

Agriculture Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs

**A Handbook for
Teacher Educators
&
Program Reviewers**



2006
(Revised September 2010)

California Commission on Teacher Credentialing

Arnold Schwarzenegger, Governor
State of California

2006

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Foreword

One of the purposes of education is to enable students to learn the important subjects of the school curriculum so they can further their professional goals and function effectively in work, society and family life. Each year in California, hundreds of students enroll in agriculture classes with teachers who are certified by the Commission on Teacher Credentialing (CTC) to teach those classes in public schools. The extent to which students learn to engage in and utilize agriculture depends substantially on the preparation of their teachers in agriculture and the quality of the teaching of agriculture.

The Commission is the agency of California government that licenses teachers and other professionals who serve in the public schools. As the policymaking body that establishes and maintains standards for the education profession in the state, the Commission is concerned with the quality and effectiveness of the preparation of teachers and other school practitioners. On behalf of the education profession and the general public, the Commission has an important responsibility to establish and implement strong, effective standards of quality for the preparation and assessment of credential candidates.

California teacher candidates are required to demonstrate competence in the subject matter they will be authorized to teach. Candidates for the Single Subject Teaching Credential have two options available for satisfying this requirement: they can either complete a Commission-approved subject matter preparation program, or they can pass the appropriate Commission-adopted subject matter examination(s) (Education Code sections 44280 and 44310). Because they satisfy the same requirement, these two options are to be as aligned and congruent as possible.

However, the substance and relevance of the single subject matter program standards and the validity of examination specifications (i.e., subject matter requirements) is not permanent. The periodic reconsideration of subject matter program standards and the need for periodic examination validity studies are related directly to one of the Commission's fundamental missions: to provide a strong assurance that teaching credentials issued by the Commission are awarded to individuals who have the knowledge, skills, and abilities that are needed in order to succeed in public school teaching positions in California. Best professional practice related to the program standards and the legal defensibility of the examination specifications require that the standards and specifications be periodically reviewed and rewritten, as job requirements and expectations change over time (Education Code sections 44225i, j, 44257, and 44288).

In the mid-1990s, the Commission developed and adopted standards for single subject matter preparation programs and, at the same time, specifications for the single subject matter examinations. This work was based on the advice of subject matter advisory panels and data from validity studies, and resulted in program standards and examination specifications that were valid and closely aligned with each other. Those subject matter standards and specifications were adopted by the Commission in 1998 and are still in use today. They are now being replaced by the subject matter requirements and single subject matter standards adopted by the Commission in 2006, as presented in this handbook.

The Commission's responsibility for establishing high standards for teachers is based, in part, on three major pieces of legislation. In 1988, 1992 and 1998 the Legislature and the governor enacted legislation sponsored by the Commission that strengthened the professional role of the Commission and enhanced its authority to establish rigorous standards for the preparation and assessment of prospective teachers. These reform laws were Senate Bills 148 (Chapter 1355, Stats. 1988), 1422 (Chapter 1245, Stats. 1992) and 2042 (Chap. 548, Stats.1998). As a result, the Commission has taken on new responsibilities for establishing and maintaining rigorous levels of quality in teacher preparation and competency for beginning teachers. To implement these three statutes, the CTC has developed new standards, subject matter requirements and other policies collaboratively with representatives of postsecondary institutions, teachers and administrators in public schools, and statewide leaders involved in public education. This work was done in alignment with the State Board-adopted academic content standards and/or frameworks for K-12 students, and, as required by SB 2042 (Chap. 548, Stats.1998), the K-12 student academic content standards are reflected in the Commission's teacher preparation and subject matter preparation program standards.

The revision of Commission standards pursuant to SB 2042 (Chap. 548, Stats.1998) was undertaken in three phases. Single subject matter advisory panels were established to assist in this important work. The first two phases of single subject matter advisory panels addressed the content areas of English, mathematics, science, social science, art, music, languages other than English, and physical education. These panels completed their work over a two year period from 2001-2003. The third and final phase of single subject matter panels was accomplished in 2004, and addressed the subject areas of home economics, business, health science, agriculture, industrial and technology education, and languages other than English: American Sign Language. The new subject matter standards developed by all of the panels were grounded in and aligned with the academic content standards for California K-12 students.

Part 1: Introduction to Subject Matter Program Standards

A. The Commission's Responsibility for Program Standards

The Commission fulfills one of its responsibilities to the public and to the profession by developing, adopting and implementing standards of program quality and effectiveness. In the process of upholding high standards for the preparation of teachers, the Commission also respects the considered judgments of educational institutions and professional educators, and holds educators accountable for excellence. The premises and principles outlined below reflect the Commission's approach to fulfilling its responsibilities under the law. The Commission asked the single subject advisory panels to apply these general principles to the development of standards for single subject matter programs.

- 1) *The status of teacher preparation programs in colleges and universities should be determined on the basis of standards that relate to significant aspects of the quality of those programs.*
- 2) *There are many ways in which a teacher preparation program could be excellent.*
- 3) *The curriculum of teacher preparation plays a central role in a program's quality.*
- 4) *Teacher preparation programs should prepare candidates to teach the public school curriculum effectively.*
- 5) *In California's public schools, the student population is so diverse that the preparation of educators to teach culturally diverse students cannot be the exclusive responsibility of professional preparation programs in schools of education.*
- 6) *The curriculum of a teacher preparation program should be based on an explicit statement of purpose and philosophy. An excellent program also includes student services and policies such as advisement services and admission criteria.*
- 7) *The assessment of each student's attainments in a teacher preparation program is a significant responsibility of the institution that offers the program.*
- 8) *The Commission's standards of program quality allow quality to assume different forms in different environments.*
- 9) *The Commission's standards of program quality are roughly equivalent in breadth and importance.*
- 10) *Whether a particular program fulfills the Commission's standards is a judgment that is made by professionals who have been trained in interpreting the standards.*

1. Overview of Standards for Preliminary Teacher Preparation Programs

The standards reforms initiated by SB 2042 (Chap. 548, Stats. 1998) began with the simultaneous development of standards for preliminary teacher preparation programs and for teacher induction programs. The advisory panel appointed by the Commission that developed these two sets of standards was charged with developing the following three policy documents for review and consideration by the Commission:

- New standards of quality and effectiveness for preliminary teacher preparation programs;
- Teaching Performance Expectations that would serve as the basis for evaluating the competence of teacher candidates on teaching performance assessments embedded in preparation programs; and

- New standards of quality and effectiveness for professional teacher induction programs.

Following their adoption by the Commission in 2001, these three sets of standards initiated structural changes in the teacher credentialing system, as follows:

- alignment of all teacher preparation standards with the state-adopted academic content standards and performance levels for K-12 students, and with the *California Standards for the Teaching Profession (CSTP)*;
- inclusion of a teaching performance assessment in preliminary multiple and single subject teacher preparation programs; and
- a required induction period of support and formative assessment for all first and second year multiple and single subject teachers.

In addition to these structural and thematic shifts in the Commission's credentialing system and standards, SB 2042 (Chap. 548, Stats. 1998) replaced the Professional Clear Credential course requirements in health science, mainstreaming and technology with a requirement that essential preparation in these three areas be addressed in both the preparation and the induction standards. Follow-up legislation in 1999, AB 1059 (Chap. 711, Stats. 1999) required that new standards for preparation and induction programs include preparation for all teachers to teach English learners in mainstream classrooms. The subject matter standards in this handbook have been designed to complement the SB 2042 standards for programs of pedagogical preparation.

2. Standards for Subject Matter Preparation Programs for Prospective Teachers

In California, subject matter preparation programs for prospective teachers are not the same as undergraduate degree programs. Postsecondary institutions govern academic programs that lead to the awarding of degrees, including baccalaureate degrees in agriculture, whereas the Commission sets standards for academic programs that lead to the issuance of credentials, including the Single Subject Teaching Credential in Agriculture. An applicant for a teaching credential must have earned a Bachelor's degree from an accredited institution, but the degree may be in a subject other than the one to appear on the credential. Similarly, degree programs for undergraduate students in agriculture may or may not fulfill the Commission's standards for subject matter preparation. Single subject candidates who complete an approved subject matter program that satisfies the standards meet the subject matter requirement to qualify for the Single Subject Credential in Agriculture.

3. The Standards Development Process

The Commission's process for standards development includes the establishment of advisory panels that develop and recommend program standards to the Commission. As this process was applied to the development of subject matter program standards, each panel consisted of:

- Classroom teachers of the subject area
- Subject area specialists in school districts, county offices of education, and postsecondary institutions
- Professors in the subject area teaching in subject matter preparation programs
- Teacher educators
- Members of relevant professional organizations
- Members of other relevant committees and advisory panels

- A liaison from the California Department of Education.

