



See Also: [Minutes of the June Commission Agenda](#)

Web-Posted
May 24, 2002;
Updated June 6,
2002

June Commission Agenda

June 6, 2002
Commission Offices, 1900 Capitol Avenue
Sacramento, CA 95814

Correspondence regarding any of these agenda items should be sent to the attention of the Executive Director at the California Commission on Teacher Credentialing, 1900 Capitol Avenue, Sacramento, CA 95814-4213.

► NOTE: All linked agenda items are in [PDF](#) Format...

Thursday, June 6, 2002 - Commission Office

- 1. Appeals and Waivers (Committee Chairman Madkins) 8:00 a.m.**
 - A&W-1 Approval of the Minutes
 - A&W-2 Waivers: Consent Calendar
 - A&W-3 Waivers: Conditions Calendar
 - A&W-4 Waivers: Denial Calendar

- 2. Executive Committee (Chairman Bersin) 8:15 a.m.**
 - EXEC-1 Approval of the May 1, 2002 Executive Committee Minutes
 - [EXEC-2](#) Committee of Credentials Recruitment Plan
 - EXEC-3 Approval of the Commission's 2003 Meeting Schedule

- 3. General Session (Chairman Bersin) 8:45 a.m.**

The Commission will immediately convene into Closed Session

Closed Session (Chairman Bersin/Vice Chairman Madkins)

(The Commission will meet in Closed Session pursuant to California Government Code Section 11126 as well as California Education Code Sections 44245 and 44248)

- 4. General Session (Chairman Bersin) 9:15 a.m.**
 - GS-1 Roll Call
 - GS-2 Pledge of Allegiance
 - GS-3 Approval of the [May 2002 Minutes](#)
 - GS-4 Approval of the June 2002 Agenda
 - GS-5 Approval of the June 2002 Consent Calendar
 - GS-6 Annual Calendar of Events - for Information
 - GS-7 Chair's Report

- GS-8 Executive Director's Report
- GS-9 Report on Monthly State Board Meeting
 - ▶ [Addendum to GS-9](#) (In-Folder) -- Posted June 6, 2002

5. Presentation

9:30 a.m.

- P-1 Resolution Honoring John B. Mockler, Former Executive Director to the State Board of Education

6. Performance Standards Committee of the Whole (Committee Chair Johnson)

- PERF-1 Recommended Subject Matter Requirements for Single Subject Teaching Credentials in English, Mathematics, Science, and Social Science

7. Preparation Standards Committee of the Whole (Committee Chair Katzman)

- PREP-1 Approval of Subject Matter Preparation Programs Submitted by Colleges and Universities
- PREP-2 Proposed Exploration for the Restructuring of the Single Subject Credential for Mathematics Teachers
- PREP-3 Report on Collaborative Pilot Technology Partnership with Palo Alto Research Center Incorporated (PARC)
- PREP-4 Recommendation to Award a Contract to Conduct a Study of the Impact of BTSA on Student Learning
 - ▶ [Addendum to PREP-4](#) (In-Folder) -- Posted June 6, 2002
- PREP-5 Report on the Relationship between AB 75 Criteria for Administrator Training and Requirements for the Professional Clear Administrative Services Credential
 - ▶ [Addendum to PREP-5](#) (In-Folder) -- Posted June 6, 2002

8. Legislative Committee of the Whole (Committee Chair Madkins)

- LEG-1 Status of Legislation of Interest to the Commission
 - ▶ -- Updated June 5, 2002
- LEG-2 Analysis of Bills of Interest to the Commission
 - ▶ -- Updated June 5, 2002
- LEG-3 Summary of Draft Masterplan for Education

9. Fiscal Policy and Planning Committee of the Whole (Committee Chair Boquiren)

- FPPC-1 Third Quarter Report of Revenues and Expenditures for Fiscal Year 2001-02
- FPPC-2 Update on the Governor's Budget for Fiscal Year 2002-03

10. Credentialing and Certificated Assignments Committee of the Whole (Committee Chair Fortune)

- C&CA-1 Proposed Amendments to Title 5 Regulations Concerning the Administrative Services Credential Authorization and Services Teachers May Provide

11. Reconvene General Session (Chairman Bersin)

- GS-10 Report of Appeals and Waivers Committee
- GS-11 Report of Closed Session Items
- GS-12 Report of the Executive Committee
- GS-13 Commission Member Reports
- GS-14 Audience Presentations
- GS-15 Old Business
 - Quarterly Agenda for Information
 - June, July and September 2002
- GS-16 New Business

All Times Are Approximate and Are Provided for Convenience Only
Except Time Specific Items Identified Herein (i.e. Public Hearing)

The Order of Business May be Changed Without Notice

Persons wishing to address the California Commission on Teacher Credentialing on a subject to be considered at this meeting are asked to complete a Request Card and give it to the Recording Secretary prior to the discussion of the item.

Reasonable Accommodation for Any Individual with a Disability

Any individual with a disability who requires reasonable accommodation to attend or participate in a meeting or function of the California Commission on Teacher Credentialing may request assistance by contacting the California Commission on Teacher Credentialing at 1900 Capitol Avenue, California, CA 95814; telephone, (916) 445-0184.

NEXT MEETING:

July 10-11, 2002

**California Commission on Teacher Credentialing
1900 Capitol Avenue, Sacramento, CA 95814**

REVIEW OF RECRUITMENT PLAN FOR THE COMMITTEE OF CREDENTIALS

Summary and Recommendations

Staff recommends that the Executive Committee direct staff to implement its recruitment plan to ensure a wider applicant base to the Committee of Credentials.

Fiscal and Workplan Impact

Costs associated with the recruitment process are part of the base budget of the Division of Professional Practices. These include the costs of printing and mailing of notices of vacancies.

The Committee of Credentials

At the April, 2002 meeting of the Executive Committee, staff was directed to develop a Recruitment Plan for expanding the candidate pool of applicants to the Committee of Credentials.

The Committee of Credentials (Committee) is a statutorily created body whose seven members are appointed by the Commission. By statute the Committee is responsible for initiating all investigations into allegations of misconduct by credential holders and applicants. In order to ensure a high level of public confidence in California teachers and other credentialed public school employees, the Commission and the Committee monitor the moral fitness and professional conduct of credential applicants and holders.

The Committee of Credentials is composed of seven members, as follows:

- (1) Elementary school teacher (currently Mike Nelson—resigned effective 7/2002)*
- (2) Secondary school teacher (currently Sara Williams—term expires 7/2002)*
- (3) School Administrator (currently Hank Richardson—term expires 7/2003)**
- (4) School Board Member (currently Steve Parkes—term expires 7/2003)**
- (5) Public Representative (currently Mary Williams—term expires 7/2003)**
- (6) Public Representative (currently Wesley Apker—term expires 7/2003)
- (7) Public Representative (currently Sylvia Whitlock—term expires 7/2003)

*new Members have been appointed effective 7/2002

**2nd term

Members of the Committee are appointed for two-year staggered terms. Pursuant to section 504 of the Policy Manual, Committee members are limited to two terms. In November of each year, the Chairperson of the Commission writes to each member of the Committee whose first term is due to expire. Those Committee members who are willing to serve another term notify the Executive Director. At the next scheduled Executive Committee meeting, the requisite vacancies are determined and the application process is opened.

Currently, staff mails notices of vacancies to 1058 stakeholders and interested parties. In addition, notices are sent to all past applicants and are posted on the Commission's web site. Applications are also made available at Commission meetings, provided to Commissioners in the Friday mail, and given to current Committee members. Despite these efforts, very few applications are received.

In order to increase the number of applications, the attached recruitment plan has been developed.

COMMITTEE OF CREDENTIALS RECRUITMENT PLAN

Year-round recruitment—In an effort to develop a pool of interested applicants, the Division of Professional Practices will institute year-round recruitment for membership on the Committee of Credentials via the following:

- CCTC web site. If visitors to the web site are interested in membership on the Committee, they will be able to use electronic mail to a dedicated electronic mail address to request that an application be sent when the appropriate vacancy is declared.
- “I am interested” postcards to be used at CCTC tables at workshops, conferences, meetings and other activities. These can also be provided to Commissioners, Committee members and stakeholders.

Targeted recruitment—Currently, notices of anticipated vacancies are sent to the Directors, Superintendents, and heads of various stakeholder groups. The notice and application may not be distributed or may be distributed on a very limited basis. Our efforts will be directed to a more targeted recruitment, as follows:

- Nomination letters: A personal letter from the Chair of the Commission requesting nominations of applicants will be sent to appropriate parties and stakeholder groups.
- Utilization of electronic mailings for announcements of specific vacancies with a link to the CCTC web site. Staff will utilize electronic mailing lists developed by other divisions to target specific constituencies.
- Identification of stakeholders’ communications personnel: DPP will develop and send notices to a list of communications personnel so that information can be printed in an organization’s newsletter or placed on an organization’s web site.
- Media contacts: Information regarding the Committee of Credentials recruitment process will be the subject of periodic CCTC newsletter articles. A media release will be prepared and sent whenever a vacancy is declared, targeted to the appropriate media outlets.

Report on the State Board of Education Meeting May 29-30, 2002

This report discusses issues of general interest to the Commission acted upon by the State Board of Education at its May 29-30, 2002 meeting.

AB 75. Last year the Legislature passed and the Governor signed AB 75 (Steinberg) which provides incentive funding for principal support, assistance, and development. AB 75 provides an alternative, local district option for candidates who wish to complete administrator credential requirements.

AB 75 requires the State Board to approve training providers. State Board staff suggested revisions to applications they received and the Department plans to recommend training providers to the State Board at the June 26-27 meeting.

The State Board approved funding for local education agencies and consortiums of local education agencies. AB 75 limits incentive funding to \$3,000 per participant and local education agencies must contribute \$1,000 per participant.

H.R. 1 is the Reauthorization of the Elementary and Secondary Education Act and commonly called the No Child Left Behind Act (NCLB). The NCLB requires the states to prepare a state plan to improve education. The State Board approved parts of the state plan at this meeting and will approve other parts in upcoming meetings.

Under the NCLB, tutoring or enrichment activities beyond the regular school day must be provided to low-income students not meeting Academic Content Standards in Title I schools. Parents may select from a State Board-approved list of Supplemental Education Service Providers. The State Board approved the criteria for approval and State Board staff anticipates having a list of Supplemental Education Service Providers available for the State Board to approve at the June meeting.

The NCLB allows students attending a "persistently dangerous" school to transfer to a safe school within the local education agency. The State Board defined "persistently dangerous" school as a school where for three consecutive years a criminal offense has been committed on campus and student expulsions for violent criminal offenses exceed one percent of the student population.

The State Board adopted the following five performance goals, as required by the NCLB.

1. All students will reach high standards, at a minimum attaining proficiency or better in reading and mathematics by 2013-2014.
2. All limited-English-proficient students will become proficient in English and reach high academic standards, at a minimum attaining proficiency or better in reading/language arts and mathematics.
3. By 2005-2006, all students will be taught by "highly qualified teachers". The state plan defines "highly qualified teacher" as meeting all of the following requirements.
 - Possession of a baccalaureate degree from a regionally accredited institution of higher education.
 - Successful passage of California's state test of reading, writing, and mathematics, unless otherwise specified in the California Education Code.
 - Demonstrated competence of the subject to be taught, as measured by successful passage of the state-approved subject matter examination(s) aligned with the State Board approved student content standards or successful completion of 18 units of university course work (or the equivalent) in the subject to be taught, that has met the state standards adopted by the Commission and that is aligned with the State Board approved student content standards or teachers serving on teaching assignment options specified in the California Education Code.
 - Orientation to the subject and grade level to be taught.
4. All students will be educated in learning environments that are safe, drug free, and conducive to learning.
5. All students will graduate from high school.

Induction Standards. Three types of induction (Institution of Higher Education, Beginning Teacher Support and Assessment and Alternative Program) will be available under the Commission-adopted *Standards of Quality and Effectiveness for Professional Teacher Induction*. The Superintendent of Public Instruction approved the BTSA *Standards* on May 20, 2002 and the State Board will review and vote on the Alternative Program *Standards* at the June meeting.

*California
Commission on Teacher Credentialing*

*Meeting of
June 6, 2002*

AGENDA ITEM NUMBER: PERF – 1
COMMITTEE: Preparation Standards Committee
TITLE: Recommended Subject Matter Requirements for Single
Subject Teaching Credentials in English, Mathematics,
Science, and Social Science

- Action**
 Information
 Report

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

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Recommended Subject Matter Requirements for Single Subject Teaching Credentials in English, Mathematics, Science, and Social Science

Professional Services Division

June 6, 2002

Executive Summary

This report presents recommended subject matter requirements (SMRs) for Single Subject Teaching Credentials in English, mathematics, science, and social science. If adopted by the Commission, the SMRs will specify the content that is to be taught in Commission-approved subject matter preparation programs and that is eligible for assessment on the Commission's subject matter examinations. The SMRs were drafted by subject matter advisory panels, reviewed by independent panels for alignment with the student academic content standards and for potential bias, evaluated by California educators statewide, and then finalized by the panels. This report also summarizes plans for the development and administration of new subject matter examinations.

Policy Issue to be Considered

What subject matter knowledge, skills, and abilities should candidates for Single Subject Teaching Credentials in English, mathematics, science, and social science have?

Fiscal Impact Statement

The development of program standards in all subject areas and SMRs in English, mathematics, science, and social science is funded from the Commission's base budget. The future development and administration of new examinations will be conducted by a National Evaluation Systems, Inc. (NES) pursuant to a contract that will have no cost to the Commission. (NES will be compensated directly from examinee fees.)

Recommendation

That the Commission adopt the attached (Appendix B) subject matter requirements for Single Subject Teaching Credential candidates in English, mathematics, science, and social science.

Recommended Subject Matter Requirements for Single Subject Teaching Credentials in English, Mathematics, Science, and Social Science

Professional Services Division

June 6, 2002

Background

The Subject Matter Competence Requirement for a Teaching Credential

Teacher candidates in California are required to demonstrate competence in the subject matter they will be authorized to teach. 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 they satisfy the same requirement, these two options should be as aligned and congruent as possible.

