
7B

Action

Professional Services Committee

Recommended Subject Matter Requirements for Single Subject Teaching Credentials in Agriculture; Business; Health Science; Home Economics; Industrial and Technology Education; and a Language Other Than English: American Sign Language

Executive Summary: This report presents recommended subject matter requirements (SMRs) for Single Subject Teaching Credentials in Agriculture; Business; Health Science; Home Economics; Industrial and Technology Education; and a Language Other Than English: American Sign Language. If adopted, the SMRs will specify the content that is eligible for assessment on the subject matter examinations and that is to be taught in Commission-approved subject matter programs.

Recommended Action: Staff recommends that the Commission adopt the proposed subject matter requirements located in Appendix E of the report for Single Subject Teaching Credential candidates in the above-mentioned subject areas.

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Strategic Plan Goal(s):

Goal 1: Promote educational excellence through the preparation and certification of professional educators.

- ◆ Sustain high quality standards for the preparation of professional educators.
- ◆ Sustain high quality standards for the performance of credential candidates.

Recommended Subject Matter Requirements for Single Subject Teaching Credentials in Agriculture, Business, Health Science, Home Economics, Industrial and Technology Education, and a Language Other Than English: American Sign Language

Introduction

This report presents recommended subject matter requirements (SMRs) for Single Subject Teaching Credentials in Agriculture, Business, Health Science, Home Economics, Industrial and Technology Education, and Languages Other Than English: American Sign Language. If adopted by the Commission, the SMRs will specify the content that is eligible for assessment for the subject matter examinations and that is to be taught in Commission-approved subject matter programs. The SMRs were drafted by subject matter advisory panels; reviewed by independent panels for alignment with the applicable student content standards, guidelines, or curriculum frameworks and for potential bias; evaluated by California educators statewide; and then finalized by the panels.

Background

The Subject Matter Competence Requirement for a Teaching Credential

In California, Single Subject Teaching Credentials are offered in the following subject areas: agriculture, art, biological science, business, chemistry, English, earth and planetary science, health science, home economics, industrial and technology education, languages other than English, mathematics, music, physical education, physics, and social science.

California requires teacher candidates to demonstrate competence in the subject matter they will be authorized to teach. Single subject candidates 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). Because both satisfy the same requirement, these two options should be as aligned and congruent as possible.

The subject matter requirements (SMRs) are the subject-specific knowledge, skills, and abilities needed by beginning teachers. As such, the SMRs for the subject areas of agriculture, business, health, home economics, industrial education and technology, and American Sign Language serve as the content specifications for both subject matter programs and examinations.

In the early 1990s, the Commission developed and adopted standards for subject matter preparation programs and, at the same time, specifications for the 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.

Established validity of the subject matter requirements (i.e., program standards and exam specifications) is not permanent. The need for periodic validity studies of the SMRs is directly related to one of the Commission's fundamental goals: to provide a strong assurance that teaching credentials are awarded to individuals who possess the most current knowledge, skills, and abilities needed to succeed in California public school teaching positions. The validity of the exam specifications and program standards used by the Commission was established in conjunction with their initial development. Professional practice and legal defensibility require, however, that the validity of subject matter requirements be periodically re-established, as job requirements and expectations change over time.

Subject Matter Advisory Panels

The Commission relies on the expertise of advisory panels of subject matter experts to inform the SMR development process and contracts with a test development company to assist in the work. In March 2002, the Executive Director signed a contract with National Evaluation Systems, Inc. (NES) for the development and administration of the new California Subject Examinations for Teachers (CSET) program, which also includes the development of the preliminary educational technology examination. Due to the large number of subject matter examinations that needed to be developed, the development of the examinations was divided into three phases:

- Phase I: multiple subjects; English; mathematics; foundational mathematics; science and specialized science in biology, chemistry, earth and planetary science and physics; and social science
- Phase II: art; languages other than English in French, German, Japanese, Mandarin, Punjabi, Russian, Spanish, and Vietnamese; music; physical education; and preliminary educational technology
- Phase III: agriculture; business; health science; home economics; industrial and technology education, and language other than English: American Sign Language

Phase I examinations are currently operational, and after the initial passing standards for the final groups of Phase II language examinations are established by the Commission, the Phase II examinations will become operational. In spring 2004, the Commission's executive director appointed subject matter advisory panels for the Phase III subject areas to advise Commission staff on the development of new subject matter program standards and examinations in these areas. A listing of the membership of the subject matter panels is included in Appendix A.

The subject matter advisory panels for all three phases consist 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, and
- liaisons from the California Department of Education.

NES began working with Commission staff and the Phase III advisory panels in April 2004 to develop and validate SMRs for prospective secondary teachers in agriculture, business, health science, home economics, industrial and technology education, and American Sign Language. At the panels' initial meeting, staff provided and discussed a written "charge" to the panels

describing their responsibilities and the characteristics of the SMRs to be developed. These materials are attached in Appendices B and C.

Development and Validation of the SMRs

The SMR development process for the Phase III subject areas is the same process that was used for the development of all SMRs for the CSET program. For the past nine months, Commission staff, NES, and the Phase III advisory panels have met numerous times to work on the development of the new SMRs and program standards. A key aspect of this work is to ensure that the new SMRs fulfill the Commission's statutory mandate to align teacher subject matter requirements with state K-12 student content standards. This mandate is established in Section 44259(b)(5) (SB 1422, Statutes of 1992/SB 2042, Statutes of 1998), which states in part:

The Commission shall ensure that subject matter standards and examinations are aligned with the state content standards for pupils adopted (by the State Board of Education).

Commission staff used State Board-adopted student content standards when available to satisfy the alignment mandate quoted above. However, there are a number of subject areas for which the State Board has not yet formally adopted student content standards. In some subjects the state has previously adopted either student curriculum guidelines or curriculum frameworks. In some other subjects, the state has yet to adopt any documents that formally establish standards for student learning in the subject area. Due to the Commission's desire to fulfill the above mandate despite the absence of formally-adopted student content standards in some subject areas, staff used the following criteria in determining which set of student standards to be used for alignment purposes.

1. For subjects in which the State Board of Education has formally adopted K-12 student content standards, those standards are used to align the new subject matter requirements for teachers.
2. For subjects in which the State Board has not formally adopted K-12 student content standards, but in which the state has previously established student curriculum frameworks or guidelines, the most recently adopted state documents for the subject area are used to align the new subject matter requirements for teachers.
3. For subjects in which the State Board of Education has not formally adopted K-12 student content standards, guidelines, or curriculum frameworks, but in which the State Board was engaged in drafting new standards, the draft standards were used to align the new SMRs for teachers.

After new formally-adopted student content standards become available, supplemental alignment and congruence studies will be conducted to determine whether any further course of action is necessary. If the studies find no substantive changes are necessary, any references made in the SMRs to the content standards will be revised to reflect the newer documents.

From May through August 2004 for each respective Phase III subject area, panels developed preliminary SMRs aligned with available state and national student content standards, frameworks and standards of national professional organizations. The various state and national standards and documents used by the Phase III Panels are listed in Appendix D in this agenda item.

The preliminary SMRs for the Phase III subject areas were independently reviewed by two separate groups in July and August 2004. A Bias Review Committee reviewed all SMRs for potential bias, such as those of gender, race, culture, ethnicity, special needs, and socio-economic status. Then Alignment and Congruence Panels composed of content experts reviewed the Phase III draft SMRs for alignment with any existing state-adopted K-12 Student Academic Content Standards. Following these reviews, changes in SMRs suggested by these two groups were presented to and acted on by the subject matter panels.

In August and September 2004, NES launched a statewide survey-based validity study of the preliminary SMRs developed by the panels. Both paper and electronic surveys were administered, and participants included California credentialed teachers, principals, curriculum specialists, and college/university faculty. Surveys were developed for each of the five content areas. Eligibility requirements were established and applied. The surveys asked eligible respondents to make judgments about the preliminary SMRs. For each SMR, respondents were asked to indicate (1) how important the SMR is for effective job performance by a teacher of the subject area; and (2) whether the SMR represents knowledge, skills, and abilities that teachers must possess at the *beginning* of their teaching career (as compared to knowledge, skills, and abilities that could be learned on the job).

Over 5800 California educators were selected or invited to complete a survey. Survey responses were received from 1,588 (27%) educators. The surveys were screened for eligibility and completeness, and 1,068 (18%) were used in the compilation of data for the study.

The validity study generated qualitative feedback, a majority of which supported the SMRs. NES analyzed and summarized the results of the validity study and presented the results to the advisory panels on November 15, 2004. The knowledge, skills, and/or abilities in the SMRs that did not receive strong support from the study were reviewed according to guidelines developed by Commission staff. Reviewed SMRs could be retained, revised, or deleted but could be retained only under specified conditions. For example, if the panel unanimously agreed and documented a strong, clear relationship between the knowledge, skills, and/or abilities in the statement and one or more specific student academic content standards, and/or framework concepts, the SMR was retained. Only three types of SMR revisions were accepted: deletion of subject matter knowledge, skills, and/or abilities; minor rewording for clarification; or nonsubstantive additions. No new subject matter could be added to an SMR based on the validity research.

On November 16, 2004, following the panels' review of the validity study results, the Commission's Bias Review Committee reviewed the SMRs a second time. Commission staff and selected panel members resolved any bias-related issues before finalizing the recommended SMRs.

Recommended Phase III Subject Matter Requirements

Final SMRs for agriculture, business, health science, home economics, industrial and technology education, and American Sign Language recommended by staff for adoption by the Commission are found in Appendix E. Each set of SMRs includes two parts, with the exception of American Sign Language. The first part describes several *content domains* for subject matter understanding and skill, and the second part describes the subject matter *skills and abilities* applicable to the content domains. The American Sign Language SMRs only include the *content domains* for subject matter understanding and skill for consistency with the SMRs for all other languages.

The adoption of the Phase III SMRs represents the completion of the final set of new subject matter requirements for the Commission's Single Subject Credential subject areas.

Future Plans for Phase III

Commission staff and NES will continue to work with the advisory panels to develop the new CSET examinations through spring 2005. Initial administrations of the new examinations are scheduled for fall 2005. NES will conduct standard setting studies for these CSET examinations after each initial test administration. Results of these studies will be presented to the Commission with recommended passing standards. Due to this process, scores for the first administration of the new exams will be available to examinees four to five months after the initial test administration.

The SMRs serve as the basis for the content of the subject matter program standards. The program standards developed by the subject matter advisory panels will be posted on the Commission website and mailed to the field for initial review and feedback in early February 2005. The field review will include K-12 California credentialed teachers, high school department chairs, college deans, directors of teacher education, academic deans, county offices of education, and professional organizations. The field review surveys will be returned to the Commission by March 12, 2005. The results will be tabulated by staff and reviewed by the advisory panels mid April 2005. Staff expects to present the program standards for consideration of approval at the June 1, 2005 Commission meeting. Following approval of the standards, staff will proceed with the implementation process as established by the Commission last year in Phase II of the CSET SMR and program standards development.

Appendix A

Phase III Subject Matter Advisory Panels

Subject Matter Advisory Panels

Agriculture

Michael Albiani	Elk Grove High School
Gina Boster	Norco High School
Glen Casey	California Polytechnic University, San Luis Obispo
Larry Crabtree	Sutter Union High School
Ann De Lay	California State University, Fresno
Robert Flores	California Polytechnic University, San Luis Obispo
Richard Herrera	Hale Middle School, Woodland Hills
Bob Heuvel	Liaison, California Department of Education
Lisa Leonardo	University of California, Davis
Margaret Martindale	University of California, Davis
Hugh Mooney	Galt High School
Michael Spiess	California State University, Chico
Cary Trexler	University of California, Davis

Business

Kathie Bennett	Azusa High School
Marcia Bush	Mission Valley Regional Occupational Program, Fremont
MaryKay Davidson	Alta Loma High School
Charles Davis	California State University, Sacramento
Mary Ellen Davis	Retired business teacher, San Francisco Unified School District
Donald De Santis	University of Phoenix
Stephen Eggert	Fountain Valley High School
Kathleen Harcharik	California Polytechnic University, Pomona
Marilyn Johnson	Colton High School
Richard Lacy	California State University, Fresno, Sid Craig School of Business
Gina LaMonica	College of the Canyons
Robert Land	Porterville High School
Kay Orrell	Business Education Resource Consortium
Suzanne Potter-Zmudosky	Riverside County of Education Regional Occupational Program
Devery Rodgers	South Gate High School
Rebecca Seher	LA County Office of Education
James Spellicy	Lowell High School, San Francisco
Ellen Welt	Santa Clara County Office of Education
Gary Wiessner	Chatsworth High School
Neil Yeager	Liaison, California Department of Education

Subject Matter Advisory Panels (continued)

Health Science

Stephen Adewole	San Bernardino High School
Cindy Beck	Liaison, California Department of Education
Kim Clark	California State University, Santa Barbara, Dept. of Health Science and Human Ecology
Dale Evans	California State University, Long Beach
Janet Gower	Ygnacio Valley High School, Concord
Mary Hazzard	National University
Holly Orozco	California State University, Los Angeles
John Orta	California State University, Los Angeles
Ardeen Russell-Quinn	James Logan High School, Union City
Leslie Sargent	Inderkum High School, Sacramento
Melinda Seid	California State University, Sacramento
Linda Shearer	Porterville High School
Patty Woodward	California State University, Sacramento

Home Economics

Carol Bertotto	Eisenhower High School, Rialto
Janice DeBenedetti	Liaison, California Department of Education
Tanya Durham	Pitman High School, Turlock
Patricia El Sharei	Cathedral City High School
Carla Escola	Sierra High School, Manteca
Marilynn Filbeck	California State University, Northridge
Elizabeth Knopf	University of Phoenix
Margaret Lichty	California State University, Long Beach
Sharon McKenzie	Office of School to Career, San Diego Office of Education
Judith Moon	Mt. Diablo High School, Concord
Bonnie Rader	California State University, Long Beach
April Rosendahl	Chino High School
Joan Schlesinger	William S. Hart High School, Newhall
Martha Siekmann	Retired home economics teacher, Fortuna Union High School
Paula Tripp	California State University, Sacramento

Subject Matter Advisory Panels (continued)

Industrial and Technology Education

Chris Almeida	Retired industrial and technology education teacher
Darnell Austin	California State University, Long Beach
Richard Dahl	Liaison, California Department of Education
Wally Fuller	Upper Lake Middle School
George Gridley	Retired industrial and technology education teacher
Don Maurizio	California State University, Los Angeles
Tijuana Middleton	University of California Extension, Los Angeles
Michael Mitsch	Quartz Hill High School, Lancaster
Matt Saldana	ROP and Career Technical Education, Long Beach Unified School District
Lisa Salmonson	Florin High School, Sacramento
Joseph Scarcella	California State University, San Bernardino
Randolph Siercks	Birmingham High School, Van Nuys
Al Tweltridge	Liaison, California Department of Education
Robert Verdugo	Spring View Middle School, Rocklin
Warren Wagner	PPS, Inc.

American Sign Language

Margo Cienik	South Hills High School, Covina
Lawrence Fleischer	California State University, Northridge
Tom Humphries	University of California, San Diego
Susannah Kirchner	Retired ASL teacher, Burbank High School
Sandra Lee Klopping	Ohlone Community College
Marlon Kuntze	San Jose State University
Christine Lanphere	Natomas High School, Sacramento
Nancy Grosz Sager	Liaison, California Department of Education
Cindy Shields	Huntington Beach High School
Colleen Smith	San Diego State University

Appendix B

Written Charge to the Subject Matter Advisory Panels, Including Characteristics of the Subject Matter Requirements (SMRs)

COMMISSION ON TEACHER CREDENTIALING
PROFESSIONAL SERVICES DIVISION
1900 Capitol Avenue
Sacramento, CA 95814-4213



Charge to the Single Subject-Subject Matter Panels in Agriculture, American Sign Language, Business, Health Sciences, Home Economics and Industrial and Technology Education

April 2004

The Executive Director of the California Commission on Teacher Credentialing (Commission) has appointed the Subject Matter Advisory Panels in Agriculture, American Sign Language, Business, Health Sciences, Home Economics and Industrial and Technology Education to *work with and advise the Commission's staff and contractor* to accomplish the following tasks:

1. To identify and articulate new subject-specific subject matter knowledge, skills and abilities that beginning teachers will need to know and be able to do. These will be known as *subject matter requirements or SMRs*.
2. To develop new *Standards of Quality and Effectiveness for Subject Matter Programs* in each of the six single subject areas. The new standards will be subject-specific and based, in part, on the newly developed SMRs.
3. To participate in test development activities to ensure that the new assessments reflect the subject matter knowledge of the newly developed SMRs.

The newly developed SMRs will serve as the basis for the development of new examinations in the six single subject areas and as a basis for the new standards that will guide college and university faculty in the development of single subject programs for prospective teachers.

- Panel members are to analyze (compare and contrast) the current single subject content specification of the *Standards of Quality and Effectiveness for Subject Matter Programs (1999)* with any existing California Department of Education and/or State Board of Education approved Frameworks, Student Content Standards, Challenge Standards for Student Success, Career Preparation Standards or Applied Learning Standards.
- Panel members will identify subject matter content areas in the California Department of Education or State Board approved documents that are not addressed in the Commission's current approved (1999) SMRs and Single Subject Standards for Subject Matter Programs.
- Panel members will also identify any subject matter areas listed in the Commission's approved subject matter content requirements and standards that are not listed in the California Department of Education or State Board approved documents.

- Panel members will also analyze (compare and contrast) any standards and subject matter areas that exist in national or state professional organization's documents with the 1999 Commission approved Single Subject Program Standards and SMRs.
- Panel members will then determine possible new standards and subject matter areas that could be added or merged with the existing standards and subject matter areas.

Upon the completion of their work, each of the six panels will recommend new subject-specific SMRs, and new subject-specific *Standards of Quality and Effectiveness for Subject Matter Programs* to the Commission for adoption. Also, with the assistance of the panels, six new subject matter assessments will be developed by the testing contractor and administered for the first time in fall 2005.

Appendix C

Characteristics of the New Subject Matter Requirements (SMRs) for Phase III

The New Subject Matter Requirements

The new subject matter requirements in Agriculture, Business, Health, Home Economics, Industrial and technology education, and American Sign Language must have the following characteristics:

1. They must be aligned with the state's student content and performance standards for grades 6-12. Competence in the subject matter requirements should enable beginning teachers to effectively assist students to meet the student content and performance standards. Although the new subject matter requirements must be aligned with the student standards, they can be broader than those standards.
2. Their intended purposes and uses are to delineate the subject matter knowledge, skills, and abilities that are (a) to be provided to candidates in a subject matter preparation program, and (b) eligible for inclusion on the exams (i.e., exam content specifications).
3. In terms of their use as exam content specifications, the subject matter requirements should enable (a) examination development specialists to create test items (both selected-response and constructed-response items) that have high validity, (b) Commission staff to monitor the work of examination development specialists in relation to clear, valid content specifications, and (c) candidates for credentials to ascertain clearly the breadth and content of subject matter knowledge, skills, and abilities eligible for assessment on the exams.
4. The new subject matter requirements for each subject area are expected to have two parts. The first part would describe several *content domains* for subject matter understanding and skill, and the second part would describe the subject matter *skills and abilities* applicable to the content domains.

Appendix D

Documents and Standards Used by the Phase III Panels

Documents Used by the Phase III Panels

Agriculture

- Single Subject Matter Standards Common to All (2003)
- Agriculture Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs (1999)
- Career Preparation Standards: Draft Interim Content and Performance Standards, Agricultural Education (1995)
- Agriculture Content Standards Grades 9-12 (1999, 2004)
- Applied Learning Standards: Draft Interim Content and Performance Standards (1995)

Business

- Single Subject Matter Standards Common to All (2003)
- Business Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs (1999)
- Challenge Standards for Student Success: Career Preparation-Business Education (2000)
- National Standards for Business Education (2001)
- Applied Learning Standards: Draft Interim Content and Performance Standards (1995)

Health Science

- Single Subject Matter Standards Common to All (2003)
- Health Science Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs (1999)
- Health Framework for California Public Schools, Kindergarten Through Grade Twelve (2003)
- Challenge Standards for Student Success: Health Education (1998)
- Guidelines for AAHE/NCATE Review of Initial Level Programs for Health Education Teacher Preparation (2001)
- Applied Learning Standards: Draft Interim Content and Performance Standards (1995)
- Accountability Criteria for National Health Care Cluster Foundation Standards, National Consortium on Health Science and Technology Education (2002)
- Biotechnology Research and Development (R & D) Pathway Standards and Accountability Criteria, National Consortium on Health Science and Technology Education (2002)
- Diagnostic Services Pathway Standards and Accountability Criteria, National Consortium on Health Science and Technology Education (2002)
- Health Informatics Pathway Standards and Accountability Criteria, National Consortium on Health Science and Technology Education (2002)
- Support Services Pathway Standards and Accountability Criteria, National Consortium on Health Science and Technology Education (2002)
- Therapeutic Services Pathway Standards and Accountability Criteria, National Consortium on Health Science and Technology Education (2002)

Documents Used by the Phase III Panels (continued)

Home Economics

- Single Subject Matter Standards Common to All (2003)
- Home Economics Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs (1999)
- Challenge Standards for Student Success: Home Economics Careers and Technology, Grades Nine Through Twelve (2000)
- National Standards for Family and Consumer Sciences Education (1998)
- Applied Learning Standards: Draft Interim Content and Performance Standards (1995)

Industrial and Technology Education

- Single Subject Matter Standards Common to All (2003)
- Industrial and Technology Education Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs (1999)
- Challenge Standards for Student Success, Industrial and Technology Education (2001)
- Career Preparation Standards: Draft Interim Content and Performance Standards, Industrial and Technology Education (1995)
- Applied Learning Standards: Draft Interim Content and Performance Standards (1995)
- Standards for Technological Literacy, International Technology Education Association (2000)
- Industrial and Technology Education: Career Path Guides and Model Curriculum Standards (1996)

American Sign Language

- Single Subject Matter Standards Common to All (2003)
- Teacher Preparation in Languages Other than English: Quality and Effectiveness Standards for Subject Matter Programs in California (1994)
- Foreign Language Framework for California Public Schools, Kindergarten through Grade Twelve (2003)
- Foreign Language Standards: Draft Interim Content and Performance Standards,
- Superintendent's Challenge Initiative, California Department of Education (1995)
- ACTFL Program Standards for the Preparation of Foreign Language Teachers (2002)
- Standards for Foreign Language Learning: Preparing for the 21st Century, National
- Standards in Foreign Language Education Project (1996)

Appendix E

Recommended Subject Matter Requirements for Phase III Single Subject Teaching Credentials

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Health	page PSC 7B-45
Home Economics	page PSC 7B-53
Industrial and Technology Education	page PSC 7B-61
Language Other Than English: American Sign Language	page PSC 7B-67

Agriculture Subject Matter Requirements

Part I: Content Domains for Subject Matter Understanding and Skill 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.)

Part II: 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, 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.

Business Subject Matter Requirements

Part I: Content Domains for Subject Matter Understanding and Skill in Business

Domain 1. Business Management

Candidates demonstrate an understanding of the purpose and function of business management. Candidates understand the functions of management, organizational theory, and organizational behavior, including leadership and motivational theories. Candidates explain the importance and implications of ethical and legal behavior. They apply effective processes and procedures for making sound business decisions. They understand the basic principles and procedures required to manage service, trade, manufacturing, nonprofit, and public organizations. Candidates understand the role of managing human resources in successful business organizations.

1.1 Management Functions and Decision Making

- a. Define and explain the five major management functions (i.e., goal setting, planning, organizing, leading, and controlling).
- b. Understand planning and problem-solving processes within an organization and explain how competition affects these processes in formulating strategy and policy.
- c. Understand major functions of an organization (e.g., accounting, marketing, operations, finance, human resources, research and development, information systems) and describe their roles and interrelationships within the organization.
- d. Identify principles and methods for managing change, incorporating innovation, and using decision-making processes in business organizations.
- e. Interpret quantitative and qualitative business information (e.g., charts, graphs, spreadsheets, articles, manuals, technical consumer and workplace documents).
- f. Apply basic mathematical operations and define quantitative analysis and methods to facilitate decision making (e.g., dependent and independent variable analysis, estimation, forecasting, descriptive and inferential statistics, quality control methods).

1.2 Organizational Behavior and Theory

- a. Demonstrate an understanding of leadership and motivational theories, styles, and qualities that foster effective leadership and positive team dynamics.
- b. Understand the interrelationships among group and individual behaviors and the culture and climate of an organization.
- c. Understand principles of organizational theory and compare and contrast different organizational structures.