During the third phase of standards development, twelve panel members were appointed to the Home Economics Panel; twelve members were appointed to the Languages Other than English: American Sign Language Panel; eighteen members were appointed to the Business Panel; thirteen members were appointed to the Health Science Panel; fourteen members were appointed to the Agriculture Panel; and fourteen members were appointed to the Industrial and Technology Education Panel. These panels began their work in 2004 with a written charge that described their responsibilities for identifying the subject-specific knowledge, skills, and abilities (SMRs) which form the basis of the content required in Commission-approved subject matter preparation programs for teacher candidates. The SMRs for each of these content areas were approved by the Commission at its January 2005 meeting.

a. Essential Reference Documents for Subject Matter Panels

The subject matter panels used a number of documents as primary resource references for their work. The documents listed below were essential for the phase three panels' use in developing the draft program standards that were subsequently adopted by the Commission.

- The draft academic content standards for K-12 students and/or frameworks approved by the California State Board of Education (2005)
- The Commission-approved (1996) *Standards of Quality and Effectiveness for Subject Matter Programs in Home Economics, Languages Other Than English, Business, Health Science, Agriculture, and Industrial and Technology Education and Handbooks for Teacher Educators and Program Reviewers* in each of the academic areas (1999)
- The *Standards of Program Quality and Effectiveness for the Subject Matter Requirements for the Multiple Subject Teaching Credential* (Sept. 2001)
- The *Standards of Quality and Effectiveness for Preliminary Teacher Preparation Programs* (Sept. 2001, revised 2003)
- The national subject matter standards for agriculture, languages other than English: American Sign Language, business, health science, home economics, and industrial and technology education
- Other important state and national studies and publications relevant to the subject areas.

The State Board-adopted K-12 student academic content standards and/or frameworks were the central documents used by the panels. In 2002, the first phase of subject matter advisory panels had identified six standards contained within the 1992 standards documents that were common to all of the subject matter standards, and had added several additional standards based on the SB 2042 reform (Chap. 578, Stats. 1998). This process resulted in the development and approval by the Commission of ten standards “common to all” programs that were incorporated within the specific program standards for each of the single subject area standards developed in phase three.

In 2010 the ten Standards Common to All were revised and replaced by two Standards Common to All.

The *Subject Matter Requirements for the Multiple Subject Teaching Credential* was also an important document used by the panels. In some cases the multiple subject standards language and the organization of the standards were incorporated by the panels. The standards of the national professional organizations also served as a guide and provided a comprehensive perspective for panel members.

b. Field Review of Draft Standards

The single subject matter standards developed by the phase three advisory panels and subsequently adopted by the Commission were formatted to align with the SB 2042 teacher preparation. In this new format the broad conceptual standard is presented, followed by Program Guidance for the standard which further articulates the concepts contained within the standard.

Early in 2004 the Commission conducted a field review of the draft single subject matter standards. The draft standards were mailed to all deans of education, directors of teacher education programs, and single subject coordinators at all Commission-accredited four-year institutions in California; to learned societies and professional organizations; and to funded subject matter projects, teacher organizations, school districts, and county offices of education. The draft standards were sent as well to over one hundred selected K-12 public school teachers and college/university professors. The standards were also placed on the Commission's web site with instructions on how to download the standards, complete the field review survey, and return survey responses to the Commission.

Standards review surveys were returned to the Commission by February 2004. Commission staff tallied all responses and listed all comments on a master survey form for each subject matter area. Revisions made by the panels as a result of the field review included providing clarifications and examples, and reorganizing content. Elements that were consistent with the state's K-12 student academic content standards remained unchanged.

c. Adoption of Standards by the Commission

The revised subject matter standards for all of the phase three subject areas were adopted by the Commission at its meeting of September 2006.

B. Alignment of Subject Matter Program Standards and Subject Matter Assessments

The Teacher Preparation and Licensing Act of 1970 (Ryan Act) established the requirement that candidates for teaching credentials verify their knowledge of the subjects they intend to teach. Candidates for single subject teaching credentials may satisfy this subject matter requirement by completing approved single subject matter programs or by passing subject matter examinations that have been adopted by the Commission. Senate Bill 2042 (Chap. 548, Stats.1998) required that subject matter programs and examinations for prospective teachers be aligned with K-12 student standards and frameworks.

To achieve this alignment and congruence, the Commission asked the subject matter advisory panels to develop subject matter requirements (SMRs) that would be consistent in scope and content with the K-12 standards and frameworks. At the time the Commission adopted the phase three subject matter program standards in 2006, it also adopted the subject matter requirements appended to the standards document. College and university faculty and administrators are urged to examine these SMRs as a source of information about essential content that should be included in subject matter preparation programs, as these represent the scope of content on which both the program standards and the subject matter examinations are based and to which the program standards and the examinations are aligned.

Early in 2004, the Commission began the process of developing assessments that were aligned with the K-12 requirements. These assessments are known as the “California Subject Examinations for Teachers (CSET),” and are administered by an external contractor under the Commission’s direction. In the six subject areas, multiple-choice and constructed-response test items were drafted, based on the subject matter requirements. The test items were reviewed by both the Bias Review Committee and the appropriate subject matter advisory panel and revised as necessary. The CSET examinations for the phase three subject areas of agriculture, business, health science, home economics, industrial and technology education, and languages other than English: American Sign Language were first administered in fall 2005, and these assessments replaced the SSAT and Praxis II examinations in these content areas.

C. Single Subject Teaching Credentials

The Single Subject Teaching Credential authorizes an individual to teach classes in that content area in departmentalized settings. The holders of these credentials may teach at any grade level, but the great majority of the classes in these subjects occurs in grades seven through twelve. The Commission asked the subject matter advisory panels to recommend new policies to ensure that future teachers are prepared to instruct in the subject areas most commonly taught in secondary public schools.

D. Contacting the Commission

The Commission periodically reviews and updates its policies, in part on the basis of responses from colleges, universities, school districts, county offices, professional organizations and individual professionals. The Commission welcomes all comments and questions about the standards and other policies in this handbook. For further information, please contact the Commission at the following address:

Commission on Teacher Credentialing
Professional Services Division
1900 Capitol Avenue
Sacramento, California 95814-4213

Part 2: Standards of Quality and Effectiveness for the Subject Matter Program in Agriculture

A. Overview and Introduction to the Handbook

This section of the handbook is organized into three parts. Part 1 of the handbook provides the background and context for the agriculture program standards. Part 2 of the handbook presents the twenty program standards as well as the subject matter requirements for agriculture. Part 3 of the handbook provides information about implementation of the Agriculture program standards in California colleges and universities.

1. Contributions of the Agriculture Subject Matter Advisory Panel

The Commission on Teacher Credentialing is indebted to the Agriculture Subject Matter Advisory Panel for the development of the *Standards of Quality and Effectiveness for the Subject Matter Program in Agriculture*. The Commission believes strongly that the standards in this handbook will improve the teaching and learning of Agriculture in California's public schools.

2. Introduction by the Agriculture Subject Matter Advisory Panel

The Subject Matter Standards and Requirements in Agriculture are designed to provide a basis for instruction and assessment in the content preparation of teacher candidates in agriculture teacher preparation programs. The standards provide the general domains of content preparation, but institutions are encouraged to reference both these standards and the corresponding Subject Matter Requirements on which the standards are based, as provided in this handbook when developing program documents.

This edition of the handbook differs in content and organization from the previous edition. However, the panel incorporated appropriate elements of the previous edition into these new standards. The panel made extensive efforts to align these standards of content knowledge for teachers with California's curriculum requirements for agriculture instruction in grades K-12. The inclusion of both university and K-12 faculty on the panel provided assurance that both education sectors were represented and their needs and interests were addressed. The panel also included a review of the agriculture teacher preparation standards of other states in its deliberations. The panel wishes to thank the substantial number of agriculture education experts who contributed both directly and indirectly to the development of these standards.

Each standard is designed to be comprehensive enough to provide general direction for university programs of agriculture education, yet flexible enough to allow and encourage local enrichment. In many respects the standards are organized by domain, but programs are allowed, and even encouraged, to consider alternative options for organizing the curriculum. As long as all domains are included at an adequate level, a program will be determined to have addressed the standards appropriately and may be approved by the Commission after review.

3. Definitions of Key Terms

California state law authorizes the California Commission on Teacher Credentialing to set standards and requirements for preparation programs (Education Code sections 44225a, i, j; 44310; and 44311). The following key terms are used in this handbook.

Preconditions

A precondition is a requirement for initial and continued program approval. Unlike standards, preconditions specify requirements for program compliance, not program quality. Commission staff determines whether a program complies with the adopted preconditions on the basis of a program document provided by the college or university. In the program review sequence, a program that meets all preconditions then undergoes a more intensive review to determine if the program's quality meets the Commission's standards.

Standards

Standards are statements of program quality adopted by the Commission on Teacher Credentialing to describe acceptable levels of quality in programs of subject matter study offered by regionally-accredited colleges and universities that award baccalaureate degrees. Each standard is elaborated by Program Guidance for that standard. Programs must meet all of the applicable standards for both initial and continuing approval of a subject matter program by the Commission. The Commission determines whether a program satisfies a standard on the basis of an intensive review of all available information provided by the program sponsor related to the standard.

Program Guidance

Program guidance is provided for each standard to help institutions in developing programs that meet the standards, and are also used by program review panels in judging the quality of a program in relation to a given standard. Within the overall scope of a standard, Program Guidance identifies what the Commission believes are the important dimensions of program quality with respect to each standard. In determining whether a program fulfills a given standard, the review panel considers the information provided by the program in response to each statement of that standard. When the review panel finds that a program has met each standard, the program is then recommended to the Commission for approval.

B. The Agriculture Standards

1. Preconditions for the Approval of Subject Matter Programs in Agriculture

To be approved by the Commission, a Subject Matter Program in Agriculture must comply with the following preconditions.

1. Each program of subject matter preparation for the Single Subject Teaching Credential in Agriculture shall include a minimum of 45 semester units with (a) a minimum of 32 to 36 semester units (or 48 to 54 quarter units) of core coursework in industrial and technology education and related subjects that are commonly taught in departmentalized classes in California public schools, and (b) a minimum of 9 to 12 semester units (or 14 to 20 quarter units) of coursework that provides extended study of the subject. These two requirements are elaborated in Preconditions 2 and 3.
2. The core (breadth) of the program shall include coursework in (or directly related to) subjects that are commonly taught in departmentalized classes of agriculture: plant and soil science, ornamental horticulture, agricultural business and economics, environmental science and natural resource management, and agricultural systems technology which will fulfill Standards 11 through 16.
3. Extended studies in the program (breadth, depth, perspective, concentrations) shall be designed to supplement the core of the program with specialization as described in Standard 17.

In addition to describing how a program meets each standard of program quality in this handbook, the program document by an institution shall include the course titles, unit designations, catalog descriptions and syllabi of all courses in the program that are used to meet the standards. Program documents must also include a matrix that identifies which courses meet which subject matter requirements.

Institutions may determine whether the standards are addressed through one or more courses for each commonly taught subject or courses offering integrated study of these subjects. Institutions may also define the program in terms of required or elective coursework. However, elective options must all meet the standards. Coursework offered by any appropriate department(s) of a regionally accredited institution may satisfy the preconditions and standards in this handbook. Programs may use general education courses in meeting the standards.

A. Standards of Quality and Effectiveness for the Subject Matter Program in Agriculture

Standards Common to All Single Subject Matter Preparation Programs

Standard 1: Program Design

Subject matter programs are based on an explicit statement expressing the purpose, design, and expected outcomes of the program. The program curriculum builds on the K-12 State-adopted academic content standards, with student outcomes and assessments aligned to the subject matter requirements. The program provides prospective teachers with conceptual knowledge of the subject matter, develops academic literacy and discipline-based fluency, addresses issues of equity and diversity, and exposes prospective teachers to a variety of learning experiences appropriate for the discipline.

Standard 2: Program Resources and Support

The program sponsor allocates resources to support effective program coordination, which includes advising students, facilitating collaboration among stakeholders, and overseeing program review. Ongoing review processes use assessments of the prospective teachers and a variety of data such as input from stakeholders and other appropriate measurements for review and evaluation of the subject matter program.

B. Agriculture Program Standards

Standard 3: Plant and Soil Science

The program requires basic preparation that develops knowledge, skill and the ability to integrate and apply concepts in the areas of plant and soil science.

The following statements no longer require a direct response but should be used for guidance in responding to the standards directly. Each statement of the standard should be responded to instead, by providing a brief description, a few examples and evidence citations for how the program meets the standard. Please limit the total response to the standard to 1-2 pages.

The program provides appropriate instruction in:

- The characteristics, components and properties of soil, including calculating soil type using the soil texture triangle and identifying the components of the soil profile.
- Plant nutrition and soil treatments, including the importance of macro and micro-nutrients and methods of amendment application.
- Plant classification, including identification of plants using binomial nomenclature and understanding of plant anatomy and physiology.
- Plant genetics, reproduction and propagation, including demonstration of sexual and asexual propagation techniques.
- Crop management and production, including practical application in crop selection, land preparation, planting, pest management, irrigation and harvesting.
- Emerging technologies in plant production, including the genetic engineering of plants and its risks and benefits.
- Career opportunities in plant and soil science.

Standard 4: Ornamental Horticulture

The program requires basic preparation that develops knowledge, skill and the ability to integrate and apply concepts in the area of ornamental horticulture.

The following statements no longer require a direct response but should be used for guidance in responding to the standards directly. Each statement of the standard should be responded to instead, by providing a brief description, a few examples and evidence citations for how the program meets the standard. Please limit the total response to the standard to 1-2 pages.

The program provides appropriate instruction in:

- Greenhouse and nursery management and production, including the ability to demonstrate propagation, crop selection, planting and environmental management techniques.
- Principles of landscape design, planning, construction and maintenance, including the installation of soft- and hardscape elements from a landscape plan.
- The basic elements and principles of floral design, including the construction of floral arrangements and use of designs.
- Career opportunities in ornamental horticulture.

Standard 5: Animal Science

The program requires basic preparation in animal science that develops knowledge, skill, and the ability to integrate and apply concepts in the areas of animal science and production.

The following statements no longer require a direct response but should be used for guidance in responding to the standards directly. Each statement of the standard should be responded to instead, by providing a brief description, a few examples and evidence citations for how the program meets the standard. Please limit the total response to the standard to 1-2 pages.

The program provides appropriate instruction in:

- The anatomy and physiology of livestock, including identification of internal structures and external parts of common livestock species.
- Management and veterinary practices in animal production, including the prevention, diagnosis and treatment of common ailments and nutrient deficiencies.
- Nutritional requirements of livestock, including an understanding of the appropriate use of concentrates, roughages, additives, and supplements used in feeding livestock.
- Animal genetics and reproduction, including an understanding of breeding techniques and animal selection.
- Environmental and facilities management in animal production systems, including an understanding of sanitation practices and evaluation of facilities appropriate to the species.
- Ethical livestock management practices, including the ability to restrain and handle livestock in accordance with industry quality assurance guidelines.
- Career opportunities in the area of animal science.

Standard 6: Environmental Science and Natural Resource Management

The program requires basic preparation in environmental science and natural resource management that develops knowledge, skill, and the ability to integrate and apply concepts in the areas of environmental science and natural resource management.

The following statements no longer require a direct response but should be used for guidance in responding to the standards directly. Each statement of the standard should be responded to instead, by providing a brief description, a few examples and evidence citations for how the program meets the standard. Please limit the total response to the standard to 1-2 pages.

The program provides appropriate instruction in:

- Basic ecological principles and natural resources, including an understanding of the interaction of fire, erosion, water quality and the human impact.
- Relationships among agriculture, the environment and society, including the responsibility of agriculturists as stewards of the land.
- Ecosystem and resource management, including an understanding of water and soil conservation, air quality and sources of pollution.
- Forest management, including an understanding of the issues and challenges of the forest industry.
- Career opportunities in the area of environmental science and natural resource management

Standard 7: Agricultural Business and Economics

The program requires basic preparation that develops knowledge, skill and the ability to integrate and apply concepts in the areas of agricultural business and economics.

The following statements no longer require a direct response but should be used for guidance in responding to the standards directly. Each statement of the standard should be responded to instead, by providing a brief description, a few examples and evidence citations for how the program meets the standard. Please limit the total response to the standard to 1-2 pages.

The program provides appropriate instruction in:

- Agricultural economics, including an understanding of public and private economic impacts on agricultural business.
- Agricultural marketing and trade, including an understanding of marketing strategies, processing and risk management for agricultural producers.
- Agricultural entrepreneurship and leadership, including an understanding of business plans, ethics and leadership styles relevant to agricultural business.
- Agricultural business management, record keeping and accounting, including developing business agreements, budgets, accurate business records, and financial statements.
- Careers in agricultural business and agricultural economics.

Standard 8: Agriculture Systems Technology

The program requires basic preparation that develops knowledge, skill and the ability to integrate and apply concepts in the area of agricultural systems technology.

The following statements no longer require a direct response but should be used for guidance in responding to the standards directly. Each statement of the standard should be responded to instead, by providing a brief description, a few examples and evidence citations for how the program meets the standard. Please limit the total response to the standard to 1-2 pages.

The program provides appropriate instruction in:

- Safety principles and practices, including the ability to develop and administer safety tests and establish safe shop procedures.
- Shop fabrication, including the ability to design, layout and construct a wood and/or metal project.
- Construction of agricultural structures, including the ability to perform concrete, masonry, carpentry, welding, plumbing, and electrical skills.
- Maintenance and operation of power equipment, including identification and selection of the appropriate tool for the job, troubleshooting, and safe operation.
- Land measurement and irrigation systems, including an understanding of surveying instruments and techniques, and irrigation types and components.
- Careers in agricultural systems technology.

Standard 9: Specialization in Agriculture

The program requires basic preparation in animal science, plant/soil science, ornamental horticulture, agricultural business management, environmental science and natural resource management, or agricultural systems technology that more deeply develops knowledge, skill, and the ability to integrate and apply concepts in the area selected.

The following statements no longer require a direct response but should be used for guidance in responding to the standards directly. Each statement of the standard should be responded to instead, by providing a brief description, a few examples and evidence citations for how the program meets the standard. Please limit the total response to the standard to 1-2 pages.

The program provides appropriate instruction in:

- Depth of study in at least one domain that is significantly beyond that which is required in the core.
- The skills required by entry-level employees in the field of study.
- The skills needed to convey the applications of the specialization.

Standard 10: Agriculture Education as a Profession

The program requires basic preparation and instruction in the philosophy and history of agricultural education, the status of agriculture in contemporary society, and the role of the educator in the school, community and industry.

The following statements no longer require a direct response but should be used for guidance in responding to the standards directly. Each statement of the standard should be responded to instead, by providing a brief description, a few examples and evidence citations for how the program meets the standard. Please limit the total response to the standard to 1-2 pages.

The program provides appropriate instruction in:

- Current educational philosophies applied to the agriculture curriculum.
- The current programs and practices within a historical perspective.
- The ethics, values, and scope of responsibilities of the professional agriculture educator.
- The current issues and advancements affecting agriculture and education.
- The benefits and responsibilities of being an active member in professional activities and organizations.

Standard 11: Integration of Concepts

The program requires basic preparation that develops knowledge of integration of standards and concepts of the program areas within agriculture and the interrelationships that exist between agriculture and other subject areas.

The following statements no longer require a direct response but should be used for guidance in responding to the standards directly. Each statement of the standard should be responded to instead, by providing a brief description, a few examples and evidence citations for how the program meets the standard. Please limit the total response to the standard to 1-2 pages.

The program provides appropriate instruction in:

- Relationships between agriculture and other disciplines commonly taught in the public schools.
- The integration of the major themes and concepts of the program areas within agriculture.
- Methodologies to achieve the integration of standards and concepts between and among agriculture and other subjects commonly taught in public schools
- The use of the state adopted curriculum standards for agriculture and the Academic Content Standards for K-12 students (i.e., CA Science and Fine Arts Standards) in agriculture courses receiving subject matter equivalence for graduation or college entrance requirements (i.e., A-G requirements).

Standard 12: Early Field Experiences in Agriculture

The program requires early field experiences in agriculture education venues.

The following statements no longer require a direct response but should be used for guidance in responding to the standards directly. Each statement of the standard should be responded to instead, by providing a brief description, a few examples and evidence citations for how the program meets the standard. Please limit the total response to the standard to 1-2 pages.

The program requires students to:

- Observe agriculture classrooms and experience integral activities associated with agriculture education programs.
- Discuss and compare their field experiences with those of other students in the program.

Standard 13: Safety

The program requires basic preparation that develops knowledge of proper safety procedures prior to laboratory field experiences and includes instruction in emergency procedures; proper use, storage, handling, and disposal of hazardous materials and equipment; and safe and secure handling of food products.

The following statements no longer require a direct response but should be used for guidance in responding to the standards directly. Each statement of the standard should be responded to instead, by providing a brief description, a few examples and evidence citations for how the program meets the standard. Please limit the total response to the standard to 1-2 pages.

The program provides appropriate instruction in:

- Safety procedures in laboratory activities.
- The proper and safe use of agricultural equipment, tools and facilities.
- Emergency procedures for handling and disposing of hazardous materials.
- Liability and risk management issues.
- Bio-security and biohazards in school agriculture facilities.

C. Subject Matter Requirements for Prospective Teachers of Agriculture

(1.) Introduction

Subject matter requirements represent the body of knowledge, skills and abilities expected of teachers of agriculture in the public schools. The subject matter requirements form the basis for both program standards and examination specifications for agriculture.

(2.) Content Domains for Subject Matter Knowledge and Skills in Agriculture

Domain 1. Plant and Soil Science

Candidates demonstrate a broad understanding of principles of plant and soil science. Candidates apply this knowledge to plan and implement programs. Candidates are able to demonstrate an understanding of a range of topics in plant and soil science, including soil science; plant nutrition and soil treatments; plant classification, anatomy, and physiology; plant genetics, reproduction, and propagation; crop production practices; and emerging technologies in plant and soil science.

1.1 Characteristics, Components, and Properties of Soil

- a. Demonstrate knowledge of soil biology (e.g., soil food chains) and soil components (e.g., humus, sand, clay, silt) and their relevance for supporting plant growth.
- b. Demonstrate knowledge of properties of soil (e.g., texture, particle size, structure, pore space) and characteristics of different types of soil.
- c. Analyze the relationship of soil type and composition to crop selection and production.

1.2 Plant Nutrition and Soil Treatments

- a. Demonstrate an understanding of plant nutrition and the role of various nutrients (e.g., nitrogen, phosphorus, potassium) in plant growth.
- b. Demonstrate knowledge of how to conduct and interpret basic soil tests (e.g., fertility, texture, pH).
- c. Demonstrate knowledge of different types (e.g., organic, inorganic, slow release), forms (e.g., liquid, granule), uses, and formulations of fertilizer and other soil amendments.

1.3 Plant Classification, Anatomy, and Physiology

- a. Demonstrate an understanding of principles of plant classification and identification (e.g., using dichotomous keys) and characteristics of major plant groups (e.g., monocots, dicots).
- b. Demonstrate knowledge of types (e.g., forage, grain, tree, vine, vegetable), varieties, characteristics, and uses of agriculturally important crops grown in California.
- c. Demonstrate knowledge of the nature and functions of plant cells, structures, organs, and systems.
- d. Demonstrate an understanding of physiological processes in plants (e.g., photosynthesis, respiration, transpiration, transport of nutrients and water).
- e. Demonstrate knowledge of processes of plant growth and analyze factors that influence plant growth (e.g., water, light, temperature, pruning).

1.4 Plant Genetics, Reproduction, and Propagation

- a. Demonstrate an understanding of processes and structures involved in asexual and sexual reproduction in plants.
- b. Demonstrate knowledge of plant genetics, selective breeding, and hybridization.
- c. Demonstrate knowledge of methods and techniques of plant propagation (e.g., seeds, budding, grafting, division).

1.5 Crop Management and Production

- a. Demonstrate knowledge of characteristics and uses of tillage, seedbed preparation, planting layout (e.g., raised bed, strip cropping), and planting methods.
- b. Demonstrate knowledge of crop management methods and practices (e.g., drainage, irrigation, mulching, crop rotation, land classification) in the production of various crops.
- c. Demonstrate knowledge of characteristics of plant pests, diseases, and weeds and methods for their control (e.g., chemical pest control, biological pest control, integrated pest management, cultivation).
- d. Demonstrate knowledge of procedures for the safe handling, application, and disposal of agricultural chemicals.
- e. Demonstrate knowledge of methods of harvesting common California crops and principles and procedures for post-harvest handling, processing, and storing of these crops.
- f. Demonstrate an understanding of food safety issues and societal concerns regarding crop production (e.g., pesticide residues, contamination during picking and handling, irradiated food, transgenic crops) and alternative methods of crop production (e.g., organic farming).

1.6 Emerging Technologies in Plant Production

- a. Demonstrate an understanding of new technologies in plant propagation (e.g., micro-propagation).
- b. Demonstrate an understanding of new technologies for crop improvement (e.g., biotechnology, genetic engineering).
- c. Demonstrate knowledge of new technologies used for crop management and production (e.g., remote sensing, precision farming, Variable Rate Technology [VRT], Geographic Information Systems [GIS], Global Positioning Systems [GPS]).

(Draft Curriculum Standards for Agriculture [2004]: Standards 1.10–1.12, 3. California Agricultural Education Career Preparation Standards: Grades 11–12 [1995]: Plant and Soil Science Career Path Standards 1–7. Agriculture Teacher Preparation in California: Standards of Quality and Effectiveness [1999]: Standard 3.)

Domain 2. Ornamental Horticulture

Candidates demonstrate a broad understanding of principles of ornamental horticulture. Candidates apply this knowledge to plan and implement programs. Candidates are able to demonstrate an understanding of a range of topics in ornamental horticulture, including greenhouse and nursery management, landscape design and management, and floriculture and floral design.

2.1 Greenhouse and Nursery Management

- a. Demonstrate knowledge of types, varieties, characteristics, and uses of greenhouse and nursery crops (e.g., shrubs, flowers, bedding plants, potted plants) grown in California.
- b. Demonstrate an understanding of the types, characteristics, uses, and care of greenhouse and nursery facilities, tools, and equipment, as well as methods for managing the greenhouse and nursery environments (e.g., water management; scheduling production; controlling temperature, light, and humidity).
- c. Demonstrate knowledge of types, characteristics, uses, and preparation of growing media in greenhouses and nurseries.
- d. Demonstrate knowledge of characteristics of pests, diseases, and weeds in greenhouses and nurseries, as well as methods for their identification and control (e.g., integrated pest management).
- e. Demonstrate knowledge of production of greenhouse and nursery crops (e.g., propagating, transplanting, hardening off, pruning, forcing, controlling day length, fertilizing, watering).

2.2 Landscape Design, Construction, and Management

- a. Demonstrate knowledge of types, varieties, characteristics, and uses of plants (e.g., turfgrasses, annuals, perennials, shrubs, trees) and materials used in landscaping in California.
- b. Demonstrate knowledge of principles of landscape design, planning, and construction.
- c. Demonstrate knowledge of methods for selecting, planting, irrigating, caring for, pruning, and maintaining landscape plants and turfgrass.
- d. Demonstrate knowledge of types, characteristics, uses, and care of tools and equipment used in landscaping and turfgrass maintenance and installation.

2.3 Floral Design

- a. Demonstrate knowledge of varieties, characteristics, and uses (e.g., line, mass, filler, form) of flowers and foliage in floral design.
- b. Demonstrate knowledge of procedures for harvesting, handling, storing, and preparing cut flowers.
- c. Demonstrate an understanding of the basic elements (e.g., form, line, texture, space, color) and principles (e.g., balance, scale, proportion, rhythm, focal point, contrast, harmony) of floral design.
- d. Demonstrate knowledge of types, characteristics, uses, and care of facilities, tools, equipment, and materials used in floral design.

(Draft Curriculum Standards for Agriculture [2004]: Standard 5. California Agricultural Education Career Preparation Standards: Grades 11–12 [1995]: Ornamental Horticulture Career Path Standards 1–6. Agriculture Teacher Preparation in California: Standards of Quality and Effectiveness [1999]: Standard 4.)

Domain 3. Animal Science

Candidates demonstrate a broad understanding of principles of animal science. Candidates apply this knowledge to plan and implement programs. Candidates are to be able to demonstrate an understanding of a range of topics in animal science, including anatomy and physiology of livestock, animal production practices, animal nutrition, animal genetics and reproduction, and animal facilities management.

3.1 Anatomy and Physiology of Livestock

- a. Demonstrate knowledge of and compare the structure, function, and interrelationships of cells, organs, and organ systems in livestock (e.g., beef and dairy cattle, swine, sheep, horses, rabbits, poultry).
- b. Demonstrate an understanding of physiological processes (e.g., digestion, respiration) of organs and organ systems in livestock.
- c. Analyze the relationship between animal anatomy and physiology and the care of livestock (e.g., the relationship of the digestive system to nutrition and feeding practices, the relationship of the reproductive system to practices during parturition).
- d. Demonstrate knowledge of principles and procedures for evaluating livestock and carcasses.

3.2 Management and Veterinary Practices in Animal Production

- a. Demonstrate knowledge of products derived from livestock and characteristics and uses of various species and breeds of livestock.
- b. Demonstrate an understanding of safe, humane, and ethical management and veterinary practices and procedures in animal production (e.g., handling, castrating, dehorning, medicating) and of the public perception of animal welfare in animal production systems.
- c. Demonstrate an understanding of characteristics of healthy and unhealthy animals, as well as types, causes, symptoms, preventive actions, and treatments of common infectious and noninfectious diseases in livestock.
- d. Demonstrate knowledge of types, symptoms, effects, and life cycles of common internal and external pests and parasites and methods for preventing and treating pest and parasite infestations.
- e. Demonstrate knowledge of harvesting and inspecting meat and other animal products.

3.3 Nutritional Requirements of Livestock

- a. Demonstrate an understanding of the processes and stages of growth and development of livestock.
- b. Demonstrate knowledge of sources and functions of animal nutrients and symptoms of nutrient deficiencies.
- c. Demonstrate an understanding of the composition, classification, and nutritional value of various types of feed.
- d. Analyze factors (e.g., species, age, pregnancy, lactation, optimal weight gain) influencing nutritional requirements and feeding options.
- e. Demonstrate an understanding of types, functions, and effects of various feed additives (e.g., minerals, vitamins, antibiotics).

3.4 Animal Genetics and Reproduction

- a. Demonstrate an understanding of basic principles of inheritance and genetics (e.g., Mendelian genetics; the genetic basis of animal selection; function of genes, chromosomes, and DNA; biotechnology and cloning).
- b. Demonstrate an understanding of the processes of meiosis and fertilization.
- c. Demonstrate knowledge of animal breeding systems, methods, and procedures (e.g., crossbreeding, artificial insemination, embryo transfer).
- d. Demonstrate knowledge of the care of animals during gestation and parturition.
- e. Demonstrate knowledge of factors that influence breeding decisions (e.g., phenotype, performance records).

3.5 Environmental and Facilities Management in Animal Production Systems

- a. Demonstrate an understanding of environmental needs (e.g., range requirements, temperature control, appropriate housing) of livestock.
- b. Demonstrate knowledge of different types, characteristics, and purposes of animal facilities, tools, technology, and equipment used in various animal production systems.
- c. Demonstrate an understanding of procedures for managing waste (e.g., manure, carcasses) and maintaining sanitation in various animal production systems.

(Draft Curriculum Standards for Agriculture [2004]: Standards 1.4–1.9, 2. California Agricultural Education Career Preparation Standards: Grades 11–12 [1995]: Animal Science Career Path Standards 1–6. Agriculture Teacher Preparation in California: Standards of Quality and Effectiveness [1999]: Standard 2.)

Domain 4. Environmental Science and Natural Resource Management

Candidates demonstrate a broad understanding of principles of environmental science and natural resource management. Candidates apply this knowledge to plan and implement programs. Candidates are able to demonstrate an understanding of a range of topics in environmental science and natural resource management, including basic ecological principles and natural resources; relationships between agriculture, the environment, and society; ecosystem and resource management; and forestry.

4.1 Basic Ecological Principles and Natural Resources

- a. Demonstrate an understanding of energy, water, and nutrient cycles and the concepts of niche, community, and ecosystem.
- b. Demonstrate knowledge of the interrelationship between environmental factors (e.g., climate, weather, habitat) and plant and animal communities.
- c. Demonstrate knowledge of types and characteristics of renewable energy and natural resources (e.g., wind power, forests, wildlife) and nonrenewable energy and natural resources (e.g., fossil fuels, minerals).
- d. Demonstrate an understanding of human and agricultural dependence on natural resources and principles and methods for the sustainable use of resources.

4.2 Relationships Between Agriculture, the Environment, and Society

- a. Demonstrate knowledge of impacts of agricultural production systems on the environment (e.g., runoff of fertilizers, water table depletion, salinization) and principles and methods for minimizing and mitigating environmental degradation.
- b. Demonstrate knowledge of the advantages and disadvantages of different production systems (e.g., monoculture, sustainable agriculture, organic agriculture).
- c. Demonstrate knowledge of the effects of environmental degradation on agricultural production (e.g., decreased productivity, loss of farmland, depletion of aquifers).
- d. Demonstrate basic knowledge of social, ethical, and legal issues (e.g., stewardship, use restrictions, landowner property rights) and the role of government agencies and private organizations (e.g., Environmental Protection Agency, land trusts, Sierra Club) relating to the use and management of ecosystems and natural resources.

4.3 Ecosystem and Resource Management

- a. Demonstrate knowledge of principles and methods of soil and water conservation and management (e.g., erosion control, water reclamation).
- b. Demonstrate knowledge of types (e.g., rangelands, forests, wetlands), characteristics (e.g., stability), and uses (e.g., grazing, mining, logging, recreation) of important California ecosystems, as well as principles and methods for their successful management.
- c. Demonstrate knowledge of principles and methods for wildlife management (e.g., identification of major wildlife species, habitat conservation and renewal).
- d. Demonstrate knowledge of principles and methods for the management of outdoor recreation areas.

4.4 Forestry

- a. Demonstrate knowledge of major types of forests in the United States, their characteristics (e.g., dominant tree species), uses (e.g., recreation, timber, watershed), and products (e.g., softwoods, hardwoods).
- b. Demonstrate knowledge of principles and methods of forest management (e.g., timber management, multiple-use management, urban forest management).
- c. Demonstrate knowledge of the effects of social, economic, and political factors on forests.
- d. Demonstrate an understanding of the causes, control, and importance of fire in the forest and wildland ecosystems (e.g., fire chemistry and behavior, fire control methods, the fire triangle, prescribed burning).
- e. Demonstrate knowledge of tools and equipment used in forest and wildland management (e.g., compass, Global Positioning Systems [GPS], maps, surveying equipment, timber measurement tools).

(Draft Curriculum Standards for Agriculture [2004]: Standards 1.2, 7. California Agricultural Education Career Preparation Standards: Grades 11–12 [1995]: Forestry and Natural Resources Career Path Standards 1–7. Agriculture Teacher Preparation in California: Standards of Quality and Effectiveness [1999]: Standard 6.)

Domain 5. Agricultural Business and Economics

Candidates demonstrate a broad understanding of principles of agricultural business and economics. Candidates apply this knowledge to plan and implement programs. Candidates are able to demonstrate an understanding of a range of topics in agricultural business and economics, including agricultural economics, marketing, and trade; agricultural entrepreneurship and management functions; agricultural business management; and government policies that affect agricultural businesses.

5.1 Agricultural Economics

- a. Demonstrate an understanding of basic economic principles (e.g., supply, demand, elasticity, equilibrium) and their application to agricultural business.
- b. Demonstrate an understanding of how government policies (e.g., tax policies, subsidies, tariffs) affect national and international agricultural businesses.
- c. Demonstrate an understanding of how private and public organizations impact agricultural businesses.

5.2 Agricultural Marketing and Trade

- a. Demonstrate an understanding of basic principles and strategies for marketing agricultural products (e.g., identifying target markets and market outlets, developing marketing plans).
- b. Analyze factors affecting the purchase and sale of agricultural products and services (e.g., customer relations; merchandising; pricing, labeling, and displaying products).
- c. Demonstrate knowledge of factors (e.g., governmental, economic, political, cultural) that affect international trade in agricultural products.

5.3 Agricultural Entrepreneurship and Leadership

- a. Demonstrate an understanding of the role of entrepreneurship in agriculture and factors that are important for successful entrepreneurship.
- b. Demonstrate knowledge of steps for establishing a successful business and the components of a business plan.
- c. Demonstrate knowledge of business management functions (e.g., planning, organizing, directing, controlling, staffing) and types of business organizations and structures (e.g., sole proprietorship, partnership, corporation, cooperative).
- d. Demonstrate knowledge of effective leadership styles, key concepts of group dynamics, team and individual decision making, and conflict resolution.
- e. Demonstrate knowledge of work-related and business-related ethics.
- f. Demonstrate knowledge of federal, state, and local agencies, laws, and regulations (e.g., environmental, liability, workplace safety, antidiscrimination, child labor, food safety and security) affecting agricultural businesses.

5.4 Agricultural Business Management, Record Keeping, and Accounting

- a. Demonstrate an understanding of principles and procedures used for budgeting, analysis of cash flow, record keeping, and accounting in agricultural businesses.
- b. Demonstrate an understanding of basic banking procedures and the types, sources, and costs of credit.

- c. Demonstrate an understanding of types and benefits of insurance and other forms of risk management (e.g., hedging, forward contracting, diversification).
- d. Demonstrate an understanding of basic principles and procedures of production management (e.g., scheduling, market forecasting, calculating production costs).
- e. Demonstrate knowledge of human resources management (e.g., identifying sources and availability of labor, setting wages, fostering teamwork, valuing diversity).
- f. Demonstrate knowledge of computer technology as a tool for decision making and office management in agricultural businesses.

(Draft Curriculum Standards for Agriculture [2004]: Standards 1.3, 4. California Agricultural Education Career Preparation Standards: Grades 11–12 [1995]: Agricultural Business Management Career Path Standards 1–9. Agriculture Teacher Preparation in California: Standards of Quality and Effectiveness [1999]: Standard 5.)

Domain 6. Agricultural Systems Technology

Candidates demonstrate a broad understanding of principles of agricultural systems technology. Candidates apply this knowledge to plan and implement programs. Candidates are able to demonstrate an understanding of a range of topics in agricultural systems technology, including safety principles and practices, shop fabrication, construction, maintenance and operation of power equipment, and land measurement and irrigation systems.

6.1 Safety Principles and Practices

- a. Demonstrate an understanding of principles and practices for the safe use, care, and maintenance of hand and power tools, machinery, and equipment used in agriculture.
- b. Demonstrate an understanding of principles and practices for safely securing and hauling loads.
- c. Demonstrate an understanding of principles and practices for the safe use, storage, and disposal of materials (e.g., solvents, fuels, paints) used in agriculture.

6.2 Shop Fabrication

- a. Demonstrate knowledge of basic drafting principles and techniques, measurement methods, and layout techniques used in shop fabrication.
- b. Demonstrate knowledge of types, properties, and uses of materials (e.g., metals, wood) used in shop fabrication.
- c. Demonstrate knowledge of techniques and equipment for performing basic metalworking procedures (e.g., oxyacetylene cutting and welding, electric welding, plasma cutting).

6.3 Construction

- a. Demonstrate knowledge of procedures for designing and planning agricultural structures (e.g., siting, estimating, drawing plans) and measurement methods and techniques used in agricultural construction.
- b. Demonstrate knowledge of carpentry and concrete/masonry skills, principles, tools, methods, and materials.

- c. Demonstrate knowledge of electrical and plumbing skills, principles, tools, methods, and materials.

6.4 Maintenance and Operation of Power Equipment

- a. Demonstrate knowledge of the types (e.g., tractors, combines, discs, balers), characteristics, components, operation, and uses of various types of power equipment and implements used in agriculture.
- b. Demonstrate knowledge of the types (e.g., diesel, two- and four-stroke cycle), characteristics, components, uses, operation, and maintenance of internal combustion engines used in agricultural power equipment.
- c. Demonstrate basic knowledge of characteristics, components, and uses of power transmission systems used in agricultural power equipment.
- d. Demonstrate basic knowledge of characteristics and components of electrical/electronic systems used in agricultural power equipment.
- e. Demonstrate knowledge of basic principles of hydraulic systems used in agricultural power equipment.

6.5 Land Measurement and Irrigation Systems

- a. Demonstrate knowledge of basic principles, methods, tools, and equipment for surveying, mapping, land measurement, and land leveling.
- b. Demonstrate knowledge of types (e.g., sprinkler, drip, furrow), components (e.g., pumps, controllers, pipes), design, uses, installation, and maintenance of irrigation systems.

(Draft Curriculum Standards for Agriculture [2004]: Standard 6. California Agricultural Education Career Preparation Standards: Grades 11–12 [1995]: Agricultural Mechanics Career Path Standards 1–6, 8–9. Agriculture Teacher Preparation in California: Standards of Quality and Effectiveness [1999]: Standard 7.)

(3.) Subject Matter Skills and Abilities Applicable to the Content Domains in Agriculture

Candidates apply knowledge of scientific principles and methods, experimental design, measurement, and data analysis to investigate and understand agriculture-related problems and issues. Candidates understand and apply safety rules and practices in the classroom, laboratory, field, and Supervised Agricultural Experience (SAE) settings.

Candidates understand the integral relationships among classroom activities, Future Farmers of America (FFA) programs, and SAEs in the context of the local community. Candidates apply organizational, leadership, and communication skills to work effectively with groups and individuals (e.g., advisory committees, industry representatives, community organizations, student organizations, school leaders, elected officials). They understand the goals and purposes of SAE programs and the characteristics of different types of SAEs. They understand strategies for coordinating student SAEs and for supervising, advising, and supporting students during their experiences. Candidates understand the characteristics, functions, and organizational structures of student leadership development organizations (e.g., FFA) and their roles and responsibilities as advisors to these organizations. Candidates are able to effectively represent the agricultural program in individual and group settings in the school, community, and industry. Candidates are able to understand and respond to issues related to diversity, equity, and ethics in the agriculture program.

Candidates understand historical events, current research, and recent developments in agriculture. They are familiar with social, economic, legal, and ethical issues in the field. They apply strategies (e.g., accessing Internet resources, joining professional organizations) for staying abreast of current issues and developments in agriculture. They are able to identify industry trends and job opportunities, employers' expectations, and the personal characteristics (e.g., appropriate work habits, social and communication skills) necessary for a successful career in agriculture. They apply their knowledge to assist students in academic and career planning and development and in applying for, obtaining, and maintaining employment in agriculture and related fields.

Candidates understand the interrelationships and connections among the various subdisciplines of agriculture and between agriculture and other disciplines commonly taught in public schools. Candidates can identify and integrate themes and concepts among these disciplines and subdisciplines.

Part 3: Implementation of Standards of Quality and Effectiveness for Subject Matter Programs in Agriculture

A. Standards Implementation Process

The 2006 *Standards of Quality and Effectiveness for Subject Matter Programs in Agriculture* are part of a broad shift in Commission policies related to the preparation of professional teachers and other California educators resulting from the mandate of Senate Bill 2042 (Chap 548, Stats. 1998). This policy change insures high quality in educator preparation while at the same time providing for flexibility along with accountability for institutions that offer programs for prospective teachers. The success of this reform effort depends on the effective implementation of program quality standards for each credential.

1. Process for Cyclical Review and Improvement of Subject Matter Standards

The Commission will adhere to its established cycle of review and reconsideration of the *Standards of Quality and Effectiveness for Subject Matter Programs in Agriculture* as well as in other subjects. The standards will be reviewed and reconsidered in relation to changes in academic disciplines, state-adopted K-12 student academic content standards, school curricula, and the backgrounds and needs of California K-12 students. Reviews of program standards will be based on the advice of subject matter teachers, college and university faculty, and curriculum specialists. All program documents will be reviewed by statewide teams of peer reviewers selected from among qualified K-12 and postsecondary professional educators. Prior to each review, the Commission will invite interested individuals and organizations to participate in the review process.

2. Process for Adoption and Implementation of Standards

Program sponsors have at least two years to transition from the current to the new subject matter program standards. Program documents should be submitted at the sponsor's earliest convenience to avoid a potential lapse in program approval status. Expiration dates of currently approved single subject matter programs are provided below. Each single subject matter program for single subject credentials must be submitted for review and approval in accordance with the new standards. No new programs written to the previous standards were allowed to be submitted to the Commission for approval following the September 2006 adoption of the new phase III standards.

Information about transition timelines for candidates, sunset and expiration dates for currently approved programs, and preconditions are provided by the Commission through Coded Correspondence to the field and by additional program transition documents as appropriate to the needs of the field. Program sponsors should check the Commission website (www.ctc.ca.gov) frequently for updates.

3. Transition and Implementation Timelines for Programs

a. Program Transition Timeline

By July 1, 2008, existing ("old") programs based on previous subject matter standards should be superseded by new Commission-approved programs that have met the new standards. Once a program based on the new standards receives Commission approval, all students not previously

enrolled in the old program (i.e., all “new” students) should enroll in the new program. After June 30, 2008, no “new” students should enroll in an “old” program, even if a new Commission-approved program in the subject is not available at that institution. Students who enrolled in an old program prior to July 1, 2008, may continue to complete the old program until July 1, 2012.

b. Program Implementation Timeline

September 2006	Commission adoption of new subject matter program standards. No new subject matter programs in Agriculture will be accepted for review in relation to the Commission's previous set of standards.
January 2007	The Commission initiates ongoing technical assistance for developing new subject matter programs to meet the new standards.
March 2007	The Commission initiates ongoing training for Program Reviewers. Qualified subject matter experts are prepared to review programs in relation to the standards.
March 2007	Review and approval of programs under the new standards begin.
2007-09	Institutions submit programs for review on an ongoing basis. Once a “new” program is approved, all students who were not previously enrolled in the “old” program (i.e., all new students) must enroll in the new program. Students may complete an old program if they enrolled in that program either (1) prior to the commencement of the new program at their campus, or (2) prior to July 1, 2008, whichever occurs first.
July 1, 2008	“Old” programs that are based on the previous 1998 standards must be superseded by new programs that have obtained Commission approval. After June 30, 2008, no new students may enroll in an old program, even if a new program is not yet available at the institution.
2007-12	The Commission continues to review program applications submitted in response to the standards and preconditions provided in this handbook. Programs submitting an application for review should provide the Commission with two qualified nominees who can serve as reviewers of other institutions’ program applications in order to expedite the review process.
July 1, 2012	This is the final date for candidates to complete subject matter preparation programs approved under the previous 1998 standards. To qualify for a credential based on an “old” program, students must have completed that program prior to either (1) the implementation of a new program with full or interim approval at their institution, or (2) July 1, 2012, whichever occurs first.

c. Implementation Timelines for Candidates

Based on the Commission's implementation plan, candidates for Single Subject Credentials in Agriculture who do not plan to pass the subject matter examinations adopted by the Commission should enroll in subject matter programs that meet the Commission's 2006 standards either (1) once a new program commences at their institution, or (2) before July 1, 2008, whichever occurs first. After a new program begins at an institution, no students may enroll for the first time in an "old" program (i.e. one approved under the previous set of standards). Regardless of the date when new programs are implemented, no students should enter old programs after June 30, 2008.

Candidates who enrolled in programs approved on the basis of prior standards ("old" programs) may complete those programs provided that (1) they entered the old programs either before new programs were available at their institutions, or before July 1, 2008, and (2) they complete the old programs before July 1, 2012. Candidates who do not comply with these timelines may qualify for Single Subject Teaching Credentials by passing the subject matter examinations that have been adopted for that purpose by the Commission.

4. Technical Assistance for Program Sponsors

Commission staff offers technical assistance for developing new programs and documents upon request by the sponsor of a preparation program. Program sponsors who are writing to new standards are advised to schedule a technical assistance meeting with staff at the earliest possible time. Topics of information at technical assistance meetings include:

- Explanation of the implementation plan adopted by the Commission
- Description of the steps in program review and approval
- Review of program standards and preconditions, as well as examples of implementing the standards
- Opportunities to discuss subject-specific questions
- Guidance on appropriate responses to the standards and the necessary level of supporting documentation and evidence to be provided within the responses
- Format and organization of the program document

5. Process for Review and Approval of Program Documents Submitted to the Commission

A regionally accredited institution of postsecondary education that would like to offer (or continue to offer) a subject matter preparation program for the Single Subject Credential in Agriculture may present a program application that responds to the preconditions and the standards provided in this handbook. The submission of programs for review and approval is voluntary for colleges and universities.

If an institution would like to offer two or more distinct programs of subject matter preparation in Agriculture with different emphases, a separate application may be forwarded to the Commission for each program. However, the Commission encourages institutions to coordinate its single subject programs that are within the same subject matter discipline in order to maximize resources.

Programs may be submitted after January 2007 on an ongoing basis. Review of subject matter program proposals began in March 2007 and continues on an ongoing basis.

a. Selection, Composition and Training of Program Document Review Panels

Review panel members are selected because of their subject matter expertise and their knowledge of curriculum and instruction in the public schools of California. Reviewers are selected from institutions of higher education, school districts, county offices of education, organizations of subject matter experts, and statewide professional organizations. Because the review process consists of a professional peer review, the Commission needs those institutions seeking program review and approval to provide at least two qualified nominees to participate in the review process. Members of the Commission's former Single Subject Waiver Panels and Subject Matter Advisory Panels also may be selected to serve as program reviewers.

The Commission staff conducts training and calibration that all reviewers must attend. Training includes explanations of:

- the purpose and function of subject matter preparation programs
- the Commission's legal responsibilities in program review and approval
- the role of reviewers in making program determinations
- the role of the Commission's professional staff in assisting reviewers
- the analysis and discussion of each standard
- alternative ways in which a standard could be met
- the aspects of the review process
- how to provide responsive feedback for program revision

Reviewers are also provided with guided practice and calibration exercises in preparation for their roles in reviewing programs.

b. Steps in the Review of Programs

The Commission is committed to conducting a program review process that is objective and comprehensive. The agency also seeks to be as helpful as possible to colleges and universities throughout the review process. Commission staff is available to consult with program sponsors during program document development.

The review process consists of two sequential steps, as outlined below. An institution responding to the Commission's standards will respond to the two sets of standards described earlier in this handbook, namely, the Preconditions and the Program Standards (including Common Standards and discipline-specific Program Standards).

Step One: Review of Preconditions. An institution's response to the preconditions is reviewed by the Commission's professional staff since the preconditions are based on Commission policies and do not involve issues of program quality. The Preconditions are reviewed upon receipt of the institution's formal document submission. Once the responses to the Preconditions are deemed to have met these standards, the program document's responses to the Program Standards are then referred to the expert reviewers.

Step Two: Review of Program Standards. Unlike the Preconditions, the Program Standards (i.e., Common Standards and discipline-specific Program Standards) address issues of program quality and effectiveness. The Commission's process, therefore, is to have each institution's

response to the Program Standards reviewed by a small team of subject matter experts (i.e., peer review). Once the review team determines that a proposed program meets the Program Standards, Commission staff recommends the program for approval by the Commission at its next public meeting.

If an institution's response to either the Preconditions or the Program Standards is determined to not meet the standards, feedback is formally provided to the program sponsor with an explanation of the review findings that includes specific reasons for the determination that the program standards are not met. During this aspect of the review process, program sponsors can obtain further information and assistance from Commission staff.

The Commission intends the overall program review process to be as helpful as possible to colleges and universities. Because a large number of institutions prepare teachers in California, it is very helpful for program sponsors to first consult with the Commission's professional staff regarding program applications that are in preparation. During the Program Standards review process, however, program sponsors and/or their representatives should not contact members of a review team directly under any circumstances in order to preserve the objectivity and integrity of the review process. If a program sponsor needs additional information during the review process, the program sponsor or representative should inform the designated staff consultant. If the issue or question is not resolved in a timely manner, program sponsors may contact the Executive Director of the Commission. After considering the review feedback, the program sponsor may make appropriate changes to the program document and resubmit the program application to the designated Commission staff member for reconsideration by the review team.

If, however, feedback from the review process indicates that only minor or technical changes need to be made in a program application in order to meet the applicable standards, Commission staff rather than the peer review team will review the resubmitted document and, if the standards are determined to have been met, will submit the program application to the Commission for approval without further review by the peer review team.

Appeal of an Adverse Decision. An institution that would like to appeal a decision of the staff (regarding Preconditions) or the review team (regarding Program Standards) may do so by submitting the appeal to the Executive Director of the Commission. The institution should include the following information in the appeal:

- The original program document and the stated reasons of the Commission's staff or the review team for not recommending approval of the program.
- A specific response by the institution to the initial denial, including a copy of the resubmitted document (if it has been resubmitted).
- A rationale for the appeal by the institution.

The CTC Executive Director may deny the appeal, appoint an independent review panel, or present the appeal directly to the Commission for consideration.

B. Submission Guidelines for Single Subject Matter Program Documents

To facilitate the proposal review and approval process, Commission staff has developed the following instructions for program sponsors submitting documents for approval of Single Subject Matter Programs. It is essential that these instructions be followed accurately. Failure to comply with these procedures can result in a proposal being returned to the prospective program sponsor for reformatting and/or revision prior to being forwarded to program reviewers.

1. Transmittal Instructions

Sponsoring agencies are required to submit **one printed bound paper copy** of their proposal(s), to the following address:

California Commission on Teacher Credentialing
Professional Services Division: Single Subject Matter Programs
1900 Capitol Avenue
Sacramento, CA 95814

In addition, **one electronic copy of the proposal text** (including supporting evidence where possible) should be submitted in Microsoft Word, or a Microsoft Word compatible format. Some phases of the review process will involve secure web-based editing. To facilitate this process, please leave no spaces in the name of your document, and be sure that the name of the file ends in ".doc" (example: CTCdocument.doc).

2. Organization of Required Documents

Sponsoring agencies should include as the cover page of each copy of the program application the "Sponsoring Organization Transmittal Cover Sheet." A copy of the Transmittal Cover Sheet is located at the end of this section of the handbook for use by program sponsors. The proposal application documents should begin with Transmittal Cover Sheet that includes the original signatures of the program contacts and chief executive officer.

The program contact identified on the Transmittal Cover Sheet will be the individual who is informed electronically and by mail as changes occur, and to whom the review feedback will be sent. Program sponsors are strongly urged to consult the CTC web site, www.ctc.ca.gov, for updates relating to the implementation of new single subject matter standards and programs.

Each proposal must be organized in the following order:

- Transmittal Cover Sheet
- Table of Contents
- Responses to Preconditions, including course lists, units and catalog descriptions
- A matrix that addresses which courses meet which subject matter requirements
- One to two pages of narrative response to each Standard

The response to the standards must:

- include evidence (i.e., syllabi, course materials, program data, etc.) supporting the responses to the standards. The evidence sections should be tabbed and labeled in order to assist the reviewers in finding the appropriate supporting documentation (e.g., course numbers, document names, etc.) The supporting evidence should also be tabbed, labeled and cross-referenced or electronically linked within the response.
- provide numbering on each page, preferably in the footer

3. Developing Responses to the Standards

a. Responses to the Standards Common to All

The Commission adopted 2 standards that relate to program design and structure for programs in *all* single subject disciplines.

Standard 1	Program Design
Standard 2	Program Resources and Support

An institution's program application should include a subject-specific reply to each of the two Common Standards. These two standards require subject-specific program information in order to provide a complete picture to the reviewers.

b. Responses to the Program Standards

Program proposals should provide sufficient information about how the program intends to deliver content consistent with each standard so that a knowledgeable team of professionals can determine whether each standard has been met by the program. The goal in writing the response to any standard should be to describe the proposed program clearly enough for an outside reader to understand what a prospective teacher will experience, as he or she progresses through the program in terms of depth, breadth, and sequencing of instructional and field experiences, and what he or she will know and be able to do and demonstrate at the end of the program. Review teams will then be able to assess the responses for consistency with the standard, completeness of the response, and quality of the supporting evidence.

The written text should be organized in the same order as the standards. Responses should not merely reiterate the standard. They should describe how the standard will be met in the coursework content, requirements, and processes and by providing evidence from course syllabi or other course materials to support the explanation. ***Responses that do not completely address each standard will be considered incomplete and returned for revision.***

Lines of appropriate supporting evidence will vary with each standard. Some examples of supporting evidence helpful for review teams include:

- Charts and graphic organizers to illustrate program organization and design
- Course or module outlines or showing the sequence of course topics, classroom activities, materials and texts used, and out-of-class assignments

- Specific descriptions of assignments and assessments that demonstrate how prospective teachers will reinforce and extend key concepts and/or demonstrate an ability or competence
- Documentation of materials to be used, including tables of contents of textbooks and identification of assignments from the texts, and citations for other reading assignments.
- Current catalog descriptions.

4. Packaging a Submission for Shipment to the Commission

Please **do not**:

- Use foam peanuts as packaging material
- Overstuff the binders. Use more binders if necessary. No binders larger than 3 inches will be accepted.
- Overstuff the boxes in which the binders are packed, as these may break open in shipment.

**Phase III Single Subject Matter Program Sponsor
Transmittal Cover Sheet
(Page 1 of 2)**

- **Date:** _____
- **Sponsoring Institution:** _____
- **Submission Type(s)** Place a check mark in the appropriate box.

Agriculture Subject Matter Program	<input type="checkbox"/>
American Sign Language Subject Matter Program	<input type="checkbox"/>
Business Subject Matter Program	<input type="checkbox"/>
Health Science Subject Matter Program	<input type="checkbox"/>
Home Economics Subject Matter Program	<input type="checkbox"/>
Industrial and Technology Education Subject Matter Program	<input type="checkbox"/>

- **Program Contacts:**

1. Name _____

Title _____

Address _____

Phone _____ Fax _____

E-mail _____

**Phase III Single Subject Matter Program Sponsor
Transmittal Cover Sheet
(Page 2 of 2)**

Name _____

Title _____

Address _____

Phone _____ Fax _____

E-mail _____

Chief Executive Officer (*President or Provost; Superintendent*):

Name _____

Address _____

Phone _____ Fax _____

E-mail _____

***I Hereby Signify My Approval to Transmit This Program Document to the California
Commission on Teacher Credentialing:***

CEO Signature _____

Title _____

Date _____