samples

Comparing Soil Texture Types

This work sample is a summary of an experiment used to determine the texture of a soil compared to determining the texture of a soil through the "ribbon test".

Using the attached directions for determining the soil texture by "feeling" the soil, determining the length of the ribbon, and making an educated guess as the texture of soil. The other directions are to a method of taking a soil sample, placing it in a jar, adding water, shaking, measuring layers of the different soil particles and determine the texture through the calculations.

This work sample allowed me the opportunity to learn of two different ways, which are easy to do, to determine soil texture. The ribbon test has taught me that experience is necessary to use this method with accurate readings. The other method uses measurements, calculations, and plotting a graph to determine the soil texture. To me, this seems to be a more accurate way of determining the texture if the directions are followed.

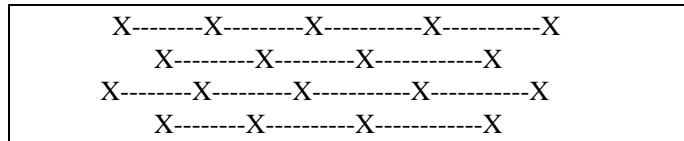
In determining the texture I had to be able to get a "clean" soil sample, follow instructions, measure, calculate, and plot figures on a graph. Using all of this I feel confident that I can determine the texture of a soil.

Standards demonstrated in the Work Sample:

Soil Science and Principles

- I. How are soil samples collected?
 1. For adequate testing, approximately one pint of soil is needed for each field to be tested.
 2. A soil auger or tube, which takes a uniform core from the surface to the desired depth and which takes a uniform volume of soil each time, is the best tool to use for taking soil samples. (If an auger or tube is not available use a trowel or spade.)
 3. The following steps should be taken into consideration in obtaining a soil sample:
 - a. Section off the land into fields for sampling.

- b. Develop a definite pattern for sampling the field. For example, in the field below samples would be taken at each "x".



- c. Clear away any surface trash or grass from where the core is to be taken.
- d. Take at least twenty cores from each field to be tested, mix them together thoroughly in a clean container, air dry, and bag or box the required amount.
- e. Take the samples from normal depth of plowing (surface level to six to twelve inches deep).
- f. Avoid taking samples near roadsides.
- g. Avoid sampling any small areas of unusual characteristics which are representative of the balance of the field. not
- h. Sample separately those areas of the field that have a different slope, color, texture of those small areas that lend themselves to separate treatment.
- i. Avoid sampling such areas as dead furrows, near manure piles or under animal droppings.
- j. Label all samples correctly. Included in the information on the label should be: your name, return address, field sample number and the desired soil test.
- k. A record should be kept of where the samples were taken. This can easily be done by making a map and placing on it the sampling number from the area in which it was taken.
- l. NOTE: Information on the cropping history and fertilization program of the field should also be made available to the soil test laboratory, as well as the planned crop.

Activity

1. Have students texture soil by the feel method.
You will need a sample of soil from each of the textural groups:
 - a. sand;
 - b. loam;
 - c. clay loam and
 - d. clay

Follow these directions:

- a. Have each student place 2 teaspoons of each of these soils in the palm of his/her hand. Do one sample at a time.
 - b. Add drop by drop of water to moisten the soil; kneading the soil while adding the water.
 - c. Make soil like moist putty.
 - d. Place ball of soil between the thumb and forefinger.
 - e. Gently push the soil so it is squeezed upward by the thumb against the forefinger.
 - f. Here is an explanation of soil casts and ribbons formed in moist soil:
 - 1) A cast will form when the moist soil is squeezed in the hand. The cast cannot be handled without breaking. No ribbon can be formed. It feels very gritty. This is sand, a coarse textured soil.
 - 2) A short ribbon can be formed with moist soil. The ribbon will split readily and will break away when it becomes 1/2 inch long. A moist cast will bear some handling. This is a clay loam, a medium textured soil.
 - 3) A ribbon can be formed easily in moist soil. This ribbon is moderately strong, but will break away when it is 3/4 of an inch long. A moist cast will bear moderate handling. This is a clay loam, a medium textured soil.
 - 4) A strong ribbon can be formed in moist soil. The ribbon often will be more than an inch long. A moist cast will bear considerable handling. This is a clay, a fine textured soil.
2. Have the class view actual soil profiles in the field.
- a. Show the individual soil horizons and point out their characteristics and differences.
 - b. Collect samples to be used in the determination of soil texture by the feel method above.
 - c. Be sure the horizons are distinct. Subtle differences in poorly developed soils are hard for students to see.

PROCEDURE FOR DETERMINING SOIL TEXTURE

1. Select a straight-sided bottle and fill approximately 3/4 full of soil.
2. Add water up to 1 inch of the top. Put a strip of masking tape up one side of the bottle.