In the early 1990s, the Commission developed and adopted (a) standards for subject matter preparation programs and, at the same time, (b) 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 (defining the subject matter competence requirement) that were valid and closely aligned with each other.

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

In the late 1990s, the State Board of Education adopted K-12 student content standards in English, mathematics, science, and social science. These new standards have obvious and direct implications for the subject matter competence requirement of prospective teachers. This was recognized in SB 2042 (Alpert, 1998), which requires the Commission to ensure that subject matter program standards and examinations are aligned with the K-12 student content standards adopted by the State Board.

Subject Matter Advisory Panels

In January 2001 the Executive Director appointed subject matter panels in English, mathematics, science, and social science to advise Commission staff on the development of new subject matter program standards and examinations in these subject areas. Each panel consists 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
- a liaison from the California Department of Education.

The panels began their work in March 2001. At the panels' initial meeting, staff provided and discussed (a) a written "charge" to the panels describing their responsibilities and (b) characteristics of the "subject matter requirements" (SMRs) that the panels were to help develop. These materials are attached as Appendix A. The SMRs are the subject-specific knowledge, skills, and abilities needed by beginning teachers. If adopted by the Commission, the SMRs will specify the content that is to be taught in Commission-approved subject matter preparation programs and that is eligible for assessment on the Commission's subject matter examinations.

In April 2001 the Executive Director signed a contract with the American Institutes for Research (AIR) to work with Commission staff and the advisory panels to develop and validate, for each of the four subject areas, SMRs for prospective secondary teachers.

Development and Validation of the SMRs

With leadership from Commission staff and assistance from AIR staff, the advisory panels in English, mathematics, science, and social science have met almost monthly since their initial meeting in March 2001. The panels have focused their work primarily on their charge to develop new program standards including SMRs.

For each of their respective subject areas, the panels developed preliminary SMRs aligned with the student content standards. The following eight sets of SMRs have been developed:

- English
- mathematics
- social science
- science, which includes
 - general science
 - biology
 - chemistry
 - Earth and planetary science (geoscience)
 - physics

Preliminary SMRs were independently reviewed by two separate groups in September 2001. An Alignment and Congruence Panel reviewed the SMRs for alignment with the state-adopted student content standards. A Bias Review Committee reviewed the SMRs for potential bias. Changes suggested by these two groups were presented to and acted on by the subject matter panels.

In January 2002, AIR 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 teachers, principals, curriculum specialists, and college/university faculty. Seven different surveys were developed, one each for English, mathematics, social science, biology, chemistry, Earth and planetary science, and physics. (The general science SMRs were included on each science survey.) 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 (a) how important the SMR is for effective job performance by a teacher of the subject area and (b) whether it represents knowledge, skills, and abilities that teachers must possess at the beginning of their teaching career (as opposed to knowledge, skills, and abilities that could be learned on the job). In addition, respondents were asked to identify any important SMRs that were missing and to judge the comprehensiveness of the complete set of SMRs.

Approximately 6,500 California educators were selected or invited to complete a survey. Responses were received from 1,875 (29%). Of these, there were 1,377 completed surveys from eligible respondents, representing 21 percent of the selected/invited educators.

AIR analyzed and summarized the results of the validity study and presented the results to the advisory panels in March 2001. Knowledge, skills, and/or abilities in the SMRs that did not receive strong support from the validity study were reviewed according to guidelines developed by staff. Reviewed statements could be retained, revised, or deleted. Reviewed statements 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. Revisions could only include deletion of subject matter knowledge, skills, and/or abilities, or minor rewording for clarification. Revisions could also include nonsubstantive additions. No new subject matter could be added to an SMR.

Following the panels' review of the SMRs on the basis of the validity study results, the SMRs were reviewed a second time by the Commission's Bias Review Committee. Potential bias issues identified by the committee were resolved by Commission staff and, when necessary, panel members.

The validity study generated much qualitative feedback, with particular concerns regarding the science SMRs. One constituent submitted to Commission staff, with follow-up correspondence, suggested omissions and errors for review by the science advisory panel. At their March 2001 meeting, the science panel reviewed these suggestions as part of the raw validity study data, addressing each item of concern. Additionally, two memos were sent to the Commission in

April 2001, one expressing concern with the physics SMRs, the other with the science SMRs in general. These three letters clustered on the following general areas of concern:

- the level of specificity of the SMRs should match that of the student academic content standards,
- the level of difficulty of the SMRs should reflect an advanced level of understanding, and
- the organization of the SMRs should match that of the student academic content standards.

In responding to each concern, the panel again referred to the student academic content standards for guidance on whether to retain, revise, or delete statements from the SMRs. Although it was the panel's intent to develop SMRs that are broader than the student academic content standards, to emphasize alignment to these standards, references to them as well as to state-adopted curriculum frameworks were added to all four sets of SMRs at the domain level, with specific citations to particular student standards at the subdomain level (see Appendix B). Also added to each domain was language emphasizing that teacher candidates must demonstrate both broad and deep conceptual knowledge of the SMRs at an advanced, post-secondary level of rigor. Minor rewording of several SMRs was also made to clarify meaning.

Recommended Subject Matter Requirements for Single Subject Teaching Credentials in English, Mathematics, Science, and Social Science

Attached as Appendix B are final SMRs recommended by staff for adoption by the Commission. As indicated above, upon adoption the SMRs will serve two critical purposes. First, they will be included in new subject matter program standards (expected to be brought to the Commission for consideration and adoption in the fall of 2002) as curricular requirements. Second, they will serve as the content specifications for the next generation of subject matter examinations. With the exception of the SMRs in English, each set of SMRs includes two parts. 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 English SMRs present the subject matter understanding, skills, and abilities in English as a whole. It was the unanimous decision of the English panel to not include a Part II, because the skills and abilities applicable to the domain are foundational to it.

Plans for Test Development and Administration

In December 2001, the Executive Director released a *Request for Proposals for the Development and Administration of Subject Matter Examinations for Prospective Teachers*. The purpose of this RFP was to secure a contractor to develop and administer new subject matter examinations for prospective teachers who choose to meet the subject matter competence requirement by taking and passing examinations. In March 2002, the Executive Director awarded the contract to National Evaluation Systems, Inc. (NES) on the basis of the unanimous recommendation of a Proposal Review Team consisting of Commission staff and advisory panel members. NES will develop and administer as part of the California Subject Examinations for Teachers (CSET) program (a) a new multiple subjects examination that will replace the Multiple Subjects

Assessment for Teachers (MSAT), (b) new single subject matter exams for all 13 Single Subject Teaching Credentials, and (c) a new Preliminary Educational Technology exam.¹

Content specifications for the CSET multiple subjects examination, as well as a plan for transitioning from the current exam (MSAT) to the new examination, were adopted by the Commission in September 2001. In March 2002, the Commission reviewed information about the new examinations (e.g., structure, timing) and adopted a transition plan for the new single subject exams and the Preliminary Educational Technology exam. This month staff is recommending adoption of SMRs in English, mathematics, science, and social science. Over the next two years, NES will work with Commission staff and subject matter advisory panels to develop and validate SMRs for the remaining tests in the CSET program for Commission adoption. NES will develop all of the subject matter exams on the basis of Commission-adopted SMRs. The CSET contract will run through October 2006, and will include test administrations through June 2006.

The CSET in English, mathematics, science, social science, and multiple subjects are expected to be ready for initial test administration in January 2003. CSET in physical education, art, music, languages other than English, and Preliminary Educational Technology are expected to be ready for initial administration approximately half way through the 2003-04 testing year.² The remaining exams (agriculture, business, health science, home economics, industrial and technology education) are expected to be ready for initial administration approximately half way through the 2004-05 testing year.

NES will conduct standard setting studies for the CSET either just before or after each initial test administration. Results of these studies will be presented to the Commission with staff-recommended passing standards.

The NES test development and administration contract will be a “no cost” contract for the Commission. That is, the contractor will be compensated completely and directly by examinees through test fees. As part of the test fees, NES will collect funds from examinees and remit them to the Commission to be used toward the Commission’s costs of operating its testing programs (e.g., salaries, operating expenses).

The CSET program will include several enhancements in test services for candidates. Some of these services are as follows:

- internet registration;
- internet score reporting;
- electronic registration bulletin;
- electronic test guides that include sample items for each content domain on a subtest (a complete sample test for the multiple subjects examination);
- regular, late, *and* emergency registration periods;

¹ There are two purposes for including the new Preliminary Educational Technology exam in the new contract. First, given the frequency of technological change, this test should be updated more frequently than most other examinations. Second, because the Preliminary Educational Technology exam is a low-volume exam, combining it in a contract with several high-volume exams (e.g., elementary subject matter exam, exams in social science and English) will keep examinee fees reasonable.

² A testing year is from July 1 through June 30.

- no additional fee to change the test date, test area, or to make changes to a registration file (i.e., name, address, social security number);
- payment of fees by credit card;
- diagnostic feedback on the score reports of candidates who do not pass a test or subtest; and
- out-of-state test administrations in states from which high volumes of educators apply for California certification: Arizona, Illinois, Massachusetts, Michigan, New York, Oregon, Pennsylvania, Texas, Utah, and Washington.

NES is also in the process of implementing enhancements in services for the Commission and other constituents of the testing program. Some of these services are as follows:

- internet and/or mail score reports to institutions and teacher preparation programs, including examinee performance data for each test administration and annual passing rate information;
- a faculty manual to support teacher preparation programs in their advisement of students;
- a website, accessible by the Commission only, to facilitate communication between Commission staff and NES, and that will include registration information (e.g., registration counts per administration, rosters and totals for test sites, and examinee information) and scoring information (e.g., statewide pass rate information and examinee scores and scoring history).

Appendix A

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

COMMISSION ON TEACHER CREDENTIALING

1900 Capitol Avenue
Sacramento, California 95814-4213



Charge to the Subject Matter Advisory Panels in English, Mathematics, Science, and Social Science

March 2001

The Executive Director of the California Commission on Teacher Credentialing has appointed the Subject Matter Advisory Panels in English, Mathematics, Science, and Social Science to work with and advise the Commission's staff and contractor to accomplish the following the task:

Develop new *Standards of Quality and Effectiveness for Subject Matter Programs* in each of four subject areas. An important element of the new standards will be a delineation of the subject-specific knowledge, skills, and abilities that beginning teachers need to know and be able to do. These will be referred to as *subject matter requirements*.

The new standards will guide sponsors of subject matter programs for prospective teachers. The subject matter requirements will delineate the subject-specific knowledge, skills, and abilities (a) to be taught in programs and (b) eligible for assessment on exams candidates can take in lieu of completing programs.

The program standards and subject matter requirements shall take into account the context for California K-12 public education, best practices in subject-matter pedagogy, and the knowledge base and methods of the disciplines under consideration.

The work and products of each panel shall be:

- Focused on the subject matter preparation of candidates for California Single Subject Teaching Credentials.
- Informed by the knowledge and expertise of its members, previously adopted program standards, the new Elementary Subject Matter Program Standards, and all applicable California laws and regulations.
- Aligned with the State-adopted K-12 student academic content standards and curriculum frameworks.
- Compatible with the assumptions, format, and organization of other segments of the Senate Bill 2042 reforms.

Upon their completion, the new *Standards of Quality and Effectiveness for Subject Matter Programs* will be presented to the Commission for adoption.

The New Subject Matter Requirements

The new subject matter requirements in English, mathematics, science, and social science 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 new 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. (See the draft subject matter requirements for prospective elementary teachers online at: <http://www.ctc.ca.gov/profserv/progstan.html>.)
5. In science, the Commission offers Single Subject Teaching Credentials in four emphasis areas: biology, chemistry, geoscience, and physics. Prospective science teachers are expected to have in-depth competence in one area (their emphasis area), and broad competence across all four areas (referred to as general science). Thus, the Science Panel will develop subject matter requirements for each emphasis area as well as a set of general science subject matter requirements, which is expected to include competencies from the four emphasis areas.

Appendix B

Recommended Subject Matter Requirements for Single Subject Teaching Credentials

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Mathematics	page 25
Science	page 33
Social Science	page 71

English Subject Matter Requirements

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

More than ever before, teachers of English in California's middle and high schools must deliver a complex and dynamic curriculum to students of every socioeconomic, linguistic and cultural background. Furthermore, society is increasingly technologically and media oriented. The Reading/Language Arts Framework for California Public Schools: Kindergarten Through Grade Twelve (1999) forms the basis for the preparation of English teachers, who must equip their students to meet the challenges of this changing world. In this context, new paradigms and models are required for teaching English/Language Arts. Multiple forms of literacy demand a broad theoretical knowledge of language and literacy acquisition, while new information technologies require an emphasis on critical analysis of both print and non-print texts.

Candidates for Single Subject Teaching Credentials in English have a broad knowledge of literature, language and linguistics, rhetoric and composition, and communication studies. Candidates must be able to read and write well for a variety of purposes and communicate effectively within a variety of rhetorical contexts. In addition, candidates must have experience in theater arts, public speaking, journalism, textual analysis of nonfiction and electronic media, and production of technologically enhanced documents. This broad scope of background and skills ensures a greater degree of success in English/Language Arts classrooms for California's public school children.