1.3 Ethical and Social Responsibility

- a. Understand procedures for developing a code of ethics and apply ethical codes to various business situations.
- b. Analyze factors that affect ethical conduct and their implications in business decision making.
- c. Identify and analyze issues related to ethical and social responsibility in the global marketplace.
- d. Understand the social responsibilities of business organizations and the function of management in making decisions related to social responsibilities.

1.4 Business Law

- a. Understand the history, sources, structure, and operations of the U.S. legal system and the basic principles of law relevant to business operations in a global economy.
- b. Demonstrate an understanding of laws, regulations, and codes related to business (e.g., enforceable contracts, personal and real property, antitrust, uniform commercial code).
- c. Apply knowledge of laws and regulations in various situations and explain their effect on business.
- d. Recognize and differentiate between ethical and legal issues related to business.

1.5 Production and Operations Management

- a. Understand the processes by which resources such as labor and raw materials are converted into finished goods and services.
- b. Understand components of successful business operations (e.g., quality control, planning, resource scheduling, inventory management).
- c. Explain the importance of productivity in business and identify factors that affect profitability (e.g., specialization, innovation, investment, technology).
- d. Identify the interrelationships between business operations and the social dynamics of the workplace.

1.6 Human Resource Management

- a. Understand and describe methods an organization can use to effectively manage its personnel policies, practices, and resources.
- b. Understand and apply methods of employee recruitment and selection, development and training, performance documentation, evaluation, and termination of employment.
- c. Demonstrate a basic understanding of the issues arising from legislation (e.g., Americans with Disabilities Act, Equal Employment Opportunity Commission, Family and Medical Leave Act) related to human resource management.
- d. Understand regulations and apply procedures related to health and safety practices and policies.

(Challenge Standards for Student Success: Career Preparation—Business Education [2000]: Standards 1.2, 1.7, 3.2, 3.3. Business Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 8, 9, 11.)

Domain 2. Accounting and Finance

Candidates demonstrate an understanding of financial analysis and accounting concepts, principles, and procedures. Candidates analyze, apply, interpret, and communicate financial data. They understand how to make decisions using accounting data. Candidates use principles of finance to analyze business situations and apply basic principles of personal financial management.

2.1 Accounting Principles

- a. Understand the basic theory of accounting (e.g., accounting equation, classification and matching, historical cost) as it relates to the accounting cycle for a sole proprietorship, partnership, and corporation.
- b. Identify components of the accounting cycle (e.g., analysis of source documents, procedures for journalizing and posting transactions to ledgers, creating financial statements, performing adjusting and closing entries).

- c. Understand and apply specific accounting principles related to recognition and measurement for reporting financial performance, financial position, and cash flows (e.g., cash management, receivables and payables, inventory, investments, non-concurrent assets and liabilities, owner's equity, foreign currency).
- d. Recognize the uses of computerized accounting packages and other financial software applications.
- e. Interpret, prepare, and use financial accounting data to make ethical business decisions.

2.2 Principles of Finance

- a. Understand basic financial analysis terminology (e.g., time value of money, interest rates, risk).
- b. Apply financial analysis principles to common business situations and problems.
- c. Interpret and communicate financial data in a business.

2.3 Personal Finance

- a. Understand principles and procedures for personal financial management (e.g., budgeting, saving, personal income tax, investing, retirement planning, personal banking).
- b. Apply consumer skills in evaluating the purchase of various consumer products (e.g., house, automobile).
- c. Understand financial and investment options offered by banks, credit unions, and other financial institutions.
- d. Describe how income from employment is affected by various factors (e.g., supply and demand, geographical location, level of education, type of industry, union membership, productivity, skill level, work ethic).
- e. Understand principles and factors that affect credit and personal debt management (e.g., choice of credit, cost of credit, legal aspects of using credit).

(Challenge Standards for Student Success: Career Preparation—Business Education [2000]: Standards 2.1–2.3, 3.1.2. Business Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standard 5.)

Domain 3. Marketing

Candidates demonstrate an understanding of marketing principles and how to use marketing strategies to improve product and service sales. Candidates recognize the customer-oriented nature of marketing and analyze the impact of marketing activities on the individual, business, society, and the global economy. They understand the role of distribution in providing products and services to consumers. Candidates understand how customer service and promotion affect sales. Candidates understand how emerging technologies influence e-commerce and global trade.

3.1 Marketing Strategy and Concepts

- a. Understand principles and procedures for developing a marketing plan and apply marketing strategies to a variety of business situations and industries.
- b. Describe how the principles of market segmentation, target marketing, and positioning are used in conducting market research and related business decisions.
- c. Understand and apply principles of the five P's (i.e., product, price, promotion, place/distribution, and people) to make marketing decisions while recognizing the influence of emerging technologies.
- d. Recognize how cultural differences in language, values, social behavior, and business protocol can affect market strategies and concepts.
- e. Identify emerging media technology trends and their impact on marketing strategies.

- f. Apply appropriate mathematical procedures to analyze and solve business problems related to marketing (e.g., purchasing, sales, promotions).

3.2 Customer Service, Sales, and Promotion

- a. Understand the nature, importance, strategies, and steps of the selling process.
- b. Understand customer buying motives and behaviors and their relationship to the decision-making process involved in selling.
- c. Understand factors affecting customer satisfaction and customer service options that are appropriate for selected types of businesses and their target markets.
- d. Apply promotional strategies for marketing products and services.
- e. Understand the different tools in the promotional mix (e.g., advertising, personal selling, sales promotion, public relations).
- f. Recognize how cultural differences in language, values, social behavior, and business protocol can affect customer service, sales, and promotion.

3.3 Global Marketing

- a. Identify political, economic, geographical, and commercial factors in global markets.
- b. Recognize how cultural differences in language, values, social behavior, and business protocol can affect market behavior and marketing strategies.
- c. Identify factors that affect global marketing (e.g., global alliances, balance of trade, logistics, market entry, marketing mix, trade barriers).

(Challenge Standards for Student Success: Career Preparation—Business Education [2000]: Standards 5.1–5.11. Business Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standard 4.)

Domain 4. Information Technology

Candidates demonstrate an understanding of the terminology, principles, and procedures related to information technology. Candidates understand principles and procedures related to ethics, security, and data integrity in technology systems. They understand communications and networking systems and apply basic concepts of programming and systems development in business situations.

4.1 Computer Technology

- a. Understand terminology and concepts related to computer technology (e.g., operating system, hardware and software compatibility, drivers).
- b. Understand the process of evaluating, selecting, installing, and configuring computer components, peripherals, operating systems, and industry-standard application software.
- c. Utilize operating systems and associated utilities for file management, backup and recovery, and execution of programs; and compare simple and multiuser operating systems.
- d. Understand basic procedures for troubleshooting problems in hardware, software, and network systems.
- e. Understand the impact of information on society (e.g., changes at home and in the workplace).

4.2 Information and Media Systems

- a. Understand principles and procedures necessary to analyze, plan, implement, and support information and media systems.
- b. Understand and apply factors affecting the ongoing management of information and media systems.

4.3 Ethics, Security, and Data Integrity

- a. Understand proper ethical procedures related to information technology, including management of intellectual property.
- b. Understand methods for implementing basic security plans and procedures for information systems.
- c. Understand policies for managing privacy and ethical issues to ensure the integrity and accuracy of electronic data in organizations and in a technology-based society.

4.4 Network Communications

- a. Understand the basic networking concepts, systems, and business models related to the creation, installation, management, and security of a network system.
- b. Understand voice and data transmission media and emerging technology trends.

4.5 Programming

- a. Understand programming logic, concepts, methodology, and design (e.g., interface, code, execution, test, debugging).
- b. Understand how to use and customize software in business applications (e.g., word processing, spreadsheet, database, Web page editor).
- c. Compare several programming languages and identify characteristics of structured programs in at least one language.

(Challenge Standards for Student Success: Career Preparation—Business Education [2000]: Standards 1.6, 4.1–4.5. Business Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 2, 3.)

Domain 5. Economics

Candidates demonstrate an understanding of basic economic principles. Candidates understand the basic principles and applications of microeconomics and macroeconomics and recognize how economic concepts affect business in domestic and international economies.

5.1 Economic Concepts

- a. Understand basic terminology, concepts, and theories related to domestic and international economics (e.g., opportunity costs, allocation of resources, scarcity, choice, circular flow, production possibilities curve).
- b. Interpret economic charts and graphs.

5.2 Microeconomics

- a. Apply principles of supply and demand, price, profits, and incentives in product markets.
- b. Identify and understand characteristics of different economic structures (e.g., perfect competition, monopolistic competition, oligopoly, monopoly).
- c. Understand and apply economic factors and concepts (e.g., law of diminishing returns, costs, competition, efficiency, profit maximization, productivity) as they relate to a business organization.
- d. Understand the four input factors of production (i.e., land, labor, capital, and

entrepreneurial ability) and their costs.

5.3 Macroeconomics

- a. Compare and contrast different economic systems and philosophies (e.g., capitalism, socialism, communism).
- b. Understand the significance of a variety of economic indicators (e.g., domestic output, unemployment, inflation, deflation).
- c. Understand principles associated with money and banking (e.g., concepts of money, money supply, financial institutions, the role of the Federal Reserve).
- d. Understand and evaluate the effects of fiscal and monetary policy on the U.S. economy and international trade.
- e. Understand aggregate supply and demand.
- f. Understand the influence of government (e.g., taxation, regulation, public vs. private goods, externalities) on business decisions.

5.4 International Economics

- a. Understand factors affecting international trade (e.g., trade agreements, trade barriers—quotas and tariffs) and the relationship of international trade to domestic and international economics.
- b. Recognize the role of international currency markets, including foreign exchange and monetary exchange rates.
- c. Recognize how differences in culture, language, values, and social behavior affect the ethical conduct of business across national borders.

(Challenge Standards for Student Success: Career Preparation—Business Education [2000]: Standards 1.4, 3.1. Business Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 6, 7.)

Domain 6. Business Environment and Communication

Candidates demonstrate an understanding of the business environment. Candidates understand the principles and procedures of business ownership. They understand the role of communications in a business environment. Candidates are familiar with different career paths and opportunities to develop career and employment skills. Candidates have an understanding of international business.

6.1 Entrepreneurship

- a. Understand principles and procedures related to business ownership (e.g., sole proprietorship, limited partnership, franchise, corporation).
- b. Identify and appraise the unique contributions of entrepreneurs to the U.S. economy.
- c. Recognize the characteristics of entrepreneurs and evaluate the advantages and disadvantages of various types of business ownership.

- d. Understand how to create a business plan and understand the processes necessary to operate a start-up business (e.g., business planning, financial planning, location analysis, marketing, operations management, human resource management, public relations, seeking government assistance) within the legal and economic environment in which a new venture operates.

6.2 Business Communications

- a. Compare and contrast appropriate types of communication (e.g., telephone, electronic, inter-office, written, verbal, nonverbal) and demonstrate an understanding of etiquette in personal and professional situations.
- b. Demonstrate an understanding of active listening techniques in a variety of settings.
- c. Understand the effects of cultural, organizational, technological, and behavioral characteristics on the selection of communication strategies and methods.
- d. Compose effective oral and written business communications that demonstrate English language conventions and the use of critical-thinking, decision-making, and problem-solving skills.
- e. Demonstrate an understanding of software applications used to produce documents and presentations (e.g., word processing, desktop publishing, database, spreadsheet, multimedia, presentation software).
- f. Identify basic inputting technology and keyboarding skills used to access, generate, format, and manipulate text and data.
- g. Identify and use multiple resources (e.g., oral, written, electronic; primary and secondary) and critically evaluate the quality of sources.

6.3 Career Development

- a. Understand employment skills necessary to be productive in a workforce in a culturally diverse global environment (e.g., ability to adapt to change, positive attitude, teamwork skills, ability to manage time effectively, good work ethic).
- b. Understand career preparation principles to help set career goals and examine interests and aptitudes related to career options.
- c. Demonstrate knowledge of career opportunities (traditional and nontraditional) and the education, training, and experience required for various careers.
- d. Demonstrate knowledge of job acquisition skills (e.g., job search methods, interviewing techniques, appropriate professional image, occupational networking, résumé and career portfolio development, correspondence).

6.4 International Business

- a. Understand the importance of international business and its influence on careers and businesses at the local, state, national, and international levels.
- b. Recognize international business activities, including operating strategies for business functions (e.g., human resource management, management, production systems, marketing, information systems).

- c. Describe the social, cultural, political, geographical, and legal factors that shape the international business environment and influence international business communications and decision making (e.g., entry strategies, business opportunities, operating and security considerations).

(Challenge Standards for Student Success: Career Preparation—Business Education [2000]: Standards 1.1–1.3, 1.5, 3.4, 6.1. Business Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 2, 10.)

Part II: Subject Matter Skills and Abilities Applicable to the Content Domains in Business

Candidates understand and are able to effectively communicate the central role that business plays in the lives of all individuals. They understand the skills, attitudes, and knowledge that students need to compete and succeed in a rapidly changing global marketplace. Candidates apply critical thinking and creativity to investigate and solve business-related problems. They understand how to collect and analyze business information, make business decisions, and implement those decisions by communicating and interacting effectively in a diverse workplace.

Candidates understand the organizational, team, leadership, and communication skills needed to work effectively with business and community leaders. They understand the fundamentals of supervising, advising, and supporting people. Candidates understand the characteristics, functions, and organizational structures of leadership organizations. They are able to effectively network in individual and group settings in educational institutions, the community, and industry. Candidates understand the need to include all stakeholders and are able to respond to issues related to diversity and equity in business.

Candidates understand historical events, current research, and recent developments in business. They are familiar with social, economic, legal, and ethical issues in the field. They apply strategies (e.g., accessing resources, joining professional organizations) for staying abreast of current issues and developments in business. 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 business. They apply their knowledge to assist in career planning and development and in applying for, obtaining, maintaining, and exiting employment in business and related fields.

Candidates understand the interrelationships and connections among the various subdisciplines of business and the integration of business and other disciplines commonly taught in public schools. They understand the importance of technology, reading, writing, mathematics, speaking, and active listening skills and how to apply this knowledge in a variety of business situations.

Health Science Subject Matter Requirements

Part I: Content Domains for Subject Matter Understanding and Skill in Health Science

Domain 1. Foundations of Health Education

Candidates demonstrate an understanding of the professional, scientific, and behavioral foundations in alignment with the Health Framework for California Public Schools (2003). Candidates must demonstrate a fundamental understanding of the professional and legal responsibilities of health educators, of the scientific and behavioral principles that are the basis of health science, and of the philosophies of health education.

1.1 Professional Foundations

- a. Demonstrate knowledge of the components and purpose of a Coordinated School Health Program (CSHP)/System.
- b. Describe the importance and relevance of Healthy People 2010 for the health educator.
- c. Interpret health-related data from various sources (e.g., the California Healthy Kids Survey [CHKS], the Youth Risk Behavior Surveillance System [YRBSS], Centers for Disease Control and Prevention [CDC]).
- d. Identify resources for keeping informed about current knowledge in health science (e.g., Internet, professional journals, local health agencies, professional organizations).
- e. Understand the role of the health education professional in communicating, promoting, and advocating for a healthy school environment.

1.2 Scientific and Behavioral Foundations

- a. Demonstrate a basic knowledge of human anatomy and physiology, emphasizing body systems.
- b. Identify behavior change theories (e.g., social learning theory, stages of change) relevant to health instruction.
- c. Demonstrate knowledge of current trends in health education (e.g., resiliency, asset development, skills-based instruction, research-based programs).

1.3 Legal Responsibilities

- a. Demonstrate knowledge of laws relating to student health and safety, including confidentiality and reporting suspected abuse or neglect.
- b. Demonstrate awareness of how laws, regulations, and local board policies affect the content of school health education.

(Challenge Standards for Student Success: Health Education [1998]: Standards 2, 6, 9. Health Science Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 2–6, 8–12.)

Domain 2. Human Growth and Development

Candidates demonstrate an understanding of physical and psychosocial growth and development in alignment with the Health Framework for California Public Schools (2003). Candidates must demonstrate a fundamental understanding of human growth patterns, characteristics of developmental stages over the life cycle, and factors that affect psychosocial growth and development.

2.1 Physical Growth and Development

- a. Demonstrate knowledge of the physical patterns of change and development that occur over the life cycle (e.g., infancy, childhood, adolescence, adulthood).
- b. Demonstrate basic knowledge of individual hygiene practices.

2.2 Psychosocial Growth and Development

- a. Demonstrate knowledge of factors influencing psychosocial growth and development (e.g., race, gender, age, ethnicity, culture, special needs) in relation to health, disease, and health behaviors.
- b. Identify cognitive, emotional, and social changes that occur over the life cycle (e.g., in body image, self-esteem, interpersonal relationships).

(Challenge Standards for Student Success: Health Education [1998]: Standards 5–8. Health Science Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 2, 3, 6, 12.)

Domain 3. Chronic and Communicable Diseases

Candidates demonstrate an understanding of chronic and communicable diseases in alignment with the Health Framework for California Public Schools (2003). Candidates must demonstrate a fundamental understanding of the risk factors for, characteristics of, and prevention of chronic and communicable diseases.

3.1 Chronic Diseases

- a. Demonstrate knowledge of risk factors for and characteristics of common chronic diseases (e.g., heart disease, asthma, diabetes, cancer), including their demographic distributions.
- b. Identify primary, secondary, and tertiary approaches for preventing common chronic diseases.
- c. Identify the historical and modern-day impact of common chronic diseases on human populations.

3.2 Communicable Diseases

- a. Demonstrate knowledge of risk factors for and characteristics of common communicable diseases (e.g., HIV/AIDS, sexually transmitted diseases [STDs], hepatitis, tuberculosis), including their means of transmission and demographic distributions.
- b. Identify primary, secondary, and tertiary approaches for preventing common communicable diseases (e.g., immunizations, risk-reduction strategies, antibiotics).
- c. Identify the historical and modern-day impact of communicable diseases (e.g., plague, polio, tuberculosis, smallpox, HIV/AIDS) on human populations.

(Challenge Standards for Student Success: Health Education [1998]: Standard 2. Health Science Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standard 11.)

Domain 4. Nutrition and Fitness

Candidates demonstrate an understanding of nutrition and physical fitness in alignment with the Health Framework for California Public Schools (2003). Candidates must demonstrate a fundamental understanding of relationships among nutrition, physical activity, and lifelong well-being.

4.1 Nutritional Bases of Human Health

- a. Demonstrate knowledge of the categories of essential nutrients (i.e., carbohydrates, fats, proteins, vitamins, minerals, and water), their sources in the diet, and consequences of their deficiency or excess.
- b. Interpret information on food labels.
- c. Demonstrate knowledge of dietary guidelines for different populations (e.g., based on age, culture, medical conditions).
- d. Demonstrate knowledge of how to develop an appropriate personal nutrition plan.
- e. Understand the principles of weight management and the importance of weight management to overall health and wellness.
- f. Understand the risk factors for and health risks associated with obesity.
- g. Demonstrate knowledge of eating disorders and their relationship to individual health and body image.

4.2 Physical Fitness and Health

- a. Demonstrate knowledge of the components of health-related fitness (e.g., endurance, strength, flexibility) and methods of self-assessment.
- b. Demonstrate knowledge of the effects of exercise and personal health behaviors (e.g., sleep, rest, relaxation) that have a positive impact on body systems and on lifelong health.
- c. Demonstrate knowledge of how to develop an appropriate personal fitness plan, including strategies for self-assessment, goal-setting, and maintenance.

(Challenge Standards for Student Success: Health Education [1998]: Standards 1, 7. Health Science Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 3, 4, 11.)

Domain 5. Mental and Emotional Health

Candidates demonstrate an understanding of the foundations of mental and emotional well-being in alignment with the Health Framework for California Public Schools (2003). Candidates must demonstrate a fundamental understanding of the role of mental and emotional health in maintaining lifelong well-being and of how to adapt positively to change.

5.1 Foundations of Mental and Emotional Health

- a. Identify the basic components of mental and emotional health (e.g., self-confidence, goal setting, coping skills, effective communication skills).
- b. Identify the relationships among mental, emotional, and physical health.
- c. Recognize the potential contributions of spirituality (e.g., purpose and meaning, connectedness, service to others, positive self-concept) to mental, emotional, and/or physical health.
- d. Demonstrate knowledge of positive youth development, asset development, and resiliency.
- e. Identify strategies for dealing with grief, loss, and bereavement in a variety of situations (e.g., individual, family, group).
- f. Identify strategies for dealing with anger in a variety of situations.

5.2 Stress, Depression, and Suicide

- a. Demonstrate knowledge of the causes, symptoms, and consequences of stress from various sources (e.g., peers, family, school, work) and of stress management techniques.
- b. Understand the nature of depression and its causes, symptoms, and treatment options.
- c. Identify risk factors for suicide and strategies for intervention.

(Challenge Standards for Student Success: Health Education [1998]: Standards 1, 6, Health Science Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 3, 7.)

Domain 6. Alcohol, Tobacco, and Other Drugs

Candidates demonstrate an understanding of drugs and of factors affecting their use, misuse, and abuse in alignment with the Health Framework for California Public Schools (2003). Candidates must demonstrate a fundamental understanding of drug classifications; the physical effects of drug use, misuse, and abuse; and the prevention, intervention, and treatment of drug abuse and addiction.

6.1 Drug Classifications and Effects on the Body

- a. Demonstrate knowledge of the categories of drugs (i.e., legal, illegal, over-the-counter, and prescription).
- b. Demonstrate knowledge of drug classifications (e.g., antibiotics, stimulants, depressants, hallucinogens) and the effects of each class of drug on the body.

6.2 Drug Use, Misuse, Abuse, and Addiction

- a. Distinguish between responsible and irresponsible use of over-the-counter and prescription drugs.
- b. Distinguish between responsible and irresponsible use of tobacco and alcohol.
- c. Identify signs of drug misuse, abuse, and addiction.
- d. Demonstrate knowledge of the physiological process and stages of drug addiction.
- e. Recognize the impact of drug abuse on relationships and family dynamics.
- f. Analyze factors contributing to the misuse and abuse of drugs (e.g., impact of the media, peer pressure).

6.3 Prevention, Intervention, and Treatment of Substance Abuse

- a. Identify and understand substance-abuse prevention strategies (e.g., decision making, finding healthy alternatives, avoiding risk situations).
- b. Demonstrate knowledge of intervention options (e.g., student assistance programs) and treatment options (e.g., inpatient, outpatient) for dealing with substance abuse.

(Challenge Standards for Student Success: Health Education [1998]: Standards 3, 4, 6, 7, Health Science Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 3, 5, 6.)

Domain 7. Family Life and Interpersonal Relationships

Candidates demonstrate an understanding of family and interpersonal relationships and of reproductive health in alignment with the Health Framework for California Public Schools (2003). Candidates must demonstrate a fundamental understanding of family structures, family life education, interpersonal relationships, and human sexuality and reproductive health.

7.1 Family Structures and Family Life

- a. Demonstrate knowledge and understanding of diverse family structures.

- b. Recognize how interpersonal, cultural, and social dynamics (e.g., intimacy, intergenerational relationships, parenting) may affect a family.
- c. Identify and analyze potential sources of stress (e.g., divorce, blended families, homelessness, finances) within families.
- d. Recognize behaviors and strategies that reduce conflict and promote healthy family relationships.

7.2 Interpersonal Relationships

- a. Recognize varying levels of intimacy and commitment across relationships (e.g., friendship, dating, marriage).
- b. Identify characteristics of healthy and unhealthy relationships.
- c. Recognize effective techniques for communicating and building healthy relationships (e.g., assertiveness, active listening, "I" messages).
- d. Demonstrate knowledge of the causes of conflict and techniques for conflict resolution.
- e. Understand forms of internal and external peer pressure and identify possible responses.

7.3 Human Sexuality and Reproductive Health

- a. Demonstrate knowledge of developmental changes and the characteristics of puberty and menarche.
- b. Analyze factors that influence decisions about sexual activity (e.g., individual, family, and cultural values, peer and media influences).
- c. Demonstrate knowledge of family planning and methods of delaying or avoiding pregnancy (e.g., abstinence, contraception).
- d. Demonstrate knowledge of sexually transmitted diseases (STDs) and methods for their prevention or risk reduction.
- e. Identify factors (e.g., nutrition, drug use, heredity) that affect pregnancy, fetal development, and birth.

(Challenge Standards for Student Success: Health Education [1998]: Standards 2–6, 8. Health Science Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 4, 6, 7.)

Domain 8. Consumer and Community Health

Candidates demonstrate an understanding of consumer and community health, intentional and unintentional injury, and emergency preparedness in alignment with the Health Framework for California Public Schools (2003). Candidates must demonstrate a fundamental understanding of the impact of culture, media, technology, and other factors on consumer health. They understand ways to promote and maintain positive and safe health practices and reduce the risk of injury and violence within the home, school, and community.

8.1 Consumer Health

- a. Identify appropriate health professionals and sources of health services for a variety of health-related needs.
- b. Identify health insurance options (e.g., health maintenance organizations, preferred provider organizations, Medi-Cal).
- c. Distinguish between reliable and unreliable sources of health-related information.
- d. Interpret and analyze advertising techniques and their influence on consumer behavior.

- e. Evaluate claims made for health products and services, and recognize quackery.
- f. Identify organizations and agencies concerned with consumer health protection.

8.2 Community Health

- a. Demonstrate knowledge of a variety of public and private community organizations and agencies that promote community health.
- b. Demonstrate knowledge of how cultural beliefs and practices may affect individual and community health behaviors (e.g., immunization, accessing health services).
- c. Demonstrate knowledge of health issues affecting special populations (e.g., migrant, homeless, uninsured).

8.3 Intentional and Unintentional Injury

- a. Demonstrate knowledge of sources of intentional injuries (e.g., bullying, assault, child abuse, hate crimes) and risk reduction strategies.
- b. Demonstrate knowledge of sources of unintentional injuries (e.g., fire, poison, traffic) and risk reduction strategies.
- c. Demonstrate knowledge of first aid and universal precautions.
- d. Demonstrate knowledge of the purpose and function of family, community, and school emergency preparedness plans.

(Challenge Standards for Student Success: Health Education [1998]: Standards 5, 7–9. Health Science Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 7, 8, 10.)

Domain 9. Environmental Health

Candidates demonstrate an understanding of the relationships between humans and their environment in alignment with the Health Framework for California Public Schools (2003). Candidates must demonstrate a fundamental understanding of factors in natural and human environments that impact health and of ways to conserve natural resources and protect the environment.

9.1 People, Health, and the Environment

- a. Identify types of pollution, hazardous wastes, biohazards, and naturally occurring environmental hazards and their effects on health.
- b. Demonstrate knowledge of ways to prevent or minimize the effects of pollution and other environmental factors.
- c. Demonstrate knowledge of steps that can be taken to conserve natural resources and protect the environment.
- d. Demonstrate knowledge of organizations and agencies concerned with environmental health.

(Challenge Standards for Student Success: Health Education [1998]: Standards 5, 6. Health Science Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 7, 11.)

Part II: Subject Matter Skills and Abilities Applicable to the Content Domains in Health Science

Candidates apply knowledge of behavioral and scientific principles to the content area of health science/health education and apply health-related skills across multiple health topics. They demonstrate problem-solving and critical-thinking skills that develop confidence in the decision-making process and promote healthy behaviors.

Candidates recognize differences in individual growth and development and variation in culture and family life. They assess individual and community needs for health education by interpreting health-related data about social and cultural environments. They differentiate between health education practices that are grounded on sound scientific research and those that are not research based. They identify opportunities for collaboration among health educators in all settings, including school and community health professions. They apply laws, regulations, and policies affecting school health education.

Candidates use their analytical skills to identify behaviors that enhance and/or compromise personal health and well-being and recognize the short-term and long-term effects of the lifestyle choices and habits of individuals. They apply a variety of risk assessment skills and prevention strategies to health-related issues. They evaluate sources of health-related information and differentiate between reliable and unreliable sources.

Candidates demonstrate effective communication and advocacy skills as they relate to personal, family, and community health and health education needs. They understand the role of communication in interpersonal relationships and identify strategies that encourage appropriate expression. They emphasize the importance of the communication process, including listening, assertiveness, and refusal skills.

Home Economics Subject Matter Requirements

Part I: Content Domains for Subject Matter Understanding and Skill in Home Economics

Domain 1. Personal, Family, and Child Development

Candidates demonstrate an understanding of personal, interpersonal, and family relationships; parenting; and child development and education. Candidates must have a broad and deep understanding of the types of relationships people have, as well as the factors that can affect relationships. They recognize major theories about human and family development and understand methods, strategies, and approaches that can be used to foster physical, cognitive, emotional, and social development. They are also familiar with knowledge and skills transferable to a variety of careers related to family services, child development, and education.

1.1 Personal, Interpersonal, and Family Relationships

- a. Demonstrate an understanding of the characteristics that affect personal, interpersonal, and family relationships, such as values, goals, morals, self-concept, and philosophy of life.
- b. Demonstrate an understanding of the reasons for personal relationships; the factors that affect the selection of friends, partners, and spouses; and the issues that can arise in personal relationships.
- c. Describe how relationship skills, responsible behavior, and stress-management techniques can help individuals promote and obtain positive personal, interpersonal, family, and workplace relationships.
- d. Demonstrate an understanding of the meaning of family, the different types of families and family structures, the roles and responsibilities within a family, the function of families within society, and the significance of families to individuals and society.
- e. Analyze the family life cycle and its effect on the health and well-being of individuals and families (e.g., major life changes, conflicts, crises) and identify resources, such as local, state, and federal systems, that can offer support to individuals and families.

1.2 Parenting

- a. Analyze various factors that affect decisions about becoming a parent (e.g., life choices, health, cultural and socioeconomic considerations).
- b. Demonstrate knowledge about family planning and ways in which individuals can prepare for the responsibilities of parenthood.
- c. Demonstrate knowledge about the stages and characteristics of pregnancy and the factors that affect prenatal, perinatal, and postnatal health (e.g., parental nutrition and health, medical care, environment).
- d. Recognize theories on parenting; how parenting affects parents, children, and families; and techniques, methods, and strategies that can be used to guide a child's development in areas such as self-worth, social skills, appropriate behavior, and self-discipline.
- e. Demonstrate an understanding of common childhood illnesses, children's healthcare needs (e.g., immunizations, nutrition, exercise), and hygienic care for children.
- f. Identify potential hazards to children's safety, precautions and practices to prevent childhood accidents, basic first-aid procedures, and ways to plan for children's safety in emergency situations (e.g., fire, earthquake, parental illness).

- g. Demonstrate an understanding of the factors that contribute to child abuse and neglect, signs of child abuse and neglect, and legal responsibilities related to ensuring a child's safety and well-being.

1.3 Child Development and Education

- a. Demonstrate knowledge of the stages and characteristics of child development, from infancy through adolescence, and the various hereditary and environmental factors that can affect child development.
- b. Demonstrate knowledge of the study of children, including major child developmental theories (e.g., Piaget's theory of cognitive development, Erikson's theory of psychosocial development, Kohlberg's theory of moral development), research methods, and observation techniques.
- c. Identify developmentally appropriate activities for children of various ages and stages, such as learning, playing, and other recreational activities that can be used to promote cognitive, physical, emotional, and social development.
- d. Demonstrate knowledge of career paths, transferable knowledge and skills, aptitudes, and responsibilities related to careers in child development and education.

(Challenge Standards for Student Success: Home Economics Careers and Technology [2000]: Family Living and Parenting Education Content Area Standards 1–9; Individual and Family Health Content Area Standards 3 and 5; Child Development and Guidance Content Area Standards 1–12; Child Development and Education Career Pathway Standards 1–17.)

Domain 2. Nutrition, Foods, and Hospitality

Candidates demonstrate an understanding of food science, nutritional science, food preparation, and hospitality. Candidates understand the scope of food and nutritional science, including physiological and biochemical processes involved in the preparation and consumption of food and nutrients. They understand the components of and the various factors that affect health and well-being and have knowledge about various illnesses and diseases related to food and nutrition. They are knowledgeable about current research and new technologies in nutrition and food industries. They also understand procedures and techniques related to food preparation and meal management. Candidates have knowledge of various kitchen designs, equipment, appliances, safety and sanitation standards, and emergency procedures. They are also familiar with knowledge and skills transferable to a variety of careers related to food, nutrition, and hospitality industries.

2.1 Food and Nutritional Science

- a. Demonstrate knowledge of the principles of food and nutritional science, such as the chemical and physical reactions that occur in food; characteristics and functions of nutrients; the digestion, absorption, and metabolism of nutrients; and the factors that affect the nutritional value of foods and beverages.
- b. Demonstrate an understanding of the components of a balanced diet, including current government-approved dietary guidelines; dietary needs throughout the life cycle; and the relationship between nutrition and health.
- c. Apply terminology used in food and nutritional science to interpret label information and evaluate current dietary programs.

- d. Demonstrate an understanding of current research and its impact on new technologies relating to the quality, safety, availability, and affordability of food and to the environment.
- e. Demonstrate knowledge of food-related diseases and disorders of the diet.
- f. Analyze cultural, environmental, and socioeconomic factors that affect diet, nutrition, and health.

2.2 Food Preparation and Hospitality

- a. Demonstrate knowledge of the principles of food safety and sanitation, including food-borne illnesses, their causes, and prevention.
- b. Demonstrate an understanding of efficient kitchen designs and layouts.
- c. Demonstrate an understanding of how to select, care for, and safely use food preparation equipment.
- d. Identify kitchen safety hazards, safety precautions, and emergency procedures.
- e. Demonstrate knowledge about food safety regulations and inspections, as well as the role of state and federal agencies (e.g., California Department of Health Services, U.S. Food and Drug Administration, U.S. Department of Agriculture) in regulating food product safety.
- f. Demonstrate an understanding of the factors that affect meal management (e.g., time, energy, resources), as well as the methods and skills necessary to effectively manage meal planning, preparation, and presentation.
- g. Demonstrate an understanding of the principles, techniques, and terminology of food preparation (e.g., measuring and substituting ingredients; following, interpreting, converting, and modifying recipes/formulas).
- h. Recognize the variety of differences in food preparation, dining etiquette, table settings, and meal service styles within the United States, as well as those of other cultures and geographical regions of the world.
- i. Demonstrate knowledge of career paths, transferable knowledge and skills, aptitudes, and responsibilities related to careers in nutrition, foods, and hospitality industries.

(Challenge Standards for Student Success: Home Economics Careers and Technology [2000]: Food and Nutrition Content Area Standards 1–10; Food Science, Dietetics, and Nutrition Career Pathway Standards 1–18; Food Service and Hospitality Career Pathway Standards 1–20.)

Domain 3. Fashion and Textiles

Candidates demonstrate an understanding of fashion, textiles, and apparel design and construction. Candidates must have a substantial understanding of the history of fashion and current trends in fashion; wardrobe management; fibers, fabrics, and finishes; and apparel equipment and materials, as well as maintenance and construction procedures used in various activities related to apparel and textile items. They are familiar with knowledge and skills transferable to a variety of careers related to the fashion and textile industries.

3.1 Fashion Influences and Wardrobe Management

- a. Demonstrate knowledge of the history of fashion (e.g., the historical development of textiles, cultural influences on design, technological advancements in apparel design and manufacturing) and current trends in the fashion industry.
- b. Demonstrate knowledge of elements and principles of design and color theory as related to the fashion industry.

- c. Demonstrate an understanding of the factors influencing wardrobe planning and selection (e.g., budget; needs; personal preferences based on culture, lifestyle and career; fashion trends).
- d. Demonstrate knowledge of career paths, transferable knowledge and skills, aptitudes, and responsibilities related to careers in the fashion and textile industries.

3.2 Fibers, Fabrics, and Finishes

- a. Identify sources of various natural and manufactured fabrics, their characteristics, and the terminology used to classify and describe them.
- b. Explain how to select appropriate fibers, fabrics, and finishes for a variety of purposes.
- c. Demonstrate an understanding of the care of clothing and household textile items (e.g., care symbols, laundering, stain removal, storage).

3.3 Apparel Construction

- a. Demonstrate an understanding of the various functions, use, and care of apparel construction equipment and materials.
- b. Demonstrate an understanding of the techniques and terminology for constructing, altering, and repairing apparel and household textile items.
- c. Demonstrate an understanding of how to evaluate the quality of apparel construction.
- d. Compare cost, time, and energy factors involved in purchasing, constructing, remodeling, or recycling materials, apparel, and household textile items.

(Challenge Standards for Student Success: Home Economics Careers and Technology [2000]: Fashion, Textiles, and Apparel Content Area Standards 1–12; Fashion Design, Manufacturing, and Merchandising Career Pathway Standards 1–23.)

Domain 4. Housing and Interior Design

Candidates demonstrate an understanding of interior design and housing. Candidates must understand the elements and principles of design; historical and contemporary interiors, architectural styles, and furniture designs; and the materials, methods, tools, and technology used in design of living and working environments. They also understand consumer aspects of interiors and housing, such as the role of the government and other organizations in housing and related matters; the criteria considered in selecting housing; and the laws, regulations, and responsibilities associated with housing. They are familiar with knowledge and skills transferable to a variety of careers related to the interior design and housing industries.

4.1 Housing

- a. Demonstrate an understanding of criteria considered in the selection of housing (e.g., construction, safety, location) and interiors (e.g., needs, affordability, personal preferences).
- b. Demonstrate an understanding of the basic factors (e.g., costs, maintenance, environmental considerations) involved in the selection of materials used in design and construction.
- c. Recognize the effect of historical architectural design and culture on contemporary design.
- d. Demonstrate an understanding of the laws, regulations, and programs related to housing (e.g., low-income housing, assistance programs, building codes).

4.2 Interior Design

- a. Demonstrate knowledge of the elements and principles of design and their use in planning and evaluating the aesthetics of living and working environments, as well as in selecting furnishings and equipment.
- b. Analyze color theory and its application to living and working environments, including the evaluation of color schemes in a variety of situations.
- c. Demonstrate an understanding of the role of design in meeting individual, family, and group needs throughout the life cycle (e.g., use of floor plans, elevations, materials).
- d. Demonstrate knowledge of career paths, transferable knowledge and skills, aptitudes, and responsibilities related to the interior design and housing industries.

4.3 Furnishings

- a. Demonstrate knowledge of historical and contemporary styles of furnishings.
- b. Demonstrate an understanding of criteria considered in the selection of furnishings and equipment (e.g., quality, construction, care, needs, affordability, personal preferences).
- c. Demonstrate an understanding of furnishing materials (e.g., wall and floor coverings, textiles, window treatments, lighting fixtures, kitchen and bath fixtures, accessories).

(Challenge Standards for Student Success: Home Economics Careers and Technology [2000]: Housing and Furnishings Content Area Standards 1–9; Interior Design, Furnishings, and Maintenance Career Pathway Standards 1–18.)

Domain 5. Consumer Education

Candidates demonstrate an understanding of personal and family resources, consumer rights and responsibilities, economic systems, and personal finances. Candidates must have a substantial understanding of consumer economics, decisions, purchases, and the resources and factors that inform, influence, and shape personal and family resource management. They understand how the U.S. economy functions and the factors that affect it, as well as its effects on U.S. consumers. They have an understanding of the global market and the global economy and how they affect the U.S. economic system. They are also familiar with knowledge and skills transferable to a variety of careers related to the consumer service industry.

5.1 Personal and Family Resources

- a. Demonstrate an understanding of how needs, wants, goals, and values shape personal and family resource management.
- b. Analyze factors that influence personal and family consumer decisions (e.g., advertising, product costs, socioeconomic factors, financial resources, culture, local and national economies).
- c. Describe how goods and services can be researched, identified, compared, and evaluated to make good consumer decisions and purchases.
- d. Demonstrate an understanding of consumer fraud and deception and the organizations, resources, and services available to assist consumers in researching, reporting, and taking legal action against perpetrators of fraud and deception.
- e. Demonstrate an understanding of management in balancing home, work, and life.

5.2 Consumer Rights and Responsibilities

- a. Demonstrate knowledge of state and federal laws pertaining to consumer protection and responsibilities and how they relate to consumerism in areas such as advertising, credit contracts, safety standards, and guarantees/warranties.
- b. Demonstrate an understanding of how to utilize communication skills in negotiating and solving problems related to the purchasing of goods and services.
- c. Identify local, state, federal, and private agencies that advocate for and protect the consumer, as well as the services that they provide (e.g., consumer redress, mediation and arbitration services, investigations).
- d. Demonstrate an understanding of environmental stewardship in relation to responsible resource consumption and conservation practices.

5.3 Economic Systems

- a. Demonstrate knowledge of the basic principles, components, and features of the U.S. economic system, as well as the role of the government in the U.S. economy.
- b. Recognize factors that affect and are affected by local, state, regional, national, and international economies (e.g., economic growth and decline, employment, inflation).
- c. Analyze the various factors (e.g., supply and demand, productivity) that affect relationships in economic systems.

5.4 Personal Finances

- a. Demonstrate knowledge about financial management (e.g., financial terms, budgeting, investment plans, banking, credit, credit cards, loans, taxes, insurance).
- b. Analyze factors that affect financial management (e.g., career choices, goals, resources, cultural and socioeconomic factors).
- c. Demonstrate knowledge of the various factors in determining major purchases (e.g., transportation, clothing, appliances, cell phones, entertainment systems).
- d. Demonstrate knowledge of the various factors involved in searching for and securing suitable housing (e.g., cost-of-living estimations, rental and sales contracts, insurance, interest rates) and resources available to help consumers search for and secure suitable housing.
- e. Demonstrate knowledge of career paths, transferable knowledge and skills, aptitudes, and responsibilities related to consumer services.

(Challenge Standards for Student Success: Home Economics Careers and Technology [2000]: Consumer Education Content Area Standards 1–11; Consumer Services Career Pathway Standards 1–16.)

Part II: Subject Matter Skills and Abilities Applicable to the Content Domains in Home Economics

Candidates understand the life skills needed to function effectively in families, in the workforce, and within society. They apply knowledge in the areas of personal, family, and child development; nutrition, foods, and hospitality; fashion and textiles; interior design and housing; and consumer education to analyze issues and make informed decisions. They apply science, technology, economics, life management, and employability skills to propose solutions to a variety of real-life situations. In addition, candidates demonstrate an understanding of the leadership skills needed to implement solutions and to help students become positive and productive members of the global community.

Candidates apply organizational, leadership, and communication skills to work effectively with advisory committees, industry representatives, and community organizations. They understand their role and responsibilities as advisors to the student leadership organization FHA-HERO. Candidates are able to effectively represent the home economics program in individual and group settings in the school, community, and industry. Candidates are able to understand and respond to issues related to diversity and equity in the home economics program, families, the community, and the workforce.

Candidates understand the philosophy of home economics as a discipline of study. They understand the history of home economics, including its major historical events and leaders. Candidates understand current research and recent developments in the field of home economics. 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 home economics. They are able to identify industry trends, career and entrepreneurship opportunities, employers' expectations, and the personal characteristic (e.g., appropriate work habits, social and communication skills) necessary for successful careers in the workplace. They use their home economics knowledge and skills to develop strategies for managing family and work life responsibilities in a rapidly changing global environment.

Industrial and Technology Education Subject Matter Requirements

Part I: Content Domains for Subject Matter Understanding and Skill in Industrial and Technology Education

Domain 1. Nature of Technology

Candidates understand technology as a problem-solving process and know the history and evolution of technology. They understand that technology involves creativity and innovation and are able to use concepts from the core content areas of science, mathematics, social science, and language arts as well as other content areas commonly taught in California public schools to design solutions to problems. Candidates understand the social aspect of technology and analyze the positive and negative effects of technologies on society and the environment. They understand the skills, knowledge, attitudes, and commitment to lifelong learning necessary to develop technological literacy and apply this knowledge in a rapidly changing global environment.

1.1 Innovation and Design

- a. Demonstrate an understanding of the engineering design process (e.g., defining a problem, using research techniques, communicating solutions, analyzing and optimizing solutions).
- b. Understand the product life cycle (e.g., prototypes, transition to production, evaluating product success).
- c. Demonstrate an understanding of how to use technological processes and systems to arrive at solutions to real-world problems.
- d. Demonstrate an understanding of current technological methods and processes to meet the needs of new and emerging fields and technologies (e.g., robotics, artificial intelligence, biotechnology, nanotechnology).
- e. Demonstrate an understanding of factors that influence design form (e.g., color theory, layout, aesthetics, juxtaposition, dimension).
- f. Demonstrate an understanding of factors that influence design function (e.g., purpose, practicality, ergonomics, utility).

1.2 Careers and Employability Skills

- a. Demonstrate an understanding of industrial and technology career opportunities (including postsecondary opportunities) and career paths.
- b. Understand skills, knowledge, responsibilities, attitudes, and aptitudes associated with industrial and technology careers.
- c. Demonstrate an understanding of workplace dynamics and structures (e.g., teaming, development of interpersonal and leadership skills, human resource and human efficiency development, Secretary's Commission on Achieving Necessary Skills [SCANS]).

1.3 Safety and the Environment

- a. Demonstrate an understanding of health and safety procedures needed for laboratory and workplace settings.
- b. Understand the safe and proper use and maintenance of tools and equipment.
- c. Demonstrate an understanding of safety regulations (e.g., OSHA regulations) and procedures (e.g., use of MSDS, handling of hazardous waste), including emergency procedures.
- d. Demonstrate an understanding of the safe design and management of laboratory facilities and planning of safe laboratory activities.
- e. Demonstrate an understanding of environmental issues (e.g., water pollution, air pollution, noise pollution, health hazards) associated with the development and use of technology and

technological systems (i.e., power and energy, communication and information, manufacturing, construction).

- f. Understand procedures and techniques for selecting, maintaining, and repairing technological systems to ensure a safe environment.

1.4 Society and Globalization

- a. Understand the history and evolution of technology.
- b. Identify and analyze the positive and negative influences of technology on communities and society (e.g., air pollution, land use, environmental impact).
- c. Analyze factors (e.g., cultural, economic) that influence innovation and the development of technology.
- d. Demonstrate an understanding of the relationship between technological literacy and technical skills.
- e. Demonstrate an understanding of legal and ethical issues related to technology (e.g., copyright, liability, intellectual property, patents).

1.5 Independent and Integrated System Model

- a. Demonstrate an understanding of systems and subsystems in terms of input, process, output, and feedback.
- b. Identify and analyze the resources needed to develop and support technological systems.
- c. Demonstrate an understanding of control systems and their use in technological systems.
- d. Demonstrate an understanding of project and product management.

1.6 Integration with Other Academic Disciplines

- a. Use appropriate mathematical concepts (e.g., algebra, trigonometry, statistics, geometry) to analyze data and solve problems.
- b. Use a variety of communication skills (e.g., technical writing, schematics, flowcharts, verbal communication) to convey information.
- c. Use appropriate scientific concepts (e.g., Newton's laws, ideal gas law, chemical reactions) to analyze and solve problems.
- d. Demonstrate an understanding of the interactions between technology and the humanities, culture, and political sciences.

Domain 2. Power and Energy

Candidates demonstrate an understanding of the fundamental scientific concepts of power and energy and how these concepts apply to mechanical, fluid, thermal, and electrical systems. Candidates understand the generation, transmission, storage, and control of power and energy and apply this knowledge to design, maintain, and analyze a variety of power and energy technologies, including transportation technologies.

2.1 Processes

- a. Demonstrate an understanding of power generation processes (e.g., geothermal, nuclear, solar, fossil fuel, fuel cell).
- b. Apply scientific principles of work, power, energy, and efficiency to analyze energy transformations.

- c. Demonstrate an understanding of processes for energy storage (e.g., dams, flywheels, batteries).
- d. Solve problems using mathematical concepts related to power and energy (e.g., Ohm's law, Pascal's law, moment of inertia, time, distance, velocity).
- e. Apply concepts of power and energy to analyze a variety of technological systems (e.g., mechanical, fluid, electrical, thermal).

2.2 Systems

- a. Understand safety principles, safety regulations, and safety engineering.
- b. Describe and analyze systems that convert energy from one form to another (e.g., engines, generators, actuators).
- c. Describe components and analyze characteristics of power control systems (e.g., brakes, valves, switches, circuit breakers).
- d. Understand power transmission systems (e.g., gears, cams, parallel and series circuits, pulleys, pumps).
- e. Demonstrate knowledge of the architecture and infrastructure associated with land, sea, aerospace, and intermodal transportation systems (e.g., rapid transit, shipping lanes, highways, locks, flight patterns).

2.3 Resources

- a. Demonstrate an understanding of renewable (e.g., solar, wind, biomass) and nonrenewable (e.g., fossil, nuclear, chemical) energy sources.
- b. Demonstrate an understanding of the uses and properties of materials (e.g., fuels, lubricants, conductors).
- c. Demonstrate an understanding of a variety of power and energy tools and equipment (e.g., multimeter, torque wrench, dynamometer).

Domain 3. Information and Communication

Candidates demonstrate an understanding of the knowledge and skills needed to design, analyze, use, and maintain a variety of communication systems. They demonstrate an understanding of how information systems encode, transmit, receive, decode, and store data. Candidates understand principles of graphic communication and use appropriate graphic tools to communicate visually. They apply knowledge of circuits and their components to electronic communication systems.

3.1 Design Processes

- a. Demonstrate an understanding of design documentation (e.g., blueprints, mock-ups, storyboards, schematics).
- b. Apply practical design concepts (i.e., form and function) to solve problems in communication.
- c. Understand computer design (e.g., hardware, software).
- d. Demonstrate an understanding of drawing and drafting principles (e.g., lettering, multiview drawing, dimensioning).

3.2 Systems

- a. Apply knowledge of imaging and image production (e.g., photographic, electronic, print).
- b. Analyze characteristics of telecommunication systems.
- c. Analyze characteristics of broadcast communication systems.

- d. Understand processes (e.g., preproduction, production, distribution) for developing multimedia systems.

3.3 Resources

- a. Demonstrate an understanding of the materials (e.g., media, electronic components), tools (e.g., test equipment, software, hand tools), and equipment (e.g., hardware, imaging equipment) used in information and communication systems.
- b. Understand strategies for the effective use of information resources (e.g., data banks, subject matter experts, search engines).
- c. Demonstrate an understanding of communication systems architecture and infrastructure (e.g., analog systems, digital systems, mainframes, client servers, network architecture).
- d. Understand criteria for the selection of appropriate materials, tools, and equipment used in information and communication systems.

3.4 Security and Privacy

- a. Understand physical security systems (e.g., locks, access control, motion detectors, surveillance, intrusion detection).
- b. Understand electronic security systems (e.g., access and permissions, passwords, user IDs, roles of administrators and end users, encryption).
- c. Demonstrate an understanding of principles related to security compliance procedures (e.g., personal responsibility, job function, need-to-know basis, ethical and legal).

Domain 4. Project and Product Development

Candidates demonstrate an understanding of product development and how to plan, manage, and produce manufacturing and construction systems. Candidates understand the resources and processes needed to safely use a variety of processes to design, produce, maintain, and evaluate products. Candidates demonstrate an understanding of the requirements and constraints in the engineering design process and the systems approach to manufacturing and construction enterprises. Candidates understand issues associated with quality management and quality control, including statistical tools.

4.1 Engineering Principles

- a. Understand the project and product design process (e.g., needs assessment, product analysis, prototyping, production design, design for manufacturing).
- b. Understand safety principles, safety regulations, and safety engineering.
- c. Understand a variety of mathematical concepts and applications (e.g., measurement, tolerance, financial calculations) for product development.
- d. Understand principles of data collection, communication, and analysis (e.g., sampling, graphical representations, statistical measures).

4.2 Manufacturing and Construction Processes

- a. Understand processes involved in manufacturing (e.g., casting, forming, shaping, finishing, assembling, packaging).
- b. Understand project (e.g., building trades, multimedia, transportation) construction processes.
- c. Understand manufacturing and construction codes, regulations, and industry guidelines (e.g., OSHA, zoning, building codes, Environmental Impact Reports).
- d. Understand the role of research and development in manufacturing and construction enterprises.
- e. Understand operations management (e.g., cost estimation, decision making, capacity

planning).

4.3 Resources

- a. Demonstrate an understanding of the proper identification, selection, use, and maintenance of tools and equipment (e.g., hand tools, power tools, measurement instruments).
- b. Demonstrate an understanding of the identification, selection, and use of materials (e.g., wood, metals, plastics, composites, polymers).
- c. Demonstrate an understanding of the supply chain and its components (e.g., vendors, just-in-time).

4.4 Quality Assurance

- a. Understand principles and procedures of product testing (e.g., source, in-process, final inspection).
- b. Demonstrate an understanding of strategies for obtaining and responding to customer feedback.
- c. Demonstrate knowledge of the development and purpose of industry standards such as Institute of Electrical and Electronics Engineers (IEEE), International Organization for Standardization (ISO), and American National Standards Institute (ANSI).
- d. Understand the principles of total quality management (TQM).
- e. Identify principles and strategies of change management (e.g., software version numbers, building codes, change orders).

Part II: Subject Matter Skills and Abilities

Applicable to the Content Domains in Industrial and Technology Education

Candidates demonstrate an understanding of the nature of technology and of the core technological concepts that remain constant as technological progress accelerates. Candidates understand the design process as a problem-solving model and are able to use it to solve problems in industrial and technology education. They apply core academic knowledge of industrial and technology education, including science, mathematics, measurement, economics, and data analysis to investigate and design technological systems and processes. Candidates are able to effectively communicate designed solutions using a variety of technologies and propose strategies for implementing the solutions. They understand how to use the tools, machines, resources, and processes needed to turn ideas into workable solutions. In addition, candidates understand and apply safety rules and practices in the classroom, laboratory, and workplace.

Candidates have knowledge of historical events, current research, and recent developments in technology and industry. Candidates have knowledge of interactions between technology and society (cultural, social, economic, and environmental) in which technologies are used. They demonstrate an understanding of the importance of continued education (e.g., professional organizations, technical publications, industry, research and development) for staying current with technological innovations. They are able to work with industry representatives and community organizations to identify industry trends and job opportunities, employers' expectations, and the personal characteristics (e.g., appropriate work habits, social and communication skills) necessary for obtaining and maintaining employment in industry and technology. They demonstrate an understanding of career planning and development and student leadership opportunities, along with the skills and attitudes needed for developing successful careers in industry and technology. Candidates are aware of the characteristics, functions, and structures of student leadership organizations, clubs, and competitive groups (e.g., SkillsUSA®, Technology Student Association [TSA]) and the candidates' roles and responsibilities as advisors.

Languages Other Than English—American Sign Language (ASL) Subject Matter Requirements

Part I: Content Domains for Subject Matter Understanding and Skill in Languages Other Than English—American Sign Language (ASL)

Domain 1. General Linguistics

Candidates demonstrate knowledge of the nature, process, and components of language at the postsecondary level, as described in the American Council on the Teaching of Foreign Languages (ACTFL): Program Standards for the Preparation of Foreign Language Teachers (2002) and reflected in the Foreign Language Framework for California Public Schools, Kindergarten through Grade Twelve (2003). Candidates demonstrate both broad and deep conceptual understanding of the subject matter, including the universal characteristics of human languages, both spoken and signed, and the ways in which linguistics describes and categorizes language structures. They analyze the processes by which languages change over time, understand how languages vary geographically, socially, and ethnographically, and recognize the family relationships among different languages. Candidates show an awareness of the communicative functions of language and how those functions vary depending upon the context and purpose of communication. They demonstrate a thorough understanding of language acquisition, including the processes by which additional languages are acquired and the developmental patterns of language learning, and recognize that language acquisition involves the interrelationship of language and culture.

1.1 The Nature of Language

- a. Demonstrate an understanding of the nature, purposes, and uses of language. For example:
 - ◆ Demonstrate an understanding of the basic elements of language structure (i.e., phonology, morphology, syntax, semantics) and how they are interrelated.
 - ◆ Demonstrate an understanding that languages can occur in different modalities.
 - ◆ Demonstrate an understanding of the basic principles of grammar and what is meant by a productive rule of language.
 - ◆ Demonstrate an understanding of the distinction between deep structure and surface structure.
- b. Demonstrate an understanding of the development of language and the significance of language change, including the variations that occur within the contexts of time, place, age, gender, and situation. For example:
 - ◆ Demonstrate an understanding of the classification of both spoken and signed languages into families and branches.
 - ◆ Describe different perspectives on the study of language (e.g., synchronic vs. diachronic).
 - ◆ Identify the different types of change that languages undergo at all levels (e.g., phonetic, morphological and syntactic, lexical and semantic).
 - ◆ Analyze the mechanisms by which language change occurs (e.g., assimilation, metathesis, contact, borrowing, euphemisms, metaphors, taboo).

1.2 Language Use

- a. Demonstrate an understanding of principles of pragmatics, discourse analysis, and the theory of speech acts. For example:
- ◆ Demonstrate an understanding of how sentences may communicate more than they literally say.
 - ◆ Analyze principles of structure, regularity, and coherence in extended discourse.
 - ◆ Demonstrate an understanding of distinctions between different types of speech acts (e.g., direct vs. indirect).
 - ◆ Demonstrate an understanding of distinctions between different varieties of speech acts (e.g., commands, questions, assertions, exclamations).
 - ◆ Demonstrate an understanding of the functions of speech acts (e.g., to inform, to amuse, to control, to persuade).
 - ◆ Demonstrate an understanding of pragmatic features (e.g., reference, sense, force, tone, conversational implicature) that affect the meaning of speech acts.
 - ◆ Demonstrate an understanding of the distinction between performative and constative utterances (language that performs an act, such as apologizing or promising, vs. language that describes facts or provides information).

1.3 Applied Linguistics

- a. Demonstrate an understanding of theories of language acquisition and learning. For example:
- ◆ Analyze potential differences between learning first and second languages.
 - ◆ Identify the developmental stages through which language learners acquire first and second languages.
 - ◆ Analyze similarities and differences between language acquisition in different modalities (e.g., acquisition of a signed language compared with acquisition of a spoken language).
 - ◆ Demonstrate an understanding of cognitive, affective, and social factors that affect second-language acquisition and learning (e.g., the concept of critical period, family and peer attitudes, linguistic interference, the interrelationship between language and power).
 - ◆ Demonstrate an understanding of the creativity and recursive character of human languages.

(American Council on the Teaching of Foreign Languages [ACTFL]: Program Standards for the Preparation of Foreign Language Teachers, 1.b, 1.c)

Domain 2. Linguistics of the Target Language—American Sign Language (ASL)

Candidates demonstrate a broad and deep knowledge of American Sign Language (ASL) linguistics at the postsecondary level, as reflected in the Foreign Language Framework for California Public Schools, Kindergarten through Grade Twelve (2003). Candidates demonstrate an understanding of ASL, including phonological structures, the rules by which lexical items are formed, and the ways in which phrases, clauses, and sentences are structured, and can explain the major levels and features of ASL grammar. They are able to describe ASL phonological features, transcription conventions, morphological rules, syntactic patterns, and semantics. Candidates are able to describe the rules for sign and sentence formation, as well as the structure, function, and meaning of ASL discourse, including pragmatic features, sociolinguistic features, and features for producing coherence in discourse. Candidates are familiar with rhetorical and stylistic devices and the levels of language appropriate for various tasks and communicative purposes. In addition, candidates understand the historical changes in ASL and its variations, including differences in articulation, vocabulary, and grammatical structures, as well as register.

2.1 Language Structures

- a. Demonstrate an understanding of the phonology of ASL. For example:
 - ◆ Describe the primary phonological features of ASL (e.g., handshape, movement, location, nonmanual markers, orientation, stress and tempo in sign formation).
 - ◆ Describe the phonological structure of ASL (e.g., hold and movement patterns, eye gaze, nodding).
 - ◆ Describe basic phonological and morphophonemic rules of ASL.
- b. Demonstrate an understanding of the morphology of ASL. For example:
 - ◆ Understand inflectional morphology in ASL (e.g., rules for adding adverbial, numerical, or distributive morphemes to root verbs; rules for forming plurals of nouns).
 - ◆ Understand derivational morphology in ASL (e.g., rules for forming derived and compound signs).
 - ◆ Understand lexical morphology in ASL, including the lexicalization of finger-spelled forms.
 - ◆ Describe strategies for identifying and using new signs in ASL by recombining morphemes.
- c. Demonstrate an understanding of the syntax of ASL. For example:
 - ◆ Demonstrate an understanding of the rules that govern the formation of phrases and sentences (e.g., the use of classifiers and classifier predicates).
 - ◆ Demonstrate an understanding of the significance of sign order in ASL.
 - ◆ Identify ways in which syntactic patterns in ASL can be used to convey nuances of meaning.
 - ◆ Identify linguistic devices used to create connected and cohesive discourse in ASL.
- d. Demonstrate an understanding of the semantics of ASL. For example:
 - ◆ Demonstrate an understanding of how meaning is structured and communicated in ASL.
 - ◆ Demonstrate an understanding of the cultural meaning of ASL signs and sentences.
- e. Demonstrate a basic understanding of transcription conventions in ASL. For example:
 - ◆ Demonstrate an understanding of commonly used glossing techniques in ASL.
- f. Describe changes that have occurred in ASL over time.

2.2 Error Analysis

- a. Identify, analyze, and correct grammatical and mechanical errors in ASL.

2.3 Contrastive Analysis

- a. Analyze and contrast linguistic structures of ASL and English.

- b. Compare and contrast how meaning is expressed in ASL and English.

2.4 Sociolinguistics and Pragmatics

- a. Demonstrate an understanding of pragmatic and sociolinguistic features of ASL discourse. For example:
 - ◆ Explain how linguistic choices depend on the setting, goals, and participants in communicative interactions.
 - ◆ Demonstrate an understanding of the influence of social and cultural norms on the use of ASL.
- b. Demonstrate an understanding of the origins and social implications of variations within ASL. For example:
 - ◆ Describe variations in articulation, vocabulary, and grammatical structures within ASL.
 - ◆ Describe the factors that account for the variations in ASL (e.g., culture/ethnicity, political background, level and/or background of education, gender, social class).
- c. Demonstrate an understanding of how the history of ASL in the United States and its acceptance as a language have influenced the use of ASL (e.g., how changing attitudes toward ASL have influenced language choice).

Domain 3. Literary and Cultural Texts and Traditions

Candidates demonstrate a broad and deep knowledge of American Sign Language (ASL) and American Deaf culture literary and cultural texts and traditions, and of their contexts, at the postsecondary level, as reflected in the Foreign Language Framework for California Public Schools, Kindergarten through Grade Twelve (2003). Candidates are familiar with major American Sign Language literary and intellectual movements, genres, creators, and works. Candidates are also familiar with major English-language works written by Deaf people within American Deaf culture. Candidates demonstrate the ability to analyze, interpret, and synthesize ideas as well as critical issues from a wide range of creators and thinkers across a variety of forms and media. They understand the historical, social, and cultural contexts in which literary and cultural texts were created, the influence of these factors on ideas and forms of expression, and the ways in which those texts both reflect and shape American Deaf culture. Finally, candidates use literary and cultural texts to interpret and reflect upon the perspectives of American Deaf culture over time.

3.1 Major Movements, Genres, Writers, and Works

- a. Demonstrate an understanding of major movements, genres, creators, and works in the literature of ASL.
- b. Demonstrate an understanding of the historical, social, and cultural influences on ASL works.
- c. Use knowledge of ASL literary and cultural traditions to interpret changes in American Deaf culture over time.
- d. Demonstrate an understanding of the ways in which ASL literary and intellectual works and movements both reflected and shaped American Deaf culture.
- e. Demonstrate an understanding of English-language literary and cultural texts written by Deaf people within American Deaf culture.

3.2 Analysis of ASL and American Deaf Culture Literary and Cultural Texts

- a. Analyze and interpret a wide range of ASL literary and cultural works in a variety of forms (e.g., folk tales, short stories, jokes, sign songs, ABC stories, poetry, personal narratives, drama, biography, history).
- b. Evaluate the use of language (e.g., vocabulary, register, function, tempo, rhythm) in ASL works to convey meaning, to inform, to persuade, or to evoke a response.
- c. Analyze the elements of ASL literary and cultural works (e.g., setting, plot, theme, character, tone, style).
- d. Interpret the use of rhetorical and literary techniques (e.g., rhyme, repetition, metaphor, personification) in ASL literary and cultural works.
- e. Analyze and interpret English-language literary and cultural works written by Deaf people within American Deaf culture.

Domain 4. Cultural Analysis and Comparisons

Candidates possess a broad and deep knowledge of American Deaf culture and demonstrate an understanding of the interrelationships among the processes, perspectives, practices, and products of American Deaf culture at the postsecondary level, as reflected in the Foreign Language Framework for California Public Schools, Kindergarten through Grade Twelve (2003). Candidates recognize culture as a dynamic, interrelated system and employ a variety of processes to identify, analyze, and evaluate cultural themes, values, and ideas. They are able to explore relationships among cultural perspectives and social institutions, and they understand how cultural practices and products exemplify the perspectives of American Deaf culture. Candidates exhibit familiarity with daily living patterns, cultural attitudes and priorities, contemporary and historical issues, social institutions, and significant artistic and literary works in American Deaf culture. They are able to identify the roles and contributions of major figures and notable individuals in American Deaf culture and references made to them. Candidates are able to interpret ideas, values, and beliefs that represent American Deaf culture's traditions and contemporary variations and are able to compare and contrast social, historical, and artistic traditions in American Deaf culture with those of other cultures.

4.1 The Nature of Culture and Cultural Processes

- a. Demonstrate an understanding of the nature and components of culture. For example:
 - ◆ definitions of culture
 - ◆ intragroup (e.g., ethnicity, generations, race, microcultures) and intergroup differences
 - ◆ values, beliefs, and expectations
 - ◆ educational, social, and political systems
 - ◆ roles, identity, and status (e.g., race, gender, ethnicity, social class, age, occupation, educational level, cultural identity)
- b. Demonstrate an understanding of cross-cultural and intercultural interactions. For example:
 - ◆ processes of cultural contact (e.g., assimilation, acculturation, accommodation, enculturation, deculturation, biculturalism)
 - ◆ the nature of pluralism and multiculturalism
 - ◆ the dynamics of oppression (e.g., ethnocentrism, stereotyping, prejudice, discrimination)

4.2 Cultural Processes in American Deaf Culture

- a. Demonstrate an understanding of how cultural processes exemplify cultural perspectives in American Deaf culture. For example:
 - ◆ processes of cultural contact (e.g., assimilation, acculturation, enculturation, biculturalism) and their role in American Deaf culture, including responses to contact with others (e.g., creation of stereotypes and anti-stereotypes, growth of activism, emergence and creation of unifying themes, promulgation of warnings about others, historical changes in the relationship with others)
 - ◆ processes of cultural development and perspectives within American Deaf culture (e.g., processes that define, categorize, include, and marginalize who is Deaf; processes of linguistic, cultural, and social development among Deaf children; processes of learning to be Deaf at different ages; processes of transmitting Deaf culture across generations)
 - ◆ the nature of pluralism, multiculturalism, and cultural variation within American Deaf culture
 - ◆ the dynamics of audism (e.g., oppression, discrimination) that affect American Deaf culture

4.3 Cultural and Historical Perspectives in American Deaf Culture

- a. Demonstrate familiarity with significant individuals, key eras, and major historical events and developments within American Deaf culture, and analyze their influence on the culture's development and evolution.
- b. Demonstrate familiarity with the formation of ASL and Deaf communities and how they influence the development and evolution of American Deaf culture.
- c. Demonstrate an understanding of how political, social, economic, and educational systems and institutions are shaped by and influence American Deaf culture.
- d. Demonstrate an understanding of how the development of American Deaf culture and the interaction of Deaf and hearing cultures influence the development of ASL.
- e. Demonstrate an understanding of how American Deaf culture employs, influences, and interacts with technology, including attitudes toward technology within American Deaf culture.
- f. Analyze cultural stereotypes and their effects on the perceptions of and attitudes toward American Deaf culture.
- g. Analyze how political perspectives and legislation influence the development and evolution of American Deaf culture.

4.4 Cultural Practices in American Deaf Culture

- a. Demonstrate an understanding of how cultural practices exemplify cultural perspectives in American Deaf culture. For example:
 - ◆ rituals, values, and traditions (e.g., rituals of greeting and leave-taking)
 - ◆ social practices and institutions (e.g., Deaf marriages, Deaf gatherings)
 - ◆ social status and social relationships
 - ◆ rules governing social and communication interactions (e.g., attention getting, sight lines, turn taking)
 - ◆ patterns of work and leisure

4.5 Cultural Products of American Deaf Culture

- a. Demonstrate an understanding of how the products of American Deaf culture exemplify its cultural perspectives. For example:
 - ◆ works of art (e.g., painting, sculpture, handicrafts)
 - ◆ architecture (e.g., design of visual environments)
 - ◆ artistic performance (e.g., storytelling, theatre, dance)
 - ◆ literary works
 - ◆ media (e.g., publications, web sites)
 - ◆ technology
 - ◆ television, video, film
 - ◆ entertainment (e.g., Deaf sporting events, conferences, captioned movies)

Domain 5. Language and Communication: Receptive Comprehension

Candidates demonstrate proficiency in the comprehension of American Sign Language (ASL) discourse as reflected in the Foreign Language Framework for California Public Schools, Kindergarten through Grade Twelve (2003). Candidates demonstrate the ability to understand ASL discourse for various purposes in different contexts, including a variety of message types and levels of formality, and to accurately comprehend ideas and vocabulary across a range of content, including art, literature, politics, society, and current events, as well as everyday communications and interactions. They demonstrate the ability to comprehend and make inferences about both limited and extended ASL discourse, including monologues, conversations, news reports, narratives and descriptions in various time frames, speeches, and debates. Candidates are not only able to identify the main ideas and supporting details of ASL discourse, but also to infer the meaning of unfamiliar signs from their contexts, understand ASL discourse on a number of levels, analyze it from multiple perspectives, and give detailed personal interpretations that are supported by a broad range of cultural knowledge and understanding. Finally, they demonstrate the ability to think critically about ASL discourse and to evaluate it in relation to stylistic variations and social relationships, as well as the signer's purposes, assumptions, and intended audience.

5.1 Literal Comprehension of ASL Discourse

- a. Demonstrate an understanding of the main ideas and significant details of ASL discourse in a variety of authentic contexts, both formal and informal. For example:
 - ◆ Understand the main idea of a signed message.
 - ◆ Respond appropriately to a request for information.
 - ◆ Choose or provide an appropriate response to a signed question or comment.
 - ◆ Recognize a stated cause or effect in a situation described in ASL discourse.
 - ◆ Identify the sequence of steps described in a set of signed directions or instructions.
 - ◆ Recognize localization and spatial relationships as described in ASL discourse.

5.2 Inferential and Interpretive Comprehension of ASL Discourse

- a. Make deductive and inductive inferences based on information contained in both formal and informal ASL discourse. For example:
 - ◆ Draw conclusions based on information presented in ASL discourse.
 - ◆ Characterize the attitude or emotions of one or more signers.
 - ◆ Infer the social relationships among participants in a conversation (e.g., age, social status, gender).
 - ◆ Analyze a personal relationship implied but not stated in a conversation.
 - ◆ Interpret the cultural context of a message or conversation.
 - ◆ Recognize implied cause-and-effect relationships in ASL discourse.

- ◆ Understand figurative language (e.g., metaphors, similes) used in ASL discourse.
- ◆ Analyze ASL discourse to determine a signer's assumptions that are implied but not explicitly stated.

5.3 Critical Analysis of ASL Discourse

- a. Analyze and evaluate both formal and informal ASL discourse in relation to its purpose, context, and point of view. For example:
 - ◆ Analyze a signer's assumptions or point of view.
 - ◆ Analyze the historical, social, or cultural context of ASL discourse.
 - ◆ Evaluate the sufficiency and reliability of evidence presented in support of statements made in ASL discourse.
 - ◆ Evaluate the social and cultural appropriateness of the language used in ASL discourse.
 - ◆ Analyze the communicative and discourse strategies employed in ASL discourse.

Domain 6. Language and Communication: Expressive Production

Candidates demonstrate proficiency in the production of American Sign Language (ASL) discourse as reflected in the Foreign Language Framework for California Public Schools, Kindergarten through Grade Twelve (2003). Candidates demonstrate the ability to communicate effectively in ASL in everyday situations and react competently when asked to respond to a complication or an unexpected turn of events. They communicate clearly and accurately to participate effectively in most formal and informal signed conversations on practical, social, professional, and abstract topics and are able to narrate and describe in multiple dimensions of time, providing detailed accounts and exhibiting good control of aspect. Candidates demonstrate the ability to communicate effectively in ASL using correct articulation for various purposes in different contexts and employ a variety of message types. Candidates accurately express ideas in culturally appropriate language across a range of content, including art, literature, politics, society, and current events, as well as everyday communications and interactions. They are able to deliver presentations on a wide range of topics, employing communication strategies and language tailored to the situation, and present narrations and descriptions that relate relevant and supporting facts in extended and cohesive discourse.

6.1 Producing ASL Discourse for a Variety of Purposes in Authentic Contexts

- a. Construct connected ASL discourse that communicates a message effectively in both formal and informal situations, demonstrating fluency and correct articulation, a wide range of vocabulary, and inflectional and linguistic structures. For example:
 - ◆ Communicate appropriately within the context of everyday situations.
 - ◆ Respond to a variety of unexpected situations by explaining or describing events or by requesting assistance.
 - ◆ Narrate or describe a personal experience.
 - ◆ Describe the reasoning behind a personal or professional decision.
 - ◆ Explain the advantages and disadvantages of an idea or a proposed course of action.
 - ◆ Communicate formally and informally about topics of current public and personal interest, demonstrating an ability to use different registers and communication styles in appropriate contexts.
 - ◆ Deliver signed presentations on a wide variety of topics to diverse audiences.
 - ◆ Formulate and defend a hypothesis in response to a given situation.
 - ◆ Take a position on an issue and support it with persuasive evidence.
 - ◆ Demonstrate the ability to communicate effectively on abstract topics and themes.