3. Add 5-6 drops of ammonium hydroxide (household ammonia) or 20 ml (4 teaspoons) of an 8% solution of Calgon to separate the sand, silt and clay. To make an 8% solution, mix 6 tablespoons of Calgon per quart of water.
4. Mix for 20 minutes by rotating through 180 degrees.
5. Set the bottle down, let it stand for 40 seconds, and mark the sediment level. It represents the sand.
6. At the end of 30 minutes mark the sediment level in the bottle. Note how slowly the soil particles are settling. The clay is still in suspension. the layer between 40 sec. and 30 min. is the silt.
7. After two or three days study the soil in the bottle carefully. The sand will be easily identifiable as it will be very near the 40 sec. mark. The silt, however, may have settled considerably. The clay will be a thin third layer (in our sandy soils) lying on top of the silt. Mark these layers.
8. Measure the total depth of soil in the bottle, in millimeters (mm). Then measure the depth of each layer. If the clay fraction is still in part suspended, add 1-2 mm to the clay reading depending on the density of the suspension. Record these readings.
9. Using the following bulk density factors calculate the % by weight of each of the primary soil separates.

Sand = 1.5 bulk density
 Silt = 1.3 bulk density
 Clay = 1.2 bulk density

To calculate % by weight:

- A. mm of depth of separate layer x bulk density = weight relationship (WR)
- B. Add the 3 weight relationships to obtain a total weight relationship (TWR)
- C. (WR divided by TWR) X 100 = % by weight of each separate. See sample problem.
10. Using these percentages by weight for each separate, determine the soil class by use of the textural triangle.

SAMPLE PROBLEM SOLUTION:

SAND LAYER MEASURED 75mm
 SILT LAYER MEASURED 12mm
 CLAY LAYER MEASURED 5mm

- A. mm of depth of separate layer x bulk density = WR
 $75\text{mm} \times 1.5 = 112.5 \text{ WR}$
 $12\text{mm} \times 1.3 = 15.6 \text{ WR}$
 $5\text{mm} \times 1.2 = \underline{+ 6.0 \text{ WR}}$
- B. Add 3 WR's to obtain TWR = 134.1 TWR
- C. (WR divided by TWR) x 100% = % by weight of each separate

$(112.5 \text{ divided by } 134.1) \times 100\% = 84.6\%$

$(15.6 \text{ divided by } 134.1) \times 100\% = 11.7\%$

$(6.0 \text{ divided by } 134.1) \times 100\% = 4.5\%$

The soil class is LOAMY SAND

NAME _____

SOIL TEXTURE
ASSIGNMENT

Using the soil texture triangle, determine the soil texture of the given examples.

1. 65% sand
20% silt
15% clay

2. 30% sand
10% silt
60% clay

3. 35% sand
55% silt
10% clay

4. 25% sand
50% silt
25% clay

5. 50% sand
10% silt
10% clay

SOIL EROSION

PURPOSE:

To find some examples of soil erosion, to discover why erosion is taking place, and to learn some methods of preventing it.

PROCEDURE:

Materials:

Tin cans, eroded areas, beakers, water, paper, balance, funnel, steel wool

Sequence of Steps:

1. The first portion of this study is to be done in the field and should help you answer the following questions. Keep a list of your answers in the observations section.
 - a. Find an example of erosion taking place in your school, and describe it as accurately and precisely as possible. How do you know the soil is eroding? What is causing the erosion?
 - b. Locate places with different soil types. Can you discover any connection between the type of soil and amount of erosion?
 - c. Locate a place that is not being eroded, and try to explain why the same forces are producing different results in the two places.
 - d. Locate and describe two places suffering from the same kind of erosion. On the basis of your observations, try to predict what will happen in both places if nothing is done to stop erosion.
 - e. Locate three or four areas. At each site, push a tin can (open at both ends) about 2 inches into the soil. Pour into each can one quart of water, and time its disappearance. See if you can guess the order in which the soil will absorb the water. Which soil proves to be the most absorptive? Least absorptive: What does this test show about the relationship between erosion and speed of run-off of rains?
 - f. Locate and describe an example of a human activity designed to prevent erosion. Has the activity completely prevented erosion? Has it helped?
 - g. Students did not study erosion fifty years ago, but erosion has existed for thousands of years. Why has interest in the process suddenly grown? How can erosion knowledge be useful?

2. The second portion of the study, to be done in the lab, will show some of the factors involved in soil erosion or its prevention.
 - a. Select 4 lumps of soil from different areas. Place each lump in a separate beaker half full of water, and record the time that elapses before the lump collapses. Record results in the observation section.
 - b. Obtain 4 samples from the above exercise. Take one handful and spread each sample in a one-half inch layer of paper and let it become as dry as the air will allow. Weigh equal amounts of each dry sample (200 grams). Plug the neck of a funnel with a small, loose wad of steel wool and add a soil sample. Slowly pour over the soil a measured amount of water (100ml), and catch the drainage. The difference between the amount poured and the amount recovered will be a rough approximation of the water absorbing power of the sample. Repeat with each sample and record observations.

OBSERVATIONS:

1. part 1 observations:

a.

b.

c.

d.

e.

f.

g.

2. Soil collapse time

Soil	Time

3. Water Holding Capacity

Soil	ml of H2O held

CONCLUSIONS:

1. From observation #2, account for the differences in the ability of some soils to hold their particles together, and how that can effect soil erosion.
2. From observation #3, relate the water absorbing power of a soil to its ability to hold particles together. What is the effective material in good soil?
3. What do soil properties have to do with erosion?
4. What are some of the ways we can prevent soil erosion?

PLANT & SOIL SCIENCE

- 1.) Judge 4 fruit trees and give a written analysis of each.
- 2.) Conduct a vine pruning demonstration and describe procedures used.
- 3.) Conduct a soil textural analysis by handling various types of soils.
- 4.) Conduct a soil textural analysis by using the quart jar method.
- 5.) Design a pest management timeline given information on pest populations
- 6.) Monitor and graph an insect pest population
- 7.) Create and illustrate a diagram of a plant cell including its components, and give the function of each part.
- 8.) Conduct a germination test using various seed varieties or seed types.
- 9.) Conduct a pesticide label analysis - determine the toxicity levels, application methods and types of pests controlled.
- 10.) Diagram a soil profile and identify the various layers.
- 11.) Evaluate a class of vegetables and note the type of defects including mechanical, cultural and other.
- 12.) Identify and describe the use of beneficial insects on one locally grown crop.

Written Scenarios

WRITTEN SCENARIO #1

TOPIC: Weed Identification

INSTRUCTIONS:

Outline specifically the procedure you would use to identify the unknown weed.
Include a listing of look-alike weeds and note the differences

PROBLEM:

A person brings you two plants which are determined to be weeds. You can identify one relying on your classroom instruction and plant collection.

WRITTEN SCENARIO #2

TOPIC: Pruning

INSTRUCTIONS:

What procedures would you give this neighbor for shaping and appropriately pruning this tree for maximum fruit production. Include bud location and development as well as an annual pruning program.

PROBLEM:

A neighbor asks you how to prune the peach tree in their yard. This tree is approximately ten years old and has had average care through its life.

WRITTEN SCENARIO #3

TOPIC: Vegetable Growth Seasons

INSTRUCTIONS:

Based on what you have learned in your classes and the references available write a comprehensive list of appropriate planting dates for these vegetables in your area.

PROBLEM:

You are asked to plant a variety of vegetables for the local farmer's market.

WRITTEN SCENARIO #4

TOPIC: Soils

INSTRUCTIONS:

Based on what you learned in class, discuss the two ways one may determine soil texture. Select one of the methods and detail the steps necessary to determine the texture. Explain why you choose the method and why it will give an accurate determination of the texture.

PROBLEM:

A neighbor went to a nursery to purchase a rose bush for their yard. During the course of the discussion one of the factors was soil texture. When asked what type of soil texture they had in the yard they were unable to answer.

Other Suggested Written Scenario Topics and Work Samples

Plant and Soil Science

- 1.) Judge 4 fruit trees and give a written analysis of each.
- 2.) Conduct a vine pruning demonstration and describe procedures used.
- 3.) Conduct a soil textural analysis by handling various types of soils.
- 4.) Conduct a soil textural analysis by using the quart jar method.
- 5.) Design a pest management timeline given information on pest populations.
- 6.) Monitor and graph an insect pest population.
- 7.) Create and illustrate a diagram of a plant cell including its components, and give the function of each part.
- 8.) Conduct a germination test using various seed varieties or seed types.
- 9.) Conduct a pesticide label analysis-determine the toxicity levels, application methods and types of pests controlled.
- 10.) Diagram a soil profile and identify the various layers.
- 11.) Evaluate a class of vegetables and note the type of defects including mechanical, cultural and other.
- 12.) Identify and describe the use of beneficial insects on one locally grown crop.

SECTION SIX

Appendices

Appendix A
Students Will be Able to...

- Delegate job responsibilities effectively
- Use tables, graphs, and maps effectively
- Use algebraic principles
- Read, understand, and follow the instructions on a chemical label
- Have sufficient understanding of the metric system
- Have the ability to lead and follow

Professional-***

- All of the above
- Utilize statistical methods; Be able to analyze and interpret data from research and draw inferences from charts, tables, and graphs that illustrate data from real-world situations
- Design and develop experimental tasks
- Use experimental or theoretical probability as appropriate, to represent and solve problems involving uncertainty
- Have ability to retrieve, sequence, package and present information
- Have ability to supervise and evaluate personnel matters
- Possess and exhibit leadership skills
- Have basic oral communication skills in a second language

Entry level** jobs are those at the lowest level of responsibility and these workers generally work under the supervision of another. A high school diploma is usually required for employment, but that requirement is often waived if the applicant has sufficient experience. *Technical level** employees usually work in an occupation involving mid-level responsibility and decision making is nearly always a part of it. These occupations usually require an associate of arts/science degree or certificate/license providing evidence of two or more years of specialized training. *****Professional level** occupations normally require a baccalaureate or higher college degree. Some of these occupations may also require certification or licensure. These employees perform very complex tasks and serve in positions that require the responsibility for successful management of departments, enterprises, programs or projects.

Appendix B
Targeted Occupations

PLANT & SOIL SCIENCE

Job Title	Entry Level	Technical Level	Professional Level
Agricultural Biologist			X
Agricultural Consultant			X
Agricultural Instructor			X
Agricultural Processing Plant Laborer	X		
Agricultural Producer			X
AGRONOMIST			X
Aquatic Biologist			X
BEEKEEPER (Apiculturist)		X	
Biochemist			X
Biologist			X
Biotech Researcher/Tissue Culture Specialist			X
Botanist			X
BUDDER/GRAFTER/PROPAGATOR		X	
Chemist			X
Civil Engineer			X
CONSULTANT			X
Crew Chief		X	
Crew Foreperson		X	
CREW LEADER	X		
Crew Supervisor		X	
CROP INSPECTOR		X	
CROP MANAGER/PRODUCER			X
Crop Technician		X	
CULTIVATION SUPERVISOR		X	
DELIVERY PERSON	X		
DITCHTENDER		X	
Entomologist			X
EQUIPMENT OPERATOR	X		
Equipment Repair Person		X	
Exporter			X
FARM ADVISOR			X
Farm Crew Foreperson		X	
Farm Equipment Operator	X		
Farm Management Consultant/Analyst			X
Farm Manager			X
Farm Owner/Operator			X
Farm Supervisor		X	
Farm Tenant/Operator			X
Farm Unit or Crew Supervisor		X	
Farm Worker	X		
Farmer, Cash Grain			X
Farmer, Diversified Crops			X
Farmer, Field Crops			X
Farmer, Fruit Crops, Bush and Vine			X
Farmer, General			X
Farmer, Tree Fruit and Nut Crops			X
Farmer, Vegetables			X
Fertilizer and Chemical Calibrator/Applicator		X	
Field Buyer		X	
Field Foreperson		X	
FIELD REP		X	
Field Soil Collector	X		

Flagger	X		
Forklift Driver	X		
FRUIT AND NUT TREE NURSERY PERSON		X	
FRUIT INSPECTOR		X	
FRUIT MANAGER/PRODUCER			X
GENERAL FARM LABORER	X		
Geneticist			X
Government Agriculture Agency Admin., Mgr.			X
GRADING SUPERVISOR		X	
Greenhouse Worker	X		
HARVEST SCHEDULER		X	
HORTICULTURIST			X
HYDROLOGIST			X
Insect Trap Monitor/Collector	X		
Instructor, Plant and Soil Science			X
IPM Specialist			X
Irrigation Installation Foreperson		X	
IRRIGATION SPECIALIST			X
IRRIGATION SUPERVISOR		X	
Irrigation Supplier/Sales Rep		X	
Irrigation System Designer			X
Irrigation System Installer	X		
IRRIGATOR	X		
Lab Technician		X	
Labor Contractor		X	
LABORATORY ASSISTANT	X		
LABORATORY TECHNICIAN		X	
LAND LEVELER	X		
Land Use Planner/Consultant			X
LAND USE SPECIALIST			X
Line Supervisor		X	
Map Maker		X	
Mechanic		X	
Nematologist			X
New Product Developer			X
NURSERY PROPAGATION WORKER	X		
Nutritionist			X
Packager	X		
PEST CONTROL ADVISOR			X
Pest Control Operator		X	
Pipeline/Canal Repair Person	X		
PLANT BREEDER			X
Plant Inspector		X	
Plant Manager			X
Plant Pathologist			X
Plant Propagator		X	
Plant Scientist			X
Processing Line Worker	X		
Processor Owner			X
Produce Inspector		X	
Product Grader		X	
Production Manager			X
PRUNER	X		
Quality Control Inspector		X	
Quality Control Technician		X	
Ranch/Farm Manager			X
Research Technician		X	

RESEARCHER/DEVELOPER			X
Retail Irrigation Supplier/Deliverer	X		
Seed and Supply Store Salesperson	X		
SEED TECHNICIAN		X	
Shipper/Receiver		X	
SOIL CONSERVATION ASSISTANT	X		
SOIL CONSERVATION TECHNICIAN		X	
SOIL CONSERVATIONIST			X
Soil Consultant			X
Soil Fumigator		X	
SOIL SCIENTIST			X
Surveyor		X	
Surveying Assistant	X		
TEACHER, PLANT & SOIL SCIENCE			X
Teaching Assistant		X	
Tissue Culture Technician		X	
Vector Control Technician		X	
VITICULTURIST			X
Water Analysis Specialist			X
WATER CONSERVATIONIST			X
Water District Manager			X
Water Master		X	
Weed Scientist			X
Well Drilling Foreperson		X	
Well Drilling Crew Member	X		
Wine Maker (Enologist)			X

Appendix C
Pathway Grids
for all
Agricultural Pathways

AGRICULTURAL EDUCATION TECH PREP
Career Pathways Core Lists

Career Pathway

A List

B List

Agricultural Business

Ag Business 1

Ag Business 2

Agricultural Mechanics

Ag Mechanics 3

Ag Mechanics 4

*Power & Machinery
 or Metal Fabrication
 or Ag Structures*

*Power & Machinery
 or Metal Fabrication
 or Ag Structures*

Animal Science

Animal Science 1

Animal Science 2

Forestry & Natural Resources

Natural Resources 1 Forestry

Natural Resources 1 Natural Resources 2

Ornamental Horticulture

Ornamental Hort. 1 Ornamental Hort. 2

Nursery Industry

*Landscape Industry
 or Florist Industry*

Plant Science

Plant Science 1

Plant Science 2

Technical Elective C List

Ag Mechanics 1 or 2

Ag Mechanics 3 or 4

Power & Machinery

Metal Fabrication

Ag Structures

Ag Business or Ag Computers

Typing/Keyboarding

Ornamental Horticulture

Wildlife Production

Other Technical Courses related to the Career Pathway but not Agriculture:

ie. Industrial Technology

Business or Computers

Foreign Language

Drafting or Mechanical Drawing

Environmental Studies

This list is to be used in advising students using the generic Tech Prep Grids.

WORKPLACE LEARNING AND TECH PREP

Workplace learning is an integral part of all Tech Prep Programs in Agriculture. As such, the specific Tech Prep Grid allows for time in the school day for these activities in the Senior year. The remaining grids offer options that allow a student to be involved in Tech Prep and meet other personal and educational objectives. For these students, there may not be sufficient time within the school day to be involved with Workplace Learning. In both of these cases, workplace learning could occur after the school day is finished, on weekends, during vacations, and summer breaks.

Workplace learning begins in the Freshman year with Supervised Practical Experience opportunities which is also a requirement of Ag Tech Prep. These are often entrepreneurial enterprises and usually continue throughout High School. Paid Work Experience SPE usually commences during the Junior year and continues through college. This procedure is outlined in the Workplace Learning Guide, "Learning to Work - Working to Learn."

Appendix D
Plant and Soil Science
Grids
(Secondary)

TECH PREP AGRICULTURE CURRICULUM PLANT SCIENCE

TECH PREP *Secondary Curriculum*

SUBJECT	Freshman	Sophomore	Junior	Senior
Technical Core	Agriculture 1 Core	Agriculture 2 Core	Plant Science 1	Plant Science 2
Technical Elective	*Tech Prep Elective C List	*Tech Prep Elective C List	*Tech Prep Elective C List	*Tech Prep Elective C List
Math	Applied Math 1 (Math 1 Algebra 1)	Applied Math 2 (Math 2 Geometry)	Applied Math 3 (Algebra 2 Trigonometry)	Work Place Learning _____
Science	Applied Biology	Applied Biology or Chemistry	Applied Physics 1	Applied Physics 2
Communications	English 1	English 2 Applied Communications	English 3 Applied Communications	English 4 Applied Communications
Social Science	Social Studies	World History	U.S. History	Government Economics
P.E. Foreign Language	Physical Education	Physical Education	Fine Arts **	Work Place Learning _____

SECONDARY TECH PREP SEQUENCE FOR SELECTED CAREER PATHWAY.

* *Tech Prep Electives possible with 7 period day*

***Fine art credit may be awarded for certain ag courses.*

*UC/CSUC acceptance of Applied Academics courses for Math, English, Biology, and Physics will determine student eligibility for admission
Depending on how closely the High School follows the Appropriate Curriculum, college credit may be awarded to successful completers.*

TECH PREP AGRICULTURE CURRICULUM PLANT SCIENCE

Traditional Agriculture

Secondary Curriculum

SUBJECT	Freshman	Sophomore	Junior	Senior
Technical Core	Agriculture 1 Core	Agriculture 2 Core or Ag Biology	Plant Science 1	Plant Science 2
Technical Elective	*Tech Prep Elective C List	*Tech Prep Elective C List	*Tech Prep Elective C List	*Tech Prep Elective C List
Math/ Humanities	Algebra A Math 1 (Algebra 1)	Algebra B Math 2 (Geometry)	Fine Arts ** <hr style="width: 100px; margin: 5px auto;"/>	
Physical Science	Physical Science	*	*	*
Communica-tions	English 1	English 2	English 3	English 4
Social Science	Social Studies	World History	U.S. History	Government Economics
P.E.	Physical Education	Physical Education		

SECONDARY TECH PREP SEQUENCE FOR SELECTED CAREER PATHWAY.

** Tech Prep Electives possible with 7 period day*

****FINE ART CREDIT MAY BE AWARDED FOR CERTAIN AG COURSES.**

Minimum High School Graduation requirements

Ag Biology Accepted, allows for local graduation requirements differences

TECH PREP AGRICULTURE CURRICULUM PLANT SCIENCE

College Prep/Tech Prep

Secondary Curriculum

SUBJECT	Freshman	Sophomore	Junior	Senior
Technical Core	Agriculture 1 Core	Agriculture 2 Core	Plant Science 1	PlantScience 2
Technical Elective	*Tech Prep Elective C List	*	*	*Tech Prep Elective C List
Math/ Humanities	Math 1 (Algebra 1)	Math 2 (Geometry)	Math 3 (Algebra 2 Trigonometry)	Fine Arts **
Science' Technical Elective	*	Biology	Chemistry	*
Communica-tions	English 1	English 2	English 3	English 4
Social Science	Social Studies	World History	U.S. History	Government Economics
P.E. Foreign Language	Physical Education	Physical Education	Foreign Language	Foreign Language

SECONDARY TECH PREP SEQUENCE FOR SELECTED CAREER PATHWAY.

* *Tech Prep Electives possible with 7 period day*

***FINE ART CREDIT MAY BE AWARDED FOR CERTAIN AG COURSES.*

Fulfills Requirements for UC/CSUC Admission from H.S.

TECH PREP AGRICULTURE CURRICULUM PLANT SCIENCE

Ag Mech Option

Secondary Curriculum

SUBJECT	Freshman	Sophomore	Junior	Senior
Technical Core	Agriculture 1 Core	Agriculture 2 Core or Biology	Plant Science 1	Plant Science 2
Technical Elective	Ag Mechanics 1	Ag Mechanics 2	*	Ag Mechanics 3 or 4
Math/ Humanities	Math 1 (Algebra 1)	Math 2 (Geometry)	Math 3 (Algebra 2 Trigonometry)	Fine Arts **
Science	*	*	Chemistry	*
Communica-tions	English 1	English 2	English 3	English 4
Social Science	Social Studies	World History	U.S. History	Government Economics
P.E. Foreign Language	Physical Education	Physical Education	Foreign Language	Foreign Language

SECONDARY TECH PREP SEQUENCE FOR SELECTED CAREER PATHWAY.

* *Tech Prep Electives possible with 7 period day*

***FINE ART CREDIT MAY BE AWARDED FOR CERTAIN AG COURSES.*

*Fulfills Requirements for UC/CSUC Admission from H.S. with Ag Biology Credit
Science Credit for Ag Biology Expected*

Ag Mechanics Option

TECH PREP AGRICULTURE CURRICULUM PLANT SCIENCE

COLLEGE TECH PREP/SPORTS

Secondary Curriculum

SUBJECT	Freshman	Sophomore	Junior	Senior
Technical Core	Agriculture 1 Core	Agriculture 2 Core or Ag Biology	Plant Science 1	Plant Science 2
Foreign Language/ Humanities	Tech Prep Elective C List	Foreign Language	Foreign Language	Fine Arts ** _____
Math/ Physical Science	Math 1 (Algebra 1)	Math 2 (Geometry)	Math 3 (Algebra 2 Trigonometry)	Chemistry
Additional Technical Electives	*	*	*	*
Communica-tions	English 1	English 2	English 3	English 4
Social Science	Social Studies	World History	U.S. History	Government Economics
P.E. Foreign Language	Physical Education	Physical Education	Physical Education	Physical Education

SECONDARY TECH PREP SEQUENCE FOR SELECTED CAREER PATHWAY.

* *Tech Prep Electives possible with 7 period day*

***FINE ART CREDIT MAY BE AWARDED FOR CERTAIN AG COURSES.*

Fulfills Requirements for UC/CSUC Admission from H.S. with Ag Biology Credit

Sports Option

Appendix E
Plant and Soil Science
Grids
(Community College)

AGRICULTURAL EDUCATION TECH PREP
COMMUNITY COLLEGE
AGRICULTURE TECHNICIAN PROGRAMS

The Technician programs in Agriculture include an extended period of specialized training beyond high school, but less than that required for a Bachelor of Science. An individual in the technician program will acquire the skill and ability to make practical application of his/her theoretical knowledge in performing specific tasks in the production of goods and services in agriculture and related fields.

Certificates are awarded to students in technical programs in recognition of completion of specified requirements which indicate proficiency. All certificate core courses must be passed with a "C" grade or better.

The technician programs are as follows:

Agricultural Business Pathway

Agricultural Sales, Service Technician

Agricultural Mechanics Pathway

Agricultural Mechanics Technician

Animal Science Pathway

Artificial Insemination Technician

Forestry and Natural Sciences Pathway

Forestry Technician

Recreational Land Management Technician

Ornamental Horticulture Pathway

Commercial Floristry Technician

Landscape Design Technician

Landscape and Park Maintenance Technician

Nursery Production Technician

Plant Science Pathway

Agricultural Laboratory Technician

Food Processing Technician

TECH PREP AGRICULTURE CURRICULUM
AGRICULTURE LABORATORY TECHNICIAN CERTIFICATE

ALT *Community College Curriculum*

SUBJECT	<i>Freshman 1st Semester</i>	<i>Freshman 2nd Semester</i>	<i>Sophomore 1st Semester</i>	<i>Sophomore 2nd Semester</i>
Technical Core	AG 315 * Intro to Agriculture Guidance	AN-M 200* Basic Mechanics -Ag	AG-EC 225 * Ag Computers	AG-EC 200* Ag Accounting
Technical Core	AGNSC 200* Intro to Animal Science or PL-SC 200 * Intro-Plant Science	NR 200 * Soils	Career Path Core * see listing core options	
Technical Core	AG 280 Ag Computations	AG 285 Ag Communications		
Technical Core	Ag 376* Basic Science and Lab Techniques			
General Education	GE Activities	GE Natural Science	GE Social Science	GE Humanities
General Education	English Comp	GE Activities	Health Education	Communications Analytical Thinking
Work- Place Learning	Work Experience Minimum 6	Work Experience	Work Experience	Work Experience

*Specific Technician Certificate Requirements

Minimum competency must be demonstrated in Reading, Written Expression, Mathematics, as referred to in the Specific College Graduation Requirements.

Successful completion of additional courses for the Intersegmental General Education Transfer Core Curriculum will GE certify the lower division B.S. requirements for UC and CSUC

Successful completion of additional courses for the CSUC Transfer Core Curriculum will GE certify the lower division B.S. Requirement for CSUC.

Minimum 62 units completion for the Associate in Science (A.S.) Degree (30 units must be in Agriculture)

Agriculture Laboratory Technician Certificate Core Options

Requires one course from the following:

FD-P 200	Basic Food Processing - 3
FD-P 376	Basic Food Plant Laboratory Procedures - 1
FD-P 387	Food Processing Sanitation and Cleanup - 2
_____	Any Plant, Animal and Natural Resources Course - 3
PHYS 160	Descriptive Intro to Physics
CHEM 101	Chemistry Principles and
CHEM 102	General Chemistry and Quantitative Analysis or
CHEM 143	Introductory College Chemistry and
CHEM 144	Fund. of Organic and Biochemistry - 4,5
MICRO 100	Microbiology or
BACT 102	General Bacteriology - 3,4

Total Core Units Required for A.S. Degree - 32

Total Core Units Required for Certificate - 33

TECH PREP AGRICULTURE CURRICULUM
FOOD PROCESSING TECHNICIAN CERTIFICATE

FPT

Community College Curriculum

SUBJECT	<i>Freshman 1st Semester</i>	<i>Freshman 2nd Semester</i>	<i>Sophomore 1st Semester</i>	<i>Sophomore 2nd Semester</i>
Technical Core	AG 315 * Intro to Agriculture Guidance	AN-M 200* Basic Mechanics -Ag	AG-EC 225 * Ag Computers	AG-EC 200* Ag Accounting
Technical Core	AGNSC 200* Intro to Animal Science or PL-SC 200 * Intro-Plant Science	Career Path Core * see listing core options	FD-P 200 * Basic Food Processing	Career Path Core* see listing core options
Technical Core	AG 280 Ag Computations	AG 285 Ag Communications	Career Path Core * see listing core options	Career Path Core* see listing core options
Technical Core	Ag 376* Basic Science and Lab Techniques			
General Education	GE Activities	GE Natural Science	GE Social Science	GE Humanities
General Education	English Comp	GE Activities	Health Education	Communications Analytical Thinking
Work- Place Learning	Work Experience Minimum 6	Work Experience	Work Experience	Work Experience

*Specific Technician Certificate Requirements

Minimum competency must be demonstrated in Reading, Written Expression, Mathematics, as referred to in the Specific College Graduation Requirements.

Successful completion of additional courses for the Intersegmental General Education Transfer Core Curriculum will GE certify the lower division B.S. requirements for UC and CSUC

Successful completion of additional courses for the CSUC Transfer Core Curriculum will GE certify the lower division B.S. Requirement for CSUC.

Minimum 62 units completion for the Associate in Science (A.S.) Degree (30 units must be in Agriculture)

Food Processing Technician Certificate Core Options

Requires four courses from the following:

FD-P 376	Basic Food Plant Laboratory Procedures
FD-P 378	Food Laboratory Instruments - 1
FD-P 379	Food Products Grading - 1
FD-P 380	Food Products Microanalysis-A - 1
FD-P 381	Food Products Microanalysis-B Mold Counting - 2
FD-P 382	Food Products Microanalysis-C - 1
FD-P 383	Enzymes in the Food Industry - 1
FD-P 386	Food Laboratory Chemistry Procedures - 1
FD-P 387	Food Processing Sanitation and Cleanup - 1

Total Core Units Required for A.S. Degree - 32

Total Core Units Required for Certificate - 36-37

TECH PREP AGRICULTURE CURRICULUM
ASSOCIATE DEGREE/CSU TRANSFER PATTERN

AS/CSU *Community College Curriculum*

SUBJECT	<i>Freshman 1st Semester</i>	<i>Freshman 2nd Semester</i>	<i>Sophomore 1st Semester</i>	<i>Sophomore 2nd Semester</i>
Technical Core	AG 315 * Intro to Agriculture	Career Path Core Option	Career Path Core Option	Career Path Core Option
Technical Core	Career Path Core Option	Career Path Core Option	Career Path Core Option	Career Path Core Option
Technical Core Elective	Career Path Core Option	Career Path Core Option	Elective	
General Education	English Comp	Communications Analytical Thinking	GE Humanities	Elective
General Education	Guidance	GE Activities	GE Activities	Elective
General Education	Health Education	GE Math	GE Natural Science	GE Social Science
Work- Place Learning	Work Experience Minimum 6	Work Experience	Work Experience	Work Experience

Minimum competency must be demonstrated in Reading, Written Expression, Mathematics, as referred to in the Specific College Graduation Requirements.

Successful completion of additional courses for the Intersegmental General Education Transfer Core Curriculum will GE certify the lower division B.S. requirements for UC and CSUC

Successful completion of additional courses for the CSUC Transfer Core Curriculum will GE certify the lower division B.S. Requirement for CSUC.

Minimum 62 units completion for the Associate in Science (A.S.) Degree (30 units must be in Agriculture)

Appendix F
*California Agriculture Model
Curriculum Instructional
Materials Order Forms*

Agriculture Learning Activities Packets

The University of California, Davis is pleased to offer a diverse group of Learning Activity Packets (LAPS) for individualized instruction. These packets include student and teacher manuals. Most packets are available in Spanish and/or English, and are sold separately. The LAPS are written at a low reading level (4th to 5th grade) and are particularly good for sheltered agriculture courses, junior high school, and students who are learning handicapped.

Items	Quantity in English	Quantity in Spanish	Unit Price	Total Amount
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EXPLORING ANIMALS

Sheep			\$20.00	
Wildlife			\$15.00	
Poultry			\$20.00	
Animal Science			\$20.00	
Small Animal			\$15.00	
Dairy Cattle			\$15.00	
Beef			\$20.00	
Swine			\$15.00	
Horses			\$15.00	

EXPLORING PLANTS

Vegetable Crops			\$20.00	
Field Crops			\$20.00	
Ornamental Horticulture			\$20.00	
Tree Crops			\$20.00	
Plant Science			\$20.00	
Forestry			\$20.00	

OTHER SUBJECTS

Agriculture and Society				
Careers in Agriculture				
FFA				
Supervised Occupational Experience				

Subtotal from Page 2	\$
Subtotal from Page 1	\$
ORDER TOTAL	\$

Send completed order form, along with school purchase order or check. (Make checks payable to The Regents of the University of California.) Mail completed order to:

Agriculture Model Curriculum Project
 Agriculture Education Program
 Dept. of Agronomy and Range Science
 University of California
 Davis, CA 95616

Curriculum Office (916) 752-8002
 J. Leising (916) 752-1808
 FAX (916) 752-4361

Model Curriculum Order Form

Name:	School:
School District:	Phone:
Address:	
City:	State: Zip:

Items	Disk Version Price	Disk Types Avail	Specify Disk Type	Disk Qty. Wanted	Printed Version Price	Printed Qty. Wanted	Total Amt.
Agriculture Model Curriculum Guide					\$15.00		

LESSON PLANS

Basic Core (9th & 10th grades)	\$30.00	DOS or Mac			\$80.00		
First Year Basic Core Lab Manual					\$10.00		

ADVANCED CLUSTERS

Animal Science	\$30.00	DOS or Mac			\$60.00		
Plant & Soil Science	\$30.00	DOS or Mac			\$60.00		
Ag. Mechanics	\$30.00	DOS or Mac			\$60.00		
Ag. Business Management	\$30.00	DOS or Mac			\$60.00		
Integrated Agriculture Biology Syllabus & Resource Materials					\$60.00		
Forestry					\$80.00		
Natural Resources & Rural Recreation					\$80.00		

OTHER MATERIALS

Animal Health Core Curriculum					\$80.00		
International Infusion Packet					\$15.00		
California Vocational Agriculture Record Book Manual					\$7.00		
California Vocational Agriculture Record Book Problems					\$7.00		
					*\$		

* Subtotal (Shipping included; sales tax not required)
Please carry subtotal to previous page

Appendix G
Tech Prep Curriculum
Order Form

Central Valley Consortium Agriculture Education Tech Prep Order Form

ITEM	UNIT COST	QUANTITY REQUESTED	TOTAL
A Project Overview	\$3.00		
Advisory Committee Manual	\$3.00		
Articulation Guide	\$3.00		
<i>Choose Agriculture and Win</i> A Recruitment Guide	\$3.00		
Counseling and Guidance Guide	\$3.00		
Curriculum Guides (Supplements to the State Frameworks)			
Agribusiness	\$3.00		
Agricultural Mechanics	\$3.00		
Animal Science	\$3.00		
Forestry & Natural Resources	\$3.00		
Ornamental Horticulture	\$3.00		
Plant & Soil Science	\$3.00		
<i>Getting a Job and Keeping It</i> A Placement Guide	\$5.00		
Integration of Academics Guide	\$5.00		
<i>Learning to Work -- Working to Learn</i> A Workplace Learning Guide	\$3.00		
Portfolio Guidelines for Grade 13-14	\$3.00		
Program Assessment and Certification Guide	\$3.00		
<i>Special Needs Not Different People</i> A Special Needs Populations Guide	\$3.00		
Student Tracking and Follow-up Guide	\$3.00		
Targeted Occupations in Agriculture Guide	\$3.00		
The Role of Student Assessment in Tech Prep	\$3.00		
TOTAL (Prices Include Tax & Shipping)			

<p style="text-align: center;"><u>Make Checks or Purchase Order Payable to:</u></p> <p style="text-align: center;">Stanislaus County Office of Education Agriculture Education Tech Prep 801 County Center III Court Modesto, CA 95355 For Information: (209) 525-5020</p>	<p style="text-align: center;">Ship to:</p> <p>School: _____</p> <p>Attention: _____</p> <p>Street: _____</p> <p>City: _____</p> <p>State: _____</p> <p>Zip: _____</p> <p>Phone: _____</p> <p>Your Purchase Order#: _____</p>
<u>MATERIALS MAY NOT BE DUPLICATED FOR COMMERCIAL PURPOSES</u>	