Domain 1. Literature and Textual Analysis

Candidates demonstrate knowledge of the foundations and contexts of the literature and textual analysis contained in the English-Language Arts Content Standards for California Public Schools (1997) as outlined in the Reading/Language Arts Framework for California Public Schools: Kindergarten Through Grade Twelve (1999) at a post secondary level of rigor. Candidates have both broad and deep conceptual knowledge of the subject matter. The candidate's preparation should include breadth of knowledge in literature, literary analysis and criticism, as well as non-literary text analysis. Literary analysis presumes in-depth exploration of the relationship between form and content. The curriculum should embrace representative selections from different literary traditions and major works from diverse cultures. Advanced study of multicultural writers is also fundamental preparation for teaching these works. Shakespeare remains integral to the secondary school curriculum; advanced study of his work is, therefore, essential to future secondary teachers. Candidates must be enthusiastic readers and writers, who know and apply effective reading strategies and compose thoughtful, well-crafted responses to literary and non-literary texts. Candidates will be able to:

1.1 Literary Analysis

- a. Recognize, compare, and evaluate different literary traditions to include:
 - ◆ American (inclusive of cultural pluralism)
 - ◆ British (inclusive of cultural pluralism)
 - ◆ World literature and literature in translation (inclusive of cross-cultural literature)
 - ◆ Mythology and oral tradition

- b. Trace development of major literary movements in historical periods (e.g., Homeric Greece, medieval, neoclassic, romantic, modern)
- c. Describe the salient features of adolescent/Young Adult literature
- d. Analyze and interpret major works by representative writers in historical, aesthetic, political, and philosophical contexts

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 2.4; Grades 11-12, Reading: 2.2, 3.5-7)

1.2 Literary Elements

- a. Distinguish salient features of genres (e.g., short stories, non-fiction, drama, poetry, novel)
- b. Define and analyze basic elements of literature (e.g., plot, setting, character, point of view, theme, narrative structure, figurative language, tone, diction, style)
- c. Articulate the relationship between the expressed purposes and the characteristics of different forms of dramatic literature (e.g., comedy, tragedy, drama, dramatic monologue)
- d. Develop critical thinking and analytic skill through close reading of texts

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 1.1-2, 2.1, 2.4, 2.6, 2.8, 3.0; Grade 7, Reading: 1.1, 2.4, 3.1-5; Grade 8, Reading: 1.1, 2.7, 3.0; Grades 9-10, Reading: 1.1, 2.8, 3.1-4, 3.7-10; Grades 11-12, Reading: 2.2, 3.1-4)

1.3 Literary Criticism

- a. Research and apply criticism of major texts and authors using print and/or electronic resources
- b. Research and apply various approaches to interpreting literature (e.g., aesthetic, historical, political, philosophical)

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 2.1-2, 2.6-8, 3.6; Grade 7, Reading: 2.1, 2.4, 2.6, 3.0; Grade 8, Reading: 2.2, 2.6, 3.0; Grades 9-10, Reading: 2.2, 2.4, 2.8, 3.5-7, 3.11-12, Writing 1.6-7; Grades 11-12, Reading: 2.2, 2.4, 3.8-9, Writing 1.6-7)

1.4 Analysis of Non-Literary Texts

- a. Compare various features of print and visual media (e.g., film, television, internet)
- b. Evaluate structure and content of a variety of consumer, workplace, and public documents
- c. Interpret individual works in their cultural, social, and political contexts

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 2.0, 3.0; Grade 7, Reading: 2.1-5, 2.2, 3.0; Grade 8, Reading: 2.1-7, 3.0; Grades 9-10, Reading: 2.1, 2.2, 2.4-7, 3.0; Grades 11-12, Reading: 2.1-3, 2.6, 3.0)

Domain 2. Language, Linguistics, and Literacy

Candidates demonstrate knowledge of the foundations and contexts of the language, linguistics, and literacy contained in the English-Language Arts Content Standards for California Public Schools (1997) as outlined in the Reading/Language Arts Framework for California Public Schools: Kindergarten Through Grade Twelve (1999) at a post secondary level of rigor. Candidates have both broad and deep conceptual knowledge of the subject matter. Many California students, coming from a variety of linguistic and sociocultural backgrounds, face specific challenges in mastering the English language. The diversity of this population requires the candidate to understand the principles of language acquisition and development. Candidates must become knowledgeable about the nature of human language, language variation, and historical and cultural perspectives on the development of English. In addition, candidates must acquire a complex understanding of the development of English literacy among both native and non-native speakers. Candidates will be able to:

2.1 Human Language Structures

- a. Recognize the nature of human language, differences among languages, the universality of linguistic structures, and change across time, locale, and communities
- b. Demonstrate knowledge of word analysis, including sound patterns (phonology) and inflection, derivation, compounding, roots and affixes (morphology)
- c. Demonstrate knowledge of sentence structures (syntax), word and sentence meanings (semantics), and language function in communicative context (pragmatics)
- d. Use appropriate print and electronic sources to research etymologies; recognize conventions of English orthography and changes in word meaning and pronunciation

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 1.1-5; Grades 7-8, Reading: 1.2; Grades 9-10, Reading: 1.1-3)

2.2 Acquisition and Development of Language and Literacy

- a. Explain the influences of cognitive, affective, and sociocultural factors on language acquisition and development
- b. Explain the influence of a first language on second language development
- c. Describe methods and techniques for developing academic literacy (e.g., tapping prior knowledge through semantic mapping, word analogies, cohesion analysis)

(English-Language Arts Content Standards for California Public Schools, Grades 6-12, Reading: 1.0)

2.3 Literacy Studies

- a. Recognize the written and oral conventions of Standard English, and analyze the social implications of mastering them
- b. Describe and explain cognitive elements of reading and writing processes (e.g., decoding and encoding, construction of meaning, recognizing and using text conventions of different genres)
- c. Explain metacognitive strategies for making sense of text (e.g., pre-reading activities, predicting, questioning, word analysis, concept formation)

(English-Language Arts Content Standards for California Public Schools, Grades 6-12, Reading: 1.0)

2.4 Grammatical Structures of English

- a. Identify methods of sentence construction (e.g., sentence combining with coordinators and subordinators; sentence embedding and expanding with clausal and phrasal modifiers)
- b. Analyze parts of speech and their distinctive structures and functions (e.g., noun phrases including count and noncount nouns and the determiner system; prepositions, adjectives, and adverbs; word transformations)
- c. Describe the forms and functions of the English verb system (e.g., modals, verb complements, verbal phrases)

(English-Language Arts Content Standards for California Public Schools, Grade 8, Reading: 1.2)

Domain 3. Composition and Rhetoric

Candidates demonstrate knowledge of the foundations and contexts of the composition and rhetoric contained in the English-Language Arts Content Standards for California Public Schools (1997) as outlined in the Reading/Language Arts Framework for California Public Schools: Kindergarten Through Grade Twelve (1999) at a post secondary level of rigor. Candidates have both broad and deep conceptual knowledge of the subject matter. Candidates face dynamic challenges in the domains of oral and written communication. They must make appropriate use of current text-production technologies and develop sensitivity to patterns of communication used by different social and cultural groups. Candidates are competent writers and speakers who are able to communicate appropriately in various rhetorical contexts, using effective text structures, word choice, sentence options, standard usage conventions, and advanced research methods as needed. The subject matter preparation program provides opportunities for candidates to develop skills and confidence in public speaking. Candidates will be able to:

3.1 Written Composing Processes (Individual and Collaborative)

- a. Reflect on and describe their own writing processes
- b. Investigate and apply alternative methods of prewriting, drafting, responding, revising, editing, and evaluating
- c. Employ such strategies as graphic organizers, outlines, notes, charts, summaries, or précis to clarify and record meaning
- d. Integrate a variety of software applications (e.g., databases, graphics, spreadsheets) to produce print documents and multi-media presentations

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 2.1-2, 2.4, Writing: 1.4-6; Grade 7, Reading: 2.3-4, Writing: 1.3-4, 1.6-7; Grade 8, Reading: 2.4, Writing: 1.1, 1.4-1.6, Listening and Speaking: 1.4; Grades 9-10, Reading: 2.4, Writing: 1.8-9; Grades 11-12, Writing: 1.4, 1.7-9, Listening and Speaking: 2.4)

3.2 Rhetorical Features of Literary and Non-Literary, Oral and Written Texts

- a. Recognize and use a variety of writing applications (e.g., short story, biographical, autobiographical, expository, persuasive, business and technical documents, historical investigation)
- b. Demonstrate awareness of audience, purpose, and context

- c. Recognize and use various text structures (e.g., narrative and non-narrative organizational patterns)
- d. Apply a variety of methods to develop ideas within an essay (e.g., analogy, cause and effect, compare and contrast, definition, illustration, description, hypothesis)
- e. Apply critical thinking strategies to evaluate methods of persuasion, including but not limited to:
 - ◆ Types of appeal (e.g., appeal to reason, emotion, morality)
 - ◆ Types of persuasive speech (e.g., propositions of fact, value, problem, policy)
 - ◆ Logical fallacies (e.g., bandwagon, red herring, glittering generalities, ad hominem)
 - ◆ Advertising techniques (e.g., Maslow’s hierarchy of needs)
 - ◆ Logical argument (e.g., inductive/deductive reasoning, syllogisms, analogies)
 - ◆ Classical argument (e.g., claim, qualifiers, rules of evidence, warrant)

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 2.1-2, 2.4, 2.6, 2.8, Writing: 1.1-3, 1.6, 2.1-5, Listening and Speaking: 1.8-9; Grade 7, Reading: 1.3, 2.2-3, Writing: 1.1-3, 1.7, 2.1-5, Listening and Speaking: 1.1, 1.3; Grade 8, Reading: 1.3, 2.2, Writing: 1.1-3, 1.5.2.1-6, Listening and Speaking: 1.8; Grades 9-10, Writing: 1.1-2, 1.4, 1.9, 2.1-6, Listening and Speaking: 1.5, 1.10, 1.13; Grades 11-12, Reading: 1.3, 2.2, 2.4-6, Writing: 1.1-5, 1.9, 2.1-6, Listening and Speaking: 1.4, 1.12-13)

3.3 Rhetorical Effects of Grammatical Elements

- a. Employ precise and extensive vocabulary and effective diction to control voice, style, and tone
- b. Use clause joining techniques (e.g., coordinators, subordinators, punctuation) to express logical connections between ideas
- c. Identify and use clausal and phrasal modifiers to control flow, pace, and emphasis (e.g., adjective clauses, appositives, participles and verbal phrases, absolutes)
- d. Identify and use devices to control focus in sentence and paragraph (e.g., active and passive voice, expletives, concrete subjects, transitional phrases)
- e. Maintain coherence through use of cohesive devices

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 1.1, Writing: 1.2, 1.6, Written and Oral English Language Conventions: 1.1-5; Grade 7, Writing: 1.1, 1.7, Written and Oral English Language Conventions: 1.1-7; Grade 8, Writing: 1.2, 1.6, Written and Oral English Language Conventions: 1.1-6, Listening and Speaking: 1.5-6; Grades 9-10, Writing: 1.1-2, 1.6, 1.9, Written and Oral English Language Conventions: 1.1-5; Grades 11-12, Reading: 2.1-2, Writing: 1.2-5, 1.9, Written and Oral English Language Conventions: 1.1-3, Listening and Speaking: 1.5)

3.4 Conventions of Oral and Written Language

- a. Apply knowledge of linguistic structure to identify and use the conventions of Standard Edited English
- b. Recognize, understand, and use a range of conventions in both spoken and written English, including:
 - ◆ Conventions of effective sentence structure (e.g., clear pronoun reference, parallel structure, appropriate verb tense)

- ◆ Preferred usage (e.g., verb/subject agreement, pronoun agreement, idioms)
- ◆ Conventions of pronunciation and intonation
- ◆ Conventional forms of spelling
- ◆ Capitalization and punctuation

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 1.1, Written and Oral English Language Conventions: 1.1-5; Grade 7, Written and Oral English Language Conventions: 1.1-7; Grade 8, Writing: 1.2, Written and Oral English Language Conventions: 1.1-6, Listening and Speaking: 1.6; Grades 9-10, Writing: 1.9, Written and Oral English Language Conventions: 1.9; Grades 11-12, Writing: 1.4, Written and Oral English Language Conventions: 1.1-3, Listening and Speaking: 1.8)

3.5 Research Strategies

- a. Develop and apply research questions
- b. Demonstrate methods of inquiry and investigation
- c. Identify and use multiple resources (e.g., oral, print, electronic; primary and secondary), and critically evaluate the quality of the sources
- d. Interpret and apply findings
- e. Use professional conventions and ethical standards of citation and attribution
- f. Demonstrate effective presentation methods, including multi-media formats

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 1.1, 2.1, 2.3, 2.6-8, Writing: 1.4-5, Listening and Speaking: 1.1-2, 1.6-7, 2.1, 2.3; Grade 7, Reading: 2.2, 2.6, Writing: 1.4-5, Listening and Speaking: 1.2, 1.6-7, 2.1, 2.3; Grade 8, Reading: 2.2, 2.7, Writing: 1.3-6, Listening and Speaking: 1.2-3, 1.6-8, 2.3; Grades 9-10, Reading: 2.2-5, 2.8, Writing: 1.3-8, Listening and Speaking: 1.7, 2.2; Grades 11-12, Writing: 1.4, 1.6-8, Listening and Speaking: 2.4)

Domain 4. Communications: Speech, Media, and Creative Performance

Candidates demonstrate knowledge of the foundations and contexts of the speech, media, and creative performance contained in the English-Language Arts Content Standards for California Public Schools (1997) as outlined in the Reading/Language Arts Framework for California Public Schools: Kindergarten Through Grade Twelve (1999) at a post secondary level of rigor. Candidates have both broad and deep conceptual knowledge of the subject matter. The Reading/Language Arts Framework for California Public Schools (1999) puts consistent emphasis on analysis and evaluation of oral and media communication as well as on effective public speaking and performance. The candidate must possess the breadth of knowledge needed to integrate journalism, technological media, speech, dramatic performance, and creative writing into the language arts curriculum, including sensitivity to cultural approaches to communication. The subject matter preparation program should include opportunities for candidates to obtain knowledge and experience in these areas. The candidate skillfully applies the artistic and aesthetic tools and sensitivities required for creative expression. Candidates will be able to:

4.1 Oral Communication Processes

- a. Identify features of, and deliver oral performance in, a variety of forms (e.g., impromptu, extemporaneous, persuasive, expository, interpretive, debate)

- b. Demonstrate and evaluate individual performance skills (e.g., diction, enunciation, vocal rate, range, pitch, volume, body language, eye contact, response to audience)
- c. Articulate principles of speaker/audience interrelationship (e.g., interpersonal communication, group dynamics, public address)
- d. Identify and demonstrate collaborative communication skills in a variety of roles (e.g., listening supportively, facilitating, synthesizing, stimulating higher level critical thinking through inquiry)

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 1.1, Listening and Speaking: 1.1-8, 2.0; Grade 7, Listening and Speaking: 1.1-7, 2.0; Grade 8, Listening and Speaking: 1.1-8, 2.0; Grades 9-10, Listening and Speaking: 1.1, 1.3-6, 1.8-13, 2.0; Grades 11-12, Reading: 2.6, Listening and Speaking: 1.4-6, 1.8-13, 2.0)

4.2 Media Analysis and Journalistic Applications

- a. Analyze the impact on society of a variety of media forms (e.g., television, advertising, radio, internet, film)
- b. Recognize and evaluate strategies used by the media to inform, persuade, entertain, and transmit culture
- c. Identify aesthetic effects of a media presentation
- d. Demonstrate effective and creative application of these strategies and techniques to prepare presentations using a variety of media forms and visual aids

(English-Language Arts Content Standards for California Public Schools, Grade 6, Reading: 2.1-2, 2.6, Listening and Speaking: 1.9; Grade 7, Reading: 2.1, Listening and Speaking: 1.8-9; Grade 8, Reading: 2.1, 2.3, Listening and Speaking: 1.8-9; Grades 9-10, Reading: 2.1, Listening and Speaking: 1.1-2, 1.7, 1.9, 1.14; Grades 11-12, Reading: 2.1, Writing: 2.6, Listening and Speaking: 1.1-4, 1.9, 1.14, 2.4; Visual and Performing Arts Content Standards for California Public Schools, Theatre, Grades 6-12, 5.0: Connections, Relationships, Applications)

4.3 Dramatic Performance

- a. Describe and use a range of rehearsal strategies to effectively mount a production (e.g., teambuilding, scheduling, organizing resources, setting priorities, memorization techniques, improvisation, physical and vocal exercises)
- b. Employ basic elements of character analysis and approaches to acting, including physical and vocal techniques, that reveal character and relationships
- c. Demonstrate basic knowledge of the language of visual composition and principles of theatrical design (e.g., set, costume, lighting, sound, props)
- d. Apply fundamentals of stage directing, including conceptualization, blocking (movement patterns), tempo, and dramatic arc (rising and falling action)
- e. Demonstrate facility in a variety of oral performance traditions (e.g., storytelling, epic poetry, recitation)

(English-Language Arts Content Standards for California Public Schools, Grade 6, Listening and Speaking: 2.1, 2.3; Grade 7, Listening and Speaking: 2.1; Grade 8, Listening and Speaking: 1.1, 2.1-2, 2.5; Grades 9-10, Listening and Speaking: 2.1, 2.4; Grades 11-12, Listening and Speaking: 1.7, 1.9-10, 2.5; Visual and Performing Arts

Content Standards for California Public Schools, Theatre, Grades 6-12, 1.0: Artistic Perception, 2.0: Creative Expression, 3.0 Historical and Cultural Context, 4.0 Aesthetic Valuing)

4.4 Creative Writing

- a. Demonstrate facility in creative composition in a variety of genres (e.g., poetry, stories, plays, film)
- b. Understand and apply processes and techniques that enhance the impact of the creative writing product (e.g., workshopping; readings; recasting of genre, voice, perspective)
- c. Demonstrate skill in composing creative and aesthetically compelling responses to literature

(English-Language Arts Content Standards for California Public Schools, Grade 6-12, Writing: 2.1)

Mathematics Subject Matter Requirements

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

Domain 1. Algebra

Candidates demonstrate an understanding of the foundations of the algebra contained in the Mathematics Content Standards for California Public Schools (1997) as outlined in the Mathematics Framework for California Public Schools: Kindergarten Through Grade Twelve (1999) from an advanced standpoint. To ensure a rigorous view of algebra and its underlying structures, candidates have a deep conceptual knowledge. They are skilled at symbolic reasoning and use algebraic skills and concepts to model a variety of problem-solving situations. They understand the power of mathematical abstraction and symbolism.

1.1 Algebraic Structures

- a. Know why the real and complex numbers are each a field, and that particular rings are not fields (e.g., integers, polynomial rings, matrix rings)
- b. Apply basic properties of real and complex numbers in constructing mathematical arguments (e.g., if $a < b$ and $c < 0$, then $ac > bc$)
- c. Know that the rational numbers and real numbers can be ordered and that the complex numbers cannot be ordered, but that any polynomial equation with real coefficients can be solved in the complex field

(Mathematics Content Standards for California Public Schools, Grade 6, Number Sense: 1.0, 2.0; Grade 7, Algebra and Functions: 1.0; Algebra I: 1.0, 3.0-7.0, 9.0-15.0, 24.0, 25.0; Geometry: 1.0, 17.0; Algebra II: 1.0-8.0, 11.0, 24.0, 25.0; Trigonometry: 17.0; Mathematical Analysis: 2.0; Linear Algebra: 9.0, 11.0)

1.2 Polynomial Equations and Inequalities

- a. Know why graphs of linear inequalities are half planes and be able to apply this fact (e.g., linear programming)
- b. Prove and use the following:
 - ◆ The Rational Root Theorem for polynomials with integer coefficients
 - ◆ The Factor Theorem
 - ◆ The Conjugate Roots Theorem for polynomial equations with real coefficients
 - ◆ The Quadratic Formula for real and complex quadratic polynomials
 - ◆ The Binomial Theorem
- c. Analyze and solve polynomial equations with real coefficients using the Fundamental Theorem of Algebra

(Mathematics Content Standards for California Public Schools, Grade 7, Algebra and Functions: 2.0-4.0; Algebra I: 1.0, 2.0, 4.0-10.0, 12.0-15.0, 17.0-23.0; Algebra II: 2.0-11.0, 16.0, 17.0; Trigonometry: 17.0, 18.0; Mathematical Analysis: 4.0, 6.0)

1.3 Functions

- a. Analyze and prove general properties of functions (i.e., domain and range, one-to-one, onto, inverses, composition, and differences between relations and functions)

- b. Analyze properties of polynomial, rational, radical, and absolute value functions in a variety of ways (e.g., graphing, solving problems)
- c. Analyze properties of exponential and logarithmic functions in a variety of ways (e.g., graphing, solving problems)

(Mathematics Content Standards for California Public Schools, Grade 6, Algebra and Functions: 1.0; Grade 7, Number Sense: 1.0, 2.0; Algebra and Functions: 3.0; Algebra I: 3.0-6.0, 10.0, 13.0, 15.0-18.0, 21.0-23.0; Algebra II: 1.0-4.0, 6.0-17.0, 24.0, 25.0; Trigonometry: 2.0, 4.0-8.0, 19.0; Mathematical Analysis: 6.0, 7.0; Calculus: 9.0)

1.4 Linear Algebra

- a. Understand and apply the geometric interpretation and basic operations of vectors in two and three dimensions, including their scalar multiples and scalar (dot) and cross products
- b. Prove the basic properties of vectors (e.g., perpendicular vectors have zero dot product)
- c. Understand and apply the basic properties and operations of matrices and determinants (e.g., to determine the solvability of linear systems of equations)

(Mathematics Content Standards for California Public Schools, Algebra I: 9.0; Algebra II: 2.0; Mathematical Analysis: 1.0; Linear Algebra: 1.0-12.0)

Domain 2. Geometry

Candidates demonstrate an understanding of the foundations of the geometry contained in the Mathematics Content Standards for California Public Schools (1997) as outlined in the Mathematics Framework for California Public Schools: Kindergarten Through Grade Twelve (1999) from an advanced standpoint. To ensure a rigorous view of geometry and its underlying structures, candidates have a deep conceptual knowledge. They demonstrate an understanding of axiomatic systems and different forms of logical arguments. Candidates understand, apply, and prove theorems relating to a variety of topics in two- and three-dimensional geometry, including coordinate, synthetic, non-Euclidean, and transformational geometry.

2.1 Parallelism

- a. Know the Parallel Postulate and its implications, and justify its equivalents (e.g., the Alternate Interior Angle Theorem, the angle sum of every triangle is 180 degrees)
- b. Know that variants of the Parallel Postulate produce non-Euclidean geometries (e.g., spherical, hyperbolic)

(Mathematics Content Standards for California Public Schools, Algebra I: 8.0, 24.0; Geometry: 1.0-3.0, 7.0, 13.0)

2.2 Plane Euclidean Geometry

- a. Prove theorems and solve problems involving similarity and congruence
- b. Understand, apply, and justify properties of triangles (e.g., the Exterior Angle Theorem, concurrence theorems, trigonometric ratios, Triangle Inequality, Law of Sines, Law of Cosines, the Pythagorean Theorem and its converse)

- c. Understand, apply, and justify properties of polygons and circles from an advanced standpoint (e.g., derive the area formulas for regular polygons and circles from the area of a triangle)
- d. Justify and perform the classical constructions (e.g., angle bisector, perpendicular bisector, replicating shapes, regular n-gons for n equal to 3, 4, 5, 6, and 8)
- e. Use techniques in coordinate geometry to prove geometric theorems

(Mathematics Content Standards for California Public Schools, Grade 6, Algebra and Functions: 2.0, 3.0; Measurement and Geometry: 2.0; Grade 7, Measurement and Geometry: 1.0-3.0; Algebra I: 8.0, 24.0; Geometry: 1.0-6.0, 8.0-16.0, 18.0-21.0; Algebra II: 16.0, 17.0; Trigonometry: 12.0-14.0, 18.0, 19.0; Mathematical Analysis: 5.0)

2.3 Three-Dimensional Geometry

- a. Demonstrate an understanding of parallelism and perpendicularity of lines and planes in three dimensions
- b. Understand, apply, and justify properties of three-dimensional objects from an advanced standpoint (e.g., derive the volume and surface area formulas for prisms, pyramids, cones, cylinders, and spheres)

(Mathematics Content Standards for California Public Schools, Grade 6, Measurement and Geometry: 1.0; Grade 7, Measurement and Geometry: 2.0; Algebra I: 24.0; Geometry: 2.0, 3.0, 12.0, 17.0; Mathematical Analysis: 5.0)

2.4 Transformational Geometry

- a. Demonstrate an understanding of the basic properties of isometries in two- and three-dimensional space (e.g., rotation, translation, reflection)
- b. Understand and prove the basic properties of dilations (e.g., similarity transformations or change of scale)

(Mathematics Content Standards for California Public Schools, Geometry: 11.0, 22.0)

Domain 3. Number Theory

Candidates demonstrate an understanding of the number theory and a command of the number sense contained in the Mathematics Content Standards for California Public Schools (1997) as outlined in the Mathematics Framework for California Public Schools: Kindergarten Through Grade Twelve (1999) from an advanced standpoint. To ensure a rigorous view of number theory and its underlying structures, candidates have a deep conceptual knowledge. They prove and use properties of natural numbers. They formulate conjectures about the natural numbers using inductive reasoning, and verify conjectures with proofs.

3.1 Natural Numbers

- a. Prove and use basic properties of natural numbers (e.g., properties of divisibility)
- b. Use the Principle of Mathematical Induction to prove results in number theory
- c. Know and apply the Euclidean Algorithm
- d. Apply the Fundamental Theorem of Arithmetic (e.g., find the greatest common factor and the least common multiple, show that every fraction is equivalent to a unique fraction)

where the numerator and denominator are relatively prime, prove that the square root of any number, not a perfect square number, is irrational)

(Mathematics Content Standards for California Public Schools, Grade 6, Number Sense: 2.0; Grade 7, Number Sense: 1.0; Algebra I: 1.0, 2.0, 12.0, 24.0, 25.0; Geometry: 1.0; Algebra II: 21.0, 23.0, 25.0; Mathematical Analysis: 3.0)

Domain 4. Probability and Statistics

Candidates demonstrate an understanding of the statistics and probability distributions for advanced placement statistics contained in the Mathematics Content Standards for California Public Schools (1997) as outlined in the Mathematics Framework for California Public Schools: Kindergarten Through Grade Twelve (1999) from an advanced standpoint. To ensure a rigorous view of probability and statistics and their underlying structures, candidates have a deep conceptual knowledge. They solve problems and make inferences using statistics and probability distributions.

4.1 Probability

- a. Prove and apply basic principles of permutations and combinations
- b. Illustrate finite probability using a variety of examples and models (e.g., the fundamental counting principles)
- c. Use and explain the concept of conditional probability
- d. Interpret the probability of an outcome
- e. Use normal, binomial, and exponential distributions to solve and interpret probability problems

(Mathematics Content Standards for California Public Schools, Grade 6, Statistics, Data Analysis, and Probability: 3.0; Algebra II: 18.0-20.0; Probability and Statistics: 1.0-4.0; Advanced Probability and Statistics: 1.0-4.0, 7.0, 9.0, 17.0, 18.0)

4.2 Statistics

- a. Compute and interpret the mean, median, and mode of both discrete and continuous distributions
- b. Compute and interpret quartiles, range, variance, and standard deviation of both discrete and continuous distributions
- c. Select and evaluate sampling methods appropriate to a task (e.g., random, systematic, cluster, convenience sampling) and display the results
- d. Know the method of least squares and apply it to linear regression and correlation
- e. Know and apply the chi-square test

(Mathematics Content Standards for California Public Schools, Grade 6, Statistics, Data Analysis, and Probability: 1.0, 2.0; Grade 7, Statistics, Data Analysis, and Probability: 1.0; Probability and Statistics: 5.0-7.0; Advanced Probability and Statistics: 4.0-6.0, 8.0, 10.0-13.0, 15.0-17.0, 19.0)

Domain 5. Calculus

Candidates demonstrate an understanding of the trigonometry and calculus contained in the Mathematics Content Standards for California Public Schools (1997) as outlined in the Mathematics

Framework for California Public Schools: Kindergarten Through Grade Twelve (1999) from an advanced standpoint. To ensure a rigorous view of trigonometry and calculus and their underlying structures, candidates have a deep conceptual knowledge. They apply the concepts of trigonometry and calculus to solving problems in real-world situations.

5.1 Trigonometry

- a. Prove that the Pythagorean Theorem is equivalent to the trigonometric identity $\sin^2x + \cos^2x = 1$ and that this identity leads to $1 + \tan^2x = \sec^2x$ and $1 + \cot^2x = \csc^2x$
- b. Prove the sine, cosine, and tangent sum formulas for all real values, and derive special applications of the sum formulas (e.g., double angle, half angle)
- c. Analyze properties of trigonometric functions in a variety of ways (e.g., graphing and solving problems)
- d. Know and apply the definitions and properties of inverse trigonometric functions (i.e., arcsin, arccos, and arctan)
- e. Understand and apply polar representations of complex numbers (e.g., DeMoivre's Theorem)

(Mathematics Content Standards for California Public Schools, Algebra I: 24.0; Geometry: 3.0, 14.0, 18.0, 19.0; Algebra II: 24.0, 25.0; Trigonometry: 1.0-6.0, 8.0-11.0, 19.0; Mathematical Analysis: 1.0, 2.0; Calculus: 18.0, 20.0)

5.2 Limits and Continuity

- a. Derive basic properties of limits and continuity, including the Sum, Difference, Product, Constant Multiple, and Quotient Rules, using the formal definition of a limit
- b. Show that a polynomial function is continuous at a point
- c. Know and apply the Intermediate Value Theorem, using the geometric implications of continuity

(Mathematics Content Standards for California Public Schools, Algebra I: 24.0; Geometry: 3.0; Algebra II: 1.0, 15.0; Mathematical Analysis: 8.0; Calculus: 1.0-4.0)

5.3 Derivatives and Applications

- a. Derive the rules of differentiation for polynomial, trigonometric, and logarithmic functions using the formal definition of derivative
- b. Interpret the concept of derivative geometrically, numerically, and analytically (i.e., slope of the tangent, limit of difference quotients, extrema, Newton's method, and instantaneous rate of change)
- c. Interpret both continuous and differentiable functions geometrically and analytically and apply Rolle's Theorem, the Mean Value Theorem, and L'Hopital's rule
- d. Use the derivative to solve rectilinear motion, related rate, and optimization problems
- e. Use the derivative to analyze functions and planar curves (e.g., maxima, minima, inflection points, concavity)
- f. Solve separable first-order differential equations and apply them to growth and decay problems

(Mathematics Content Standards for California Public Schools, Algebra I: 5.0-8.0, 10.0, 11.0, 13.0, 21.0, 23.0; Geometry: 3.0; Algebra II: 1.0, 9.0, 10.0, 12.0, 15.0; Trigonometry: 7.0, 15.0-19.0; Mathematical Analysis: 5.0, 7.0; Calculus: 1.0, 4.0-12.0, 27.0)

5.4 Integrals and Applications

- a. Derive definite integrals of standard algebraic functions using the formal definition of integral
- b. Interpret the concept of a definite integral geometrically, numerically, and analytically (e.g., limit of Riemann sums)
- c. Prove the Fundamental Theorem of Calculus, and use it to interpret definite integrals as antiderivatives
- d. Apply the concept of integrals to compute the length of curves and the areas and volumes of geometric figures

(Mathematics Content Standards for California Public Schools, Algebra I: 24.0; Geometry: 9.0; Calculus: 13.0-23.0)

5.5 Sequences and Series

- a. Derive and apply the formulas for the sums of finite arithmetic series and finite and infinite geometric series (e.g., express repeating decimals as a rational number)
- b. Determine convergence of a given sequence or series using standard techniques (e.g., Ratio, Comparison, Integral Tests)
- c. Calculate Taylor series and Taylor polynomials of basic functions

(Mathematics Content Standards for California Public Schools, Algebra I: 24.0, 25.0; Algebra II: 21.0-23.0; Mathematical Analysis: 8.0; Calculus: 23.0-26.0)

Domain 6. History of Mathematics

Candidates understand the chronological and topical development of mathematics and the contributions of historical figures of various times and cultures. Candidates know important mathematical discoveries and their impact on human society and thought. These discoveries form a historical context for the content contained in the Mathematics Content Standards for California Public Schools (1997) as outlined in the Mathematics Framework for California Public Schools: Kindergarten Through Grade Twelve (1999; e.g., numeration systems, algebra, geometry, calculus).

6.1 Chronological and Topical Development of Mathematics

- a. Demonstrate understanding of the development of mathematics, its cultural connections, and its contributions to society
- b. Demonstrate understanding of the historical development of mathematics, including the contributions of diverse populations as determined by race, ethnicity, culture, geography, and gender

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

Candidates for Single Subject Teaching Credentials in mathematics use inductive and deductive reasoning to develop, analyze, draw conclusions, and validate conjectures and arguments. As they reason, they use counterexamples, construct proofs using contradictions, and create multiple representations of the same concept. They know the interconnections among mathematical ideas, and use techniques and concepts from different domains and sub-domains to model the same problem. They explain mathematical interconnections with other disciplines. They are able to communicate their mathematical thinking clearly and coherently to others, orally, graphically, and in writing, through the use of precise language and symbols.

Candidates solve routine and complex problems by drawing from a variety of strategies while demonstrating an attitude of persistence and reflection in their approaches. They analyze problems through pattern recognition and the use of analogies. They formulate and prove conjectures, and test conclusions for reasonableness and accuracy. They use counterexamples to disprove conjectures.

Candidates select and use different representational systems (e.g., coordinates, graphs). They understand the usefulness of transformations and symmetry to help analyze and simplify problems. They make mathematical models to analyze mathematical structures in real contexts. They use spatial reasoning to model and solve problems that cross disciplines.

(Mathematics Content Standards for California Public Schools, Grade 6, Mathematical Reasoning: 1.0-3.0; Grade 7, Mathematical Reasoning: 1.0-3.0)

General Science Subject Matter Requirements

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

Domain 1. Astronomy

Candidates demonstrate an understanding of the foundations of the astronomy contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of astronomy and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand that knowledge of the structure and composition of the universe can be learned from studying stars and galaxies and their evolution. They recognize that objects in the sky move in regular and predictable patterns. Candidates explain how and why the moon's appearance changes during the four-week lunar cycle. They understand how telescopes magnify the appearance of distant objects in the sky, including the moon and the planets. They realize that the solar system consists of planets and other bodies that orbit the sun in predictable paths.

1.1 Astronomy

- a. Describe the chemical composition and physical structure of the universe
- b. Describe the structure of the solar system and its place in the Milky Way galaxy
- c. Distinguish between stars and planets
- d. Recognize that stars vary in color, size, and luminosity
- e. Describe a simple model of how fusion in stars produces heavier elements and results in the production of energy, including light
- f. Describe the regular and predictable patterns of stars and planets in time and location
- g. Explain and predict changes in the moon's appearance (phases)
- h. Describe the use of astronomical instruments in collecting data, and use astronomical units and light years to describe distances

(Science Content Standards for California Public Schools, Grades 3:4a-e; Grade 5: 5a-c; Grade 6: 7a; Grade 7: 6d, 7a; Grade 8:4a-e; Grades 9-12, Earth Sciences: 1a, 1e, 1g, 2a, 2c, 2e-f)

Domain 2. Dynamic Processes of the Earth (Geodynamics)

Candidates demonstrate an understanding of the foundations of the geodynamics contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of geodynamics and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand that Earth's features can be explained by a variety of dynamic processes that have occurred in the past and continue to occur. They understand that plate tectonics account for most of the important features of Earth's surface and major geologic events. Candidates explain how surficial processes and agents such as waves, wind, water, and ice are slowly modifying Earth's land surface. They understand how weathering, transport, and deposition of sediment are related to this reshaping. Candidates are familiar with evidence from rocks that allows us to understand geologic history and the evolution of life on Earth. They can use observed

properties of rocks and minerals to determine their processes of formation. Candidates understand that most of the energy on the Earth comes from the sun. They know that energy from the sun heats Earth unevenly, causing air movements that result in changing weather patterns. They use their understanding of heat to explain the many phenomena on Earth's surface that are affected by the transfer of energy through radiation and convection.

2.1 Tectonic Processes and Features

- a. Diagram the features that provide evidence for plate tectonics
- b. Summarize the thermal processes driving plate movement
- c. Explain how density and buoyancy are related to plate tectonics
- d. Describe types of plate boundaries
- e. Relate the causes of volcanoes, earthquakes, and earth resources to tectonic processes
- f. Summarize earthquake processes in terms of epicenter, focal mechanism, distance, and materials, and the role various factors play in the amount of damage caused by an earthquake

(Science Content Standards for California Public Schools, Grade 6: 1a-g; Grade 8: 4a-e; Grades 9-12, Earth Sciences: 1e, 1g, 2c, 3b, 3d)

2.2 Rock Formation

- a. Diagram and explain the rock cycle
- b. Describe relative and absolute dating techniques, including how half-lives are used in radiometric dating
- c. Compare uniformitarianism and catastrophism

(Science Content Standards for California Public Schools, Grade 4: 4a ; Grade 7: 3c, 4a-e; Grades 9-12, Chemistry: 11f)

2.3 Shaping Earth's Surface: Surficial Processes and Features

- a. Describe the dynamic processes of erosion, deposition, and transport
- b. Describe coastal processes including beach erosion and natural hazards
- c. Describe the effects of natural hazards, including earthquakes, volcanic eruptions, landslides, and floods, on natural and human-made habitats and environmental and human responses to those events

(Science Content Standards for California Public Schools, Grade 4: 5c; Grade 6: 1e, 1f, 2a-d)

2.4 Energy in the Earth System

- a. Diagram the water cycle and describe interrelationships of surface and sub-surface reservoirs
- b. Explain daily and seasonal changes in the sky (i.e., the sun's position and the intensity and duration of sunlight)
- c. Analyze the uneven heating of Earth by the sun
- d. Discuss the effects of air movements on weather
- e. Describe the energy transfer processes of convection, conduction, and radiation in relation to the atmosphere/ocean and Earth's interior structure

- f. Interpret weather maps to predict weather patterns

(Science Content Standards for California Public Schools, Grade 3: 4e; Grade 5: 3a-d, 4a-e; Grade 6: 4a-e; Grades 9-12, Earth Sciences: 5a-b)

Domain 3. Earth Resources

Candidates demonstrate an understanding of the Earth resources contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of Earth resources and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates know there are many different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests, and know how to classify them as renewable or nonrenewable. They realize that sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation. Candidates understand that the utility of energy sources is determined by factors that are involved in converting these sources to useful forms and the consequences of the conversion process. They know the natural origin of the materials used to make common objects.

3.1 Earth Resources

- a. Describe a variety of energy resources, including fossil fuels, nuclear fuels, solar, and biomass
- b. Recognize earth materials as resources (e.g., rocks, minerals, soils, and water)
- c. Identify resources as renewable vs. nonrenewable
- d. Compare extraction and recycling in relation to energy, cost, and demand
- e. Explain sustainable uses of resources with respect to utility, cost, human population, and environmental consequences

(Science Content Standards for California Public Schools, Grade 2: 3e; Grade 6: 6a-c; Grades 9-12, Earth Sciences: 9a, 9c)

Domain 4. Ecology

Candidates demonstrate an understanding of the foundations of the ecology contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of ecology and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand how organisms in ecosystems exchange energy and nutrients among themselves and with the environment. They can identify factors that affect organisms within an ecosystem, including natural hazards and human activity.

4.1 Ecology

- a. Explain energy flow and nutrient cycling through ecosystems (e.g., food chain, food web)
- b. Explain matter transfer (e.g., biogeochemical cycles) in ecosystems
- c. Distinguish between abiotic and biotic factors in an ecosystem
- d. Compare the roles of photosynthesis and respiration in an ecosystem
- e. Describe interrelationships within and among ecosystems (e.g., predator/prey)
- f. Identify and explain factors that affect population types and size (e.g., competition for resources, niche, habitats, species and population interactions, abiotic factors)

(Science Content Standards for California Public Schools, Grade 4: 2a-c, 3a-c; Grade 5: 2f-g; Grade 6: 5a-e)

Domain 5. Genetics and Evolution

Candidates demonstrate an understanding of the foundations of the genetics and evolution contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of genetics and evolution and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand that a typical cell of any organism contains genetic instructions that specify its traits. They can explain how biological evolution accounts for the diversity of species that developed through gradual processes over many generations. Candidates can describe evidence used to explain the evolution of life on Earth.

5.1 Genetics and Evolution

- a. Explain the inheritance of traits which are determined by one or more genes, including dominance, recessiveness, sex linkage, phenotypes, genotypes, and incomplete dominance
- b. Solve problems that illustrate monohybrid and dihybrid crosses
- c. Compare sexual and asexual reproduction
- d. Explain how the coding of DNA (deoxyribonucleic acid) controls the expression of traits by genes
- e. Define mutations and explain their causes
- f. Explain the process of DNA replication
- g. Describe evidence, past and present, that supports the theory of evolution, including diagramming relationships that demonstrate shared characteristics of fossil and living organisms
- h. Explain the theory of natural selection, including adaptation, speciation, and extinction
- i. List major events that affected the evolution of life on Earth (e.g., climate changes, asteroid impacts)

(Science Content Standards for California Public Schools, Grade 7: 2a-e, 3a-e; Grades 9-12, Biology/Life Sciences: 4c, 7c, 8a)

Domain 6. Molecular Biology and Biochemistry

Candidates demonstrate an understanding of the foundations of the molecular biology and biochemistry contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve

(2002) from an advanced standpoint. To ensure a rigorous view of molecular biology and biochemistry and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand and apply the principles of chemistry that underlie the functioning of biological systems. They describe the properties of biochemical compounds that make them essential to life.

6.1 Molecular Biology and Biochemistry

- a. Demonstrate understanding that a small subset of elements (C, H, O, N, P, S) makes up most of the chemical compounds in living organisms by combining in many ways
- b. Recognize and differentiate the structure and function of molecules in living organisms, including carbohydrates, lipids, proteins, and nucleic acids
- c. Describe the process of protein synthesis, including transcription and translation
- d. Compare anaerobic and aerobic respiration
- e. Describe the process of photosynthesis

(Science Content Standards for California Public Schools, Grade 5: 2f-g; Grade 6: 5a; Grade 8: 6b-c; Grades 9-12, Biology/Life Sciences: 1d, 1f, 1g, 1h, 4a, Chemistry: 10c)

Domain 7. Cell and Organismal Biology

Candidates demonstrate an understanding of the foundations of the cell and organismal biology contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of cell and organismal biology and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand that all living organisms are composed of cells and explain important cellular processes. They describe and give examples of how the anatomy and physiology of plants and animals illustrate the complementary nature of structure and function. Candidates demonstrate understanding of physical principles that underlie biological structures and functions. They apply these principles to important biological systems.

7.1 Cell and Organismal Biology

- a. Describe organelles and explain their function in the cell
- b. Relate the structure of organelles and cells to their functions
- c. Identify and contrast animal and plant cells
- d. Explain the conversion, flow, and storage of energy of the cell
- e. Identify the function and explain the importance of mitosis and meiosis as processes of cellular and organismal reproduction
- f. Compare single-celled and multicellular organisms, noting the role of cell differentiation in the development of multicellular organisms
- g. Describe the levels of organization (e.g., cells, tissues, organs, systems, organisms) in plants and animals
- h. Describe the structures and functions of human body systems, including, but not limited to, the skeletal, reproductive, nervous, and circulatory systems
- i. Explain the major structures and their functions in vascular and nonvascular plants
- j. Describe the life processes of various plant groups, including, but not limited to, reproduction, photosynthesis, respiration, and transpiration

- k. Explain the reproductive processes in flowering plants

(Science Content Standards for California Public Schools, Grade 3: 1b, 1c; Grade 5: 2a, 2e; Grade 7: 1a-f, 5a-g, 6d, 6h-j)

Domain 8. Waves

Candidates demonstrate an understanding of the foundations of waves as contained in the Science Content Standards for California Public Schools (1998) and outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of waves and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand that all waves have a common set of characteristic properties. They apply their knowledge of these properties to describe and predict the behavior of waves, including light waves, sound waves, and seismic waves. Candidates apply the simple principles of optics to explain how various lenses work.

8.1 Waves

- a. Compare the characteristics of sound, light, and seismic waves (e.g., transverse/longitudinal, travel through various media, relative speed)
- b. Explain that energy is transferred by waves without mass transfer and provide examples
- c. Explain how lenses are used in simple optical systems, including the camera, telescope, microscope, and the eye
- d. Explain and apply the laws of reflection and refraction
- e. Compare transmission, reflection, and absorption of light in matter

(Science Content Standards for California Public Schools, Grade 3: 1d, 2a-d, 4c; Grade 6: 3a; Grade 7: 6a, 6c-g; Grades 9-12, Physics: 4a-b, 4d, 4f)

Domain 9. Forces and Motion

Candidates demonstrate an understanding of the foundations of forces and motion as contained in the Science Content Standards for California Public Schools (1998) and outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of forces and motion and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates describe the motion of an object and understand the relationships among its velocity, speed, distance, time, and acceleration. They understand the relationship among force, mass, and acceleration. Candidates use Newton's laws to predict the motion of objects.

9.1 Forces and Motion

- a. Discuss and apply Newton's laws (i.e., first, second, third, and law of universal gravitation)
- b. Define pressure and relate it to fluid flow and buoyancy (e.g., heart valves, atmospheric pressure)

- c. Describe the relationships among position, distance, displacement, speed, velocity, acceleration, and time, and perform simple calculations using these variables for both linear and circular motion
- d. Identify the separate forces that act on a body (e.g., gravity, pressure, tension/compression, normal force, friction) and describe the net force on the body
- e. Construct and analyze simple vector and graphical representations of motion and forces (e.g., distance, speed, time)
- f. Identify fundamental forces, including gravity, nuclear forces, and electromagnetic forces (magnetic and electric), and explain their roles in nature, such as the role of gravity in maintaining the structure of the universe
- g. Explain and calculate mechanical advantages for levers, pulleys, and inclined planes

(Science Content Standards for California Public Schools, Grade 7: 6h-j; Grade 8: 1a-f, 2a-g)

Domain 10. Electricity and Magnetism

Candidates demonstrate an understanding of the foundations of the electricity and magnetism contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of electricity and magnetism and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand that electric and magnetic phenomena are related. They use knowledge of electricity and magnetism to explain many practical applications.

10.1 Electricity and Magnetism

- a. Describe and provide examples of electrostatic and magnetostatic phenomena
- b. Predict charges or poles based on attraction/repulsion observations
- c. Build a simple compass and use it to determine direction of magnetic fields, including the Earth's magnetic field
- d. Relate electric currents to magnetic fields and describe the application of these relationships, such as in electromagnets, electric current generators, motors, and transformers
- e. Design and interpret simple series and parallel circuits
- f. Define and calculate power, voltage differences, current, and resistance in simple circuits

(Science Content Standards for California Public Schools, Grade 4: 1a-g; Grade 9-12, Physics: 5a-c)

Domain 11. Heat Transfer and Thermodynamics

Candidates demonstrate an understanding of the foundations of heat transfer and thermodynamics as contained in the Science Content Standards for California Public Schools (1998) and outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of heat transfer and thermodynamics and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates explain how heat flows in a predictable manner. They understand that energy cannot be created or destroyed, although in many processes energy is transferred to the environment as heat. Candidates

apply their knowledge to explain how many phenomena on Earth's surface are affected by the transfer of energy through radiation and convection currents.

11.1 Heat Transfer and Thermodynamics

- a. Know the principle of conservation of energy and apply it to energy transfers
- b. Discuss how the transfer of energy as heat is related to changes in temperature
- c. Diagram the direction of heat flow in a system
- d. Describe the methods of heat transfer by conduction, convection, and radiation, and provide examples for each
- e. Explain how chemical energy in fuel is transformed to heat
- f. Design and explain experiments to induce a physical change such as freezing, melting, or boiling
- g. Distinguish between physical and chemical changes and provide examples of each

(Science Content Standards for California Public Schools, Grade 6: 3a-d, 4d; Grade 8: 3b, 3d-e, 5c-d; Grade 9-12, Physics: 3a-c, Chemistry: 7a-c)

Domain 12. Structure and Properties of Matter

Candidates demonstrate an understanding of the structure and properties of matter contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of matter and its underlying structures, candidates have a deep conceptual knowledge of the content area. Candidates know that more than 100 elements of matter exist, each with distinct properties and a distinct atomic structure. They describe both macroscopic and microscopic properties of matter including intermolecular and intramolecular forces. They know that the organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. Candidates understand how the periodic table is constructed and the periodic trends in chemical and physical properties that can be seen in the table. They recognize chemical reactions as processes that involve the rearrangement of electrons to break and form bonds with different atomic partners. Candidates demonstrate understanding of the principles of chemistry that underlie the functioning of biological systems.

12.1 Structure and Properties of Matter

- a. Identify, describe, and diagram the basic components within an atom (i.e., proton, neutron, and electron)
- b. Know that isotopes of any element have different numbers of neutrons but the same number of protons, and that some isotopes are radioactive
- c. Differentiate between atoms, molecules, elements, and compounds
- d. Compare and contrast states of matter and describe the role energy plays in the conversion from one state to another
- e. Discuss the physical properties of matter including structure, melting point, boiling point, hardness, density, and conductivity
- f. Recognize that all chemical substances are characterized by a unique set of physical properties
- g. Define and calculate density, and predict whether an object will sink or float in a fluid

- h. Explain that chemical changes in materials result in the formation of a new substance corresponding to the rearrangement of the atoms in molecules
- i. Explain and apply principles of conservation of matter to chemical reactions, including balancing chemical equations
- j. Distinguish among acidic, basic, and neutral solutions by their observable properties
- k. Describe the construction and organization of the periodic table
- l. Based on position in the periodic table, predict which elements have characteristics of metals, semi-metals, non-metals, and inert gases
- m. Explain chemical reactivity using position on the periodic table
- n. Predict and explain chemical bonding using elements' positions in the periodic table
- o. Recognize that inorganic and organic compounds (e.g., water, salt, carbohydrates, lipids, proteins, nucleic acids) are essential to processes within living systems
- p. Explain the central role of carbon in living system chemistry

(Science Content Standards for California Public Schools, Grade 8: 3a-c, 5a-e, 6a, 6c, 7a-c, 8a-d; Grades 9-12, Chemistry: 7b, 11c)

Biology/Life Science Subject Matter Requirements

Part I: Content Domains for Subject Matter Understanding and Skill in Biology/Life Science

Domain 1. Cell Biology and Physiology

Candidates demonstrate an understanding of the foundations of the cell biology and physiology contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of cell biology and physiology and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate an understanding of the fundamental life processes of plants and animals that depend on a variety of chemical reactions that occur in specialized areas of an organism's cells. They recognize the coordination of organ systems and the relationship of structure to function. They use this understanding to apply the concepts of homeostasis and its mechanisms to the regulation of human body systems.

1.1 Prokaryotic and Eukaryotic Cells

- a. Compare prokaryotic cells, eukaryotic cells, and viruses in terms of complexity, general structure, differentiation, and their requirements for growth and replication

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 1c, 1d)

1.2 Cellular Reproduction

- a. Describe the stages of the cell cycle
- b. Diagram and describe the stages of the mitotic process

(Science Content Standards for California Public Schools, Grades 7: 1e)

1.3 Plant and Animal Cell Anatomy and Physiology

- a. Diagram the structure of the cell membrane and relate the structure to its function
- b. Explain methods of transport across the membrane (e.g., diffusion, active transport, endocytosis and exocytosis)
- c. Explain the role of semipermeable membranes in cellular communication
- d. Explain the role of the endoplasmic reticulum and Golgi apparatus in the secretion of proteins
- e. Explain the role of chloroplasts in obtaining and storing usable energy
- f. Explain the role of mitochondria in cellular respiration
- g. Explain the role of enzymes in chemical reactions and describe an experiment to test the catalytic role of enzymes and factors that affect enzyme activity (e.g., levels of protein organization, temperature, ionic conditions, concentration of enzyme and substrate, pH)
- h. Explain anabolic and catabolic pathways involved in the metabolism of macromolecules (e.g., polysaccharides, nucleic acids, proteins, lipids)

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 1a-b, 1d-j)

1.4 Integration and Control of Human Organ Systems

- a. Relate the complementary activity of major body systems (e.g., circulatory, digestive, respiratory, excretory) to provide cells with oxygen and nutrients and remove waste products
- b. Explain and analyze the role of the nervous system in mediating communication between different parts of the body and the body's interactions with the environment
- c. Explain the homeostatic role of the major organs (e.g., kidneys, heart, brain)
- d. Explain the function of feedback loops in the nervous and endocrine systems to regulate conditions in the body and predict the effects of disturbances on these systems
- e. Explain the role of hormones (e.g., digestive, reproductive, osmoregulatory) in providing internal feedback mechanisms for homeostasis at the cellular level and in whole organisms
- f. Describe the role of the musculo-skeletal system in providing structure, support, and locomotion to the human organism

(Science Content Standards for California Public Schools, Grade 7: 5a-b; Grades 9-12, Biology/Life Sciences: 9a-i)

1.5 Physiology of the Immune System

- a. Explain the humoral response to infection
- b. Compare cell mediated and humoral responses to infection
- c. Explain how vaccination works and distinguish among variables affecting success rate
- d. Predict the consequences of a compromised immune system [e.g., AIDS (Acquired Immune Deficiency Syndrome)]

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 10b-f)

Domain 2. Genetics

Candidates demonstrate an understanding of the foundations of the genetics contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of genetics and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate understanding of the structure and function of genetic material. They understand the genetic coding of DNA (deoxyribonucleic acid) and how this coding specifies the sequence of amino acids in proteins characteristic of the organism. Candidates know that a multicellular organism develops from a single zygote, and its phenotype depends on its genotype, which is established at fertilization. They understand the roles of mutation and sexual reproduction in genetic variation within populations. They know how new biotechnology methods incorporate exogenous DNA into cells to alter their genetic composition, and the resulting ethical implications of using such methods. Candidates also understand the relationship of genetics to evolution and how the frequency of an allele in a gene pool of a population depends on many factors and may be stable or unstable over time.

2.1 Chromosome Structure and Function

- a. Relate the structure and function of DNA, RNA (ribonucleic acid), and proteins to the concept of variation in organisms

- b. Describe chromosome structure as a sequence of genes each with a specific locus

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 1d, 3d, 4a-c, 4e, 5a-b)

2.2 Patterns of Inheritance

- a. Explain the necessity of both meiosis and fertilization in promoting variation
- b. Describe the role of chromosomes in determining phenotypes (e.g., sex determination, chromosomal aberrations)
- c. Predict the probable outcome of phenotypes in a genetic cross from the genotypes of the parents and mode of inheritance (e.g., autosomal or X-linked, dominant or recessive, co-dominance)
- d. Explain the genetic and cellular bases for Mendel's laws of dominance, segregation and independent assortment

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 2a-g, 3b-c, 8a)

2.3 Gene Expression

- a. Explain how random chromosome segregation explains the probability that a particular allele will be in a gamete
- b. Recognize that specialization of cells in multicellular organisms is usually due to different patterns of gene expression rather than to differences among the genes themselves
- c. Describe how alleles that are lethal in a homozygous individual may be carried in a heterozygote and thus maintained in a gene pool
- d. Distinguish when and why mutations in the DNA sequence of a gene may or may not affect the expression of the gene or the sequence of amino acids in an encoded protein

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 3a, 4c-d, 7b-c)

2.4 Biotechnology

- a. Recognize how genetic engineering (biotechnology) produces biomedical and agricultural products
- b. Describe the construction of recombinant DNA molecules by basic DNA technology including restriction digestion by endonucleases, gel electrophoresis, ligation, and transformation

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 5c-e)

2.5 Bioethics

- a. Discuss issues of bioethics including genetic engineering, cloning, the human genome project, gene therapy, and medical implications

(Science Content Standards for California Public Schools, Grades 9-12, Investigation and Experimentation: 1m)

Domain 3. Evolution

Candidates demonstrate an understanding of the foundations of the evolution contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of evolution and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates explain that evolution is the result of genetic changes that occur in constantly changing environments. They know that the frequency of an allele in a gene pool of a population depends on many factors and may be stable or unstable over time. Based on available evidence, they relate evolutionary theory to the history of life on Earth.

3.1 Natural Selection

- a. Explain why natural selection acts on the phenotype rather than the genotype of an organism
- b. Predict the survival potential of various groups of organisms based on the amount of diversity in their gene pools

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 7a-d)

3.2 Evolutionary Patterns

- a. Analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction
- b. Analyze the effects of evolutionary patterns on the diversity of organisms (e.g., genetic drift, convergent evolution, punctuated equilibrium, patterns of selection)
- c. Explain the conditions for Hardy-Weinberg equilibrium and why they are unlikely to appear in nature, and solve equations to predict the frequency of genotypes in a population

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 7e-f, 8b-c, 8e)

3.3 Mechanisms for Speciation

- a. Distinguish between the accommodation of an individual organism to its environment and the gradual adaptation of a lineage of organisms through genetic change
- b. Describe a scenario that demonstrates the effects of reproductive or geographic isolation on speciation

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6g, 8d)

3.4 History and Origin of Life

- a. Explain the theoretical origins of life on Earth
- b. Construct a branching diagram (cladogram) from a variety of data sources illustrating the phylogeny between organisms of currently identified taxonomic groups

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 8f-g)

Domain 4. Ecology

Candidates demonstrate an understanding of the foundations of the evolution contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of evolution and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate understanding that stability in an ecosystem is a balance among competing effects. They understand the interrelationships within ecosystems, the flow of matter and energy through ecosystems, and how humans impact the environment.

4.1 Biodiversity

- a. Define biodiversity and describe the effects on biodiversity of alteration of habitat

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6a-b)

4.2 Energy Flow and Nutrient Cycles

- a. Evaluate the importance of stability of producers, consumers, and decomposers

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6e-f)

4.3 Interrelationships and Change in Ecosystems

- a. Describe various species interactions (e.g., predator/prey, parasitism, mutualism, commensalism, competition)
- b. Analyze the fluctuations in population size in an ecosystem due to the relative rates of birth, immigration, emigration, and death
- c. Analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, and changes in population size

(Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6b-c)

Chemistry Subject Matter Requirements

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

Domain 1. Atomic and Molecular Structure

Candidates demonstrate an understanding of atomic and molecular structure as contained in the Science Content Standards for California Public Schools (1998) and outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of atomic and molecular structure, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate understanding of how periodicity of physical and chemical properties of the elements relates to atomic structure. They base this on a demonstrated understanding of current models of atomic, molecular, and subatomic structure.

1.1 Periodic Table and Periodicity

- a. Differentiate periodic groups and families of elements and their properties
- b. Relate valence electrons and the electron shell structure (s, p, d, f orbitals) to an element's position in the periodic table
- c. Predict periodic trends including electronegativity, ionization energy, and the relative sizes of ions and atoms

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: 1c-d, 1f-g)

1.2 Atomic Structure

- a. Analyze the evolution of the atomic model (including, but not limited to, the historical importance of the Bohr model and the development of the quantum structure of the atom)
- b. Relate atomic spectroscopy and the photoelectric effect to the quantum structure of the atom
- c. Illustrate the position and describe the properties of quarks, protons, neutrons, and electrons within atoms

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: h-j, 11g)

1.3 Molecular Structure and Chemical Bonds

- a. Compare types of molecular bonds including ionic, covalent and hydrogen bonds
- b. Draw Lewis dot structures for compounds and ions
- c. Predict molecular geometries using Lewis dot structures and hybridized atomic orbitals, e.g., valence shell electron pair repulsion model (VSEPR)
- d. Relate intermolecular electrostatic forces, including Van der Waals, polar and induced polar, and ionic, to their expected states of matter and their characteristic physical properties

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: 2a-h)

Domain 2. Chemical Reactions

Candidates demonstrate an understanding of the foundations of chemical reactions as contained in the Science Content Standards for California Public Schools (1998) and outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of chemical reactions and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate an understanding of the principles that underlie the conditions governing chemical reactions. They apply the principle of conservation of matter and are able to quantify the mass of products and reactants. Candidates understand that chemical reaction rates depend on factors that affect the frequency of collisions and reactivities of reactant molecules. They explain and predict the behavior of chemical systems by applying the principle of chemical equilibrium as a dynamic process at the molecular level.

2.1 Conservation of Matter and Stoichiometry

- a. Calculate molar mass, mass, number of particles, and volume, at standard temperature and pressure (STP) for elements and compounds
- b. Calculate the masses of reactants and products, and percent yield using balanced chemical equations, including problems with a limiting reagent
- c. Distinguish reaction types, including single replacement, double replacement, synthesis, decomposition, and combustion
- d. Utilize the rules of oxidation states to balance oxidation-reduction reactions

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: 3a-g)

2.2 Reaction Rates and Chemical Equilibrium

- a. Predict the effect of temperature, pressure, and concentration on chemical equilibrium (LeChatelier's principle) and the reaction rate
- b. Interpret a diagram showing activation energy along the reaction pathway
- c. Identify and predict the role of catalysts on the reaction rate
- d. Write and calculate an equilibrium constant expression for a given reaction
- e. Know that equilibrium is established when the reaction rates of the forward and reverse reactions are equal

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: 8a-d, 9a-c)

Domain 3. Kinetic Molecular Theory

Candidates demonstrate an understanding of the foundations of the kinetic molecular theory contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of kinetic molecular theory and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand kinetic molecular theory and use it to generate a description of the motion of atoms and molecules. They use kinetic molecular theory to explain and predict the properties and behaviors of gases.

3.1 Gases and Their Properties

- a. Solve problems using the ideal gas law and use the ideal gas law to predict pressure-volume, pressure-temperature, and volume-temperature relationships

- b. Relate pressure, volume, and temperature to the kinetic theory of atoms and molecules in gases
- c. Know and use STP to solve gas law problems
- d. Convert between Kelvin and Celsius temperature scales
- e. Recognize the significance of absolute zero
- f. Solve problems using Dalton's law of partial pressures and Graham's Laws of diffusion

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: 4a-i)

Domain 4. Solution Chemistry

Candidates demonstrate an understanding of the foundations of the solution chemistry contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of solution chemistry and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates predict and explain the properties and behaviors of acids, bases, and salts in solution. They explain the properties of various solutions.

4.1 Solutions

- a. Recognize and identify solutes and solvents
- b. Calculate concentration in terms of molarity, parts per million, and percent composition
- c. Describe the dissolving process at the molecular level
- d. Explain how factors such as temperature, pressure, and surface area affect the dissolving process
- e. Describe various methods for separation of solutions (e.g., chromatography, distillation)

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: 6a-d, 6f)

4.2 Acids and Bases

- a. Distinguish between strong and weak acids and bases based on degree of dissociation and their chemical properties
- b. Calculate pH and hydrogen ion concentration in solutions including buffer solutions
- c. Use Arrhenius, Brønsted-Lowry, and Lewis acid-base definitions appropriately to characterize acids and bases and in acid-base reactions

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: 5a-g)

Domain 5. Chemical Thermodynamics

Candidates demonstrate an understanding of the foundations of the chemical thermodynamics contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of chemical thermodynamics and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate by solving problems an understanding that energy is exchanged or transformed in all chemical reactions and physical changes of matter. They apply the concepts of thermodynamic

properties of materials such as specific heat, heats of fusion, heats of vaporization, and heat of reaction (enthalpy).

5.1 Chemical Thermodynamics

- Perform calculations using specific heat, heats of fusion, heats of vaporization, and heat of reaction (enthalpy)
- Interpret phase diagrams

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: 7b, 7e)

Domain 6. Organic Chemistry and Biochemistry

Candidates demonstrate an understanding of the foundations of the organic chemistry and biochemistry contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of organic chemistry and biochemistry and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate understanding that the bonding characteristics of carbon allow the formation of many different organic molecules of varied sizes, shapes, and chemical properties, and provide the biochemical basis of life.

6.1 Organic Chemistry and Biochemistry

- Explain the bonding characteristics of carbon
- Recognize the chemical structure of various organic functional groups (i.e., alcohols, ketones, ethers, amines, esters, aldehydes, and organic acids) and provide examples of reactions involving these groups
- Inventory the ten simplest hydrocarbons that contain single bonds, multiple bonds, and benzene rings
- Understand the differences in structures and properties between amino acids and their polymers and between sugars and their polymers

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: 10b-f)

Domain 7. Nuclear Processes

Candidates demonstrate an understanding of the foundations of the nuclear processes contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of nuclear processes and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates explain nuclear processes including the radioactive decay of naturally occurring and human-made isotopes, nuclear fission, and nuclear fusion (e.g., stellar nucleosynthesis and synthesis of transuranium elements). They apply understanding of these processes to discuss the benefits and hazards of the use of radiation and radioactivity.

7.1 Nuclear Processes

- Understand how mass-energy relationships in nuclear reactions and radioactive decay requires the relationship $E=mc^2$

- b. Compare and contrast alpha, beta, and gamma decay, and the relative kinds of damage to matter caused by α -, β -, and γ - rays
- c. Perform calculations involving half-life
- d. Contrast the benefits and hazards of the use of radiation and radioactivity

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: 11b, 11d-f; Investigation and Experimentation: 1m)

Earth and Planetary Science Subject Matter Requirements

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

Domain 1. Earth's Place in the Universe

Candidates demonstrate an understanding of Earth's place in the universe as contained in the Science Content Standards for California Public Schools (1998) and outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of the solar system and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand how Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time, and how astronomy and planetary exploration reveal the solar system's structure, scale, and change over time. They base this understanding on their knowledge of the characteristics and properties of phenomena such as galaxies, stars, and bodies of the solar system.

1.1 Galaxies and Stars

- a. Identify and describe characteristics of galaxies
- b. Explain the evidence for the "big bang" model
- c. Know that the Sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium
- d. Describe the process of the nuclear synthesis of chemical elements and how accelerators simulate the conditions for nuclear synthesis (i.e., in stars and in the early universe)
- e. Compare the use of visual, radio, and X-ray telescopes to collect data that reveal that stars differ in their life cycles
- f. Describe, in terms of color and brightness, how the evolution of a star is determined by a balance between gravitational collapse and nuclear fusion

(Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 1e, 2b-g)

1.2 Solar Systems

- a. Explain how the solar system was formed, including differences and similarities among the sun, terrestrial planets, and the gas planets, and cite the evidence from Earth and moon rocks that indicate that the solar system was formed approximately 4.6 billion years ago
- b. Know the current evidence for the existence of planets orbiting other stars
- c. Describe changes in the solar system over time

(Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 1a, 1b, 1g)

1.3 Planets and Satellites

- a. Cite various forms of evidence that indicate the proximity of the planets in the solar system in relation to Earth and the stars
- b. Cite various forms of evidence that Earth and other planets change over time

- c. Describe the influence of collisional processes on early Earth and other planetary bodies in terms of shaping planetary surfaces and affecting life on Earth

(Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 1c, 1d, 1f)

Domain 2. Planet Earth

Candidates demonstrate an understanding of the foundations of Earth contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of Earth and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate an understanding of the dynamic processes of the solid Earth, oceans, and the atmosphere. Candidates understand how plate tectonics operating over geologic time have changed the patterns of land, sea, and mountains on Earth's surface. Candidates also understand the dynamic processes that operate in and among the atmosphere, oceans and other water bodies, and the biosphere. They understand how life has changed Earth's atmosphere, and how changes in the atmosphere affect conditions for life. Candidates apply their knowledge of dynamic Earth processes to make predictions and form conclusions about surface phenomena such as earthquakes.

2.1 Tectonic Processes

- a. Diagram the major divisions of the geologic time scale as a basis for understanding changes in the Earth's processes
- b. Describe how earthquake intensity, magnitude, epicenter, focal mechanism, and distance are determined from a seismogram
- c. Compare major types of volcanoes in terms of shape and chemical and rock composition
- d. Describe the location and characteristics of volcanoes that are due to hot spots and those due to subduction
- e. Relate geologic structures to tectonic settings and forces
- f. Describe the evidence for plate tectonics on the sea floor and on land

(Science Content Standards for California Public Schools, Grade 7: 3c, 4b, 4d, 4g; Grades 9-12, Earth Sciences: 1c, 3a-b, 3d-f)

2.2 Oceans

- a. Describe the chemical and physical properties of sea water
- b. Describe the mechanisms that cause wave action and tides
- c. Explain the layered structure of the oceans, including the generation of horizontal and vertical ocean currents and the geographic distribution of marine organisms, and how properties of ocean water, such as temperature and salinity, are related to these phenomena

(Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 5d)

2.3 Atmosphere

- a. Compare the layers of the atmosphere in terms of chemical composition and thermal structure

- b. Discuss the evolution of Earth’s atmosphere over geologic time, including the effects of outgassing, the variations of carbon dioxide concentration, and the origin of atmospheric oxygen
- c. Know the location of the ozone layer in the upper atmosphere, explain its role in absorbing ultraviolet radiation, and explain the way in which this layer varies both naturally and in response to human activities
- d. Identify the bands at specific latitudes where rainforests and deserts are distributed and the causes of this pattern

(Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 5e-f, 8a-c)

Domain 3. Energy in the Earth System

Candidates demonstrate an understanding of energy in the Earth system contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of energy in the Earth system and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand how energy enters, flows through, and leaves the Earth system, and the relationship between energy transfer and the dynamic processes of the Earth system. They base this on knowledge of how energy enters the Earth system primarily as solar radiation and eventually escapes as heat, and how heating of Earth’s surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents. Candidates apply their knowledge of dynamic Earth processes to make predictions and form conclusions about surface phenomena such as climate.

3.1 Earth’s Energy Budget: Inflow and Outflow

- a. Compare the amount of incoming solar energy, the Earth’s internal energy, the energy used by society, and the energy reflected back to space
- b. Describe what happens to incoming solar radiation as it relates to reflection, absorption, and photosynthesis
- c. Explain the mechanism and evaluate the significance of the greenhouse effect
- d. Differentiate among greenhouse conditions on Earth, Mars, and Venus; the origins of those conditions; and the climatic consequences of each

(Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 4a-d, 6a)

3.2 Circulation in the Oceans and Atmosphere

- a. Assess the differential effects of heating on circulation patterns in the atmosphere and oceans
- b. Relate the rotation of Earth to the circular motions of ocean currents and air in low- and high-pressure centers
- c. Compare the causes and structures of various cloud types, precipitation, air masses, and fronts, and the causes and effects of different types of severe weather

- d. Know and explain features of the ENSO cycle (El Niño southern oscillation, including La Niña) in terms of sea-surface and air temperature variations across the Pacific, and climatic results of this cycle

(Science Content Standards for California Public Schools, Grade 5: 3b-c, 4c; Grades 9-12, Earth Sciences: 5a-b, 5g)

3.3 Climate Variations in Time and Space

- a. Analyze weather (short-term) and climate (over time) in relation to the transfer of energy into and out of the atmosphere
- b. Discuss and assess factors that affect climate including latitude, elevation, topography, and proximity to large bodies of water and cold or warm ocean currents

(Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 5e, 6a, 6b)

Domain 4. Biogeochemical Cycles

Candidates demonstrate an understanding of the foundations of the biogeochemical cycles contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of biogeochemical cycles and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate an understanding of how each element on Earth moves among reservoirs, which exist in the solid earth, in oceans, in the atmosphere, and within and among organisms as part of biogeochemical cycles. Candidates understand how the movement of matter among reservoirs is driven by Earth's internal and external sources of energy.

4.1 Rock Cycle

- a. Compare and contrast the properties of rocks based on physical and chemical conditions in which rocks are formed, including plate tectonic processes
- b. Identify common rock-forming minerals (e.g., feldspars, quartz, biotite, calcite) using a table of diagnostic properties
- c. Identify common ore minerals as sources of copper, iron, lead, zinc, cement, halite, gypsum, and uranium

(Science Content Standards for California Public Schools, Grade 4: 4b, 6c; Grades 9-12, Earth Sciences: 3c)

4.2 Water, Carbon, and Nitrogen Cycles

- a. Illustrate the mechanism that drives the water cycle
- b. Compare the processes of photosynthesis and respiration in terms of reservoirs of carbon and oxygen
- c. Identify the carbon reservoirs (i.e., physical and chemical forms of carbon in the atmosphere, oceans, biomass, soils, fossil fuels, and solid earth) and describe the movement of carbon among these reservoirs in the global carbon cycle

- d. Describe the nitrogen cycle as it relates to the atmosphere, soils as reservoirs, life processes, and pollution

(Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 7a-d)

Domain 5. California Geology

Candidates demonstrate an understanding of the foundations of the California geology contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of California geology and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand that the geology of California underlies the state's scenic diversity and wealth of natural resources as well as its natural hazards. Candidates are familiar with the geology of California, and are aware of the unique opportunities for field experiences in the state. Candidates describe activities using geologic maps that illustrate processes, location, and scale of phenomena. Candidates also describe field experiences that include the basic elements of geologic mapping to record and interpret the history of geological processes portrayed in California.

5.1 Tectonic Evolution

- a. Interpret geologic maps as a basis for understanding the tectonic evolution of California in terms of plate margins (i.e., Atlantic-type passive margin, Japanese volcanic arc, Andean arc, and faulted margin)

(Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 9d, Investigation and Experimentation: 1h)

5.2 Major Economic Earth Resources

- a. Understand the importance of water to society, the origins of California's fresh water, statewide water distribution, and the environmental and economic impact of water redistribution
- b. Describe resources of major economic importance in California and their relation to California's geology (e.g., oil, gas, gold, sand, gravel, salts, open space, soil, arable land, clean air)

(Science Content Standards for California Public Schools, Grade 6: 6b; Grades 9-12, Earth Sciences: 9a, 9c)

5.3 Surface Processes

- a. Assess mechanisms by which tectonics, geologic structures (i.e., folds and faults), and rock properties influence surface properties (e.g., flow of water, differential erosion, uplift, subsidence)
- b. Discuss the factors controlling the influence of water in modifying the landscape
- c. Interpret the factors controlling erosion, deposition, and transport in surficial processes
- d. Appraise desert environments in terms of water resource needs for habitation

(Science Content Standards for California Public Schools, Grade 4: 5b-c; Grade 6: 2a-c)

5.4 Natural Hazards

- a. Analyze published geologic hazard maps of California and know how to use maps to identify evidence of geologic events of the past and to predict the likelihood of geologic changes in the future

(Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 9b, 9d, Investigation and Experimentation: 1h)

5.5 Geologic Mapping

- a. Know how to find position using a topographic map
- b. Know how to make a geologic map showing faults, structural data, and contacts between formations
- c. Know how to interpret geologic history and processes from a geologic map

(Science Content Standards for California Public Schools, Grade 6: 7f; Grades 9-12: Earth Sciences, 9d; Investigation and Experimentation; 1h)

Physics Subject Matter Requirements

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

Domain 1. Motion and Forces

Candidates demonstrate an understanding of the foundations of motion and forces as contained in the Science Content Standards for California Public Schools (1998) and outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of motion and forces and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate an understanding of motion and the relationship of force to motion. Candidates use analytical, numerical, and graphical methods in problem-solving.

1.1 Motion and Forces

- a. Solve problems using Newton's Second Law (e.g., problems involving time, velocity, and space-dependent forces)
- b. Construct appropriate free-body diagrams of many-body problems (e.g., two or more coupled masses)
- c. Solve periodic motion problems
- d. Solve 2-dimensional problems involving vector analysis of motion and forces, including projectile motion, uniform circular motion, and statics
- e. Generate and understand functional relationships of graphs showing distance, velocity, and acceleration versus time
- f. Recognize relationships among variables for linear motion and rotational motion
- g. Solve problems involving linear and rotational motion in term of forces and torques

(Science Content Standards for California Public Schools, Grades 9-12, Physics: 1a-m)

Domain 2. Conservation of Energy and Momentum

Candidates demonstrate an understanding of the conservation of energy and momentum contained in the Science Content Standards for California Public Schools (1998) and outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of conservation of energy and momentum and of their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate an understanding of the principles of conservation of energy and momentum. They apply this understanding to predict and describe the movement of objects.

2.1 Conservation of Energy and Momentum

- a. Use conservation of energy to characterize kinetic-potential energy systems such as oscillating systems (pendula and springs), projectile motion, and roller coasters
- b. Analyze elastic and inelastic collisions and solve for unknown values
- c. Solve problems involving linear and rotational motion in terms of conservation of momentum and energy
- d. Recognize relationships between energy/momentum conservation principles and Newton's Laws

- e. Examine the impact of friction on conservation principles
- f. Interpret force-versus-time and force-versus-distance graphs to find, for example, work done or impulse on a system

(Science Content Standards for California Public Schools, Grades 9-12, Physics: 2a-h)

Domain 3. Heat and Thermodynamics

Candidates demonstrate an understanding of the foundations of heat and thermodynamics as contained in the Science Content Standards for California Public Schools (1998) and outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of heat and thermodynamics and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates demonstrate understanding of the laws of thermodynamics and the thermodynamic properties of materials.

3.1 Heat and Thermodynamics

- a. Solve problems involving the laws of thermodynamics using the relationships among work, heat flow, energy, and entropy
- b. Define and correctly apply thermodynamic properties of materials such as specific heat (heat capacity), heats of fusion, heat of vaporization, thermal conductivity, and thermal expansion to solve problems
- c. Solve problems for ideal gas systems
- d. Solve problems involving cyclic processes, including calculations of work done, heat gain/loss, , and entropy change
- e. Interpret graphs showing phase changes and graphs of cyclic processes
- f. Describe a plasma, state its characteristic properties, and contrast it with an ideal gas

(Science Content Standards for California Public Schools, Grades 9-12, Physics: 3a-g)

Domain 4. Waves

Candidates demonstrate an understanding of the foundations of waves as contained in the Science Content Standards for California Public Schools (1998) and outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of waves and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates can describe waves and their characteristic properties and understand that these properties do not depend on the type of wave. They use their knowledge of waves and wave properties to predict wave behavior under various conditions. Candidates are familiar with the electromagnetic spectrum.

4.1 Waves and Their Characteristic Properties

- a. Relate wave propagation to properties of materials (e.g., predict wave speed from density and tension)
- b. Describe, distinguish, and solve both conceptual and numerical problems involving interference, diffraction, refraction, reflection, Doppler effect, polarization, dispersion, and scattering

(Science Content Standards for California Public Schools, Grades 9-12, Physics: 4a-f)

Domain 5. Electromagnetism

Candidates demonstrate an understanding of the foundations of electromagnetism contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of electromagnetism and its underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates understand the relationship between electric and magnetic phenomena and can apply their knowledge to real-life examples. They can solve calculus-based problems using the quantitative and vector relationships among charges, currents, forces, and fields.

5.1 Electric and Magnetic Phenomena

- a. Analyze electric and magnetic forces, charges, and fields using Coulomb's law, the Lorentz force, and the right-hand rule
- b. Apply energy principles to analyze problems in electricity, magnetism, and circuit theory involving capacitors, resistors, and inductors
- c. Calculate power, voltage changes, current, and resistance in multiloop circuits involving capacitors, resistors, and inductors
- d. Interpret and design mixed series and parallel circuits involving capacitors, resistors, and inductors
- e. Solve problems involving the relationships between electric and magnetic phenomena
- f. Explain properties of transistors, diodes, and semiconductors

(Science Content Standards for California Public Schools, Grades 9-12, Physics: 5a-o)

Domain 6. Quantum Mechanics and the Standard Model of Particles

Candidates demonstrate an understanding of the foundations of quantum mechanics and the standard model of particles contained in the Science Content Standards for California Public Schools (1998) as outlined in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2002) from an advanced standpoint. To ensure a rigorous view of quantum mechanics and the standard model of particles and their underlying structures, candidates have a deep conceptual knowledge of the subject matter. Candidates are familiar with the standard model of particles and the four fundamental forces of nature. They recognize the assumptions and principles of early quantum mechanics.

6.1 Quantum Mechanics and the Standard Model

- a. Distinguish the four fundamental forces of nature, describe their ranges, and identify their force carriers
- b. Evaluate the assumptions and relevance of the Bohr model of the atom

(Science Content Standards for California Public Schools, Grades 9-12, Chemistry: 1i)

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

Domain 1. Investigation and Experimentation

Candidates for Single Subject Teaching Credentials in Science formulate and conduct scientific investigations. They select appropriate scientific tools, make relevant measurements of changes in natural phenomena, and present unbiased findings in logical and meaningful formats using charts, maps, tables, models, graphs, and labeled diagrams. Candidates apply mathematics to scientific investigations and experimentation(s) for the purpose of quantifying results and drawing conclusions. Candidates interpret experimental results and determine whether further information is necessary to formulate accurate conclusions. They communicate results through various methods, and use technology where appropriate.

1.1 Question Formulation

- a. Formulate and evaluate a viable hypothesis
- b. Recognize the value and role of observation prior to question formulation
- c. Recognize the iterative nature of questioning
- d. Given an experimental design, identify possible hypotheses that it may test

(Science Content Standards for California Public Schools, Grade 6: 7a)

1.2 Planning a Scientific Investigation (including Experimental Design)

- a. Given a hypothesis, formulate an investigation or experimental design to test that hypothesis
- b. Evaluate an experimental design for its suitability to test a given hypothesis
- c. Distinguish between variable and controlled parameters

(Science Content Standards for California Public Schools, Grade 5: 6c-d; Grade 8: 9a, 9c)

1.3 Observation and Data Collection

- a. Identify changes in natural phenomena over time without manipulating the phenomena (e.g., a tree limb, a grove of trees, a stream, a hill slope)
- b. Analyze the locations, sequences, and time intervals that are characteristic of natural phenomena (e.g., locations of planets over time, succession of species in an ecosystem)
- c. Select and use appropriate tools and technology (e.g., computer-linked probes, spreadsheets, graphing calculators) to perform tests, collect data, analyze relationships, and display data
- d. Evaluate the precision, accuracy, and reproducibility of data
- e. Identify and analyze possible reasons for inconsistent results, such as sources of error or uncontrolled conditions
- f. Identify and communicate sources of unavoidable experimental error
- g. Recognize the issues of statistical variability and explain the need for controlled tests
- h. Know and evaluate the safety issues when designing an experiment and implement appropriate solutions to safety problems
- i. Appropriately employ a variety of print and electronic resources (e.g., the World Wide Web) to collect information and evidence as part of a research project

- j. Assess the accuracy validity and reliability of information gathered from a variety of sources

(Science Content Standards for California Public Schools, Grade 3: 5a; Grade 6: 7a-b, 7g-h; Grade 7: 7a-b; Grade 8: 9b; Grades 9-12, Investigation and Experimentation: 1a-c, 1i-j, 1m)

1.4 Data Analysis/Graphing

- a. Construct appropriate graphs from data and develop qualitative and quantitative statements about relationships between variables
- b. Recognize the slope of the linear graph as the constant in the relationship $y=kx$ and apply this principle in interpreting graphs constructed from data
- c. Apply simple mathematical relationships to determine a missing quantity in an algebraic expression, given the two remaining terms (e.g., speed = distance/time, density = mass/volume, force = pressure x area, volume = area x height)
- d. Determine whether a relationship on a given graph is linear or non-linear and determine the appropriateness of extrapolating the data
- e. Solve scientific problems by using quadratic equations and simple trigonometric, exponential, and logarithmic functions

(Science Content Standards for California Public Schools, Grade 6: 7c; Grade 8: 9d-g; Grades 9-12, Investigation and Experimentation: 1e)

1.5 Drawing Conclusions and Communicating Explanations

- a. Draw appropriate and logical conclusions from data
- b. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence
- c. Communicate the steps and results of an investigation in written reports and oral presentations
- d. Recognize whether evidence is consistent with a proposed explanation
- e. Construct appropriate visual representations of scientific phenomenon and processes (e.g., motion of Earth's plates, cell structure)
- f. Read topographic and geologic maps for evidence provided on the maps and construct and interpret a simple scale map

(Science Content Standards for California Public Schools, Grade 5: 6g; Grade 6: 7e-f; Grade 7: 7c-e; Grade 8: 9a; Grades 9-12, Investigation and Experimentation: 1d, 1h)

Domain 2. Nature of Science

Candidates recognize that science is an active endeavor in which acquisition of knowledge is based upon the collection and examination of data. Candidates understand that scientists have a responsibility to report fully and openly the methods and results of their observations and experiments, even if those results disagree with their favored hypotheses or are controversial in public opinion. They understand that to hide data, arbitrarily eliminate data, or conceal how an experiment was conducted is to invite errors, make those errors difficult to discover, and risk harm to colleagues and communities. They understand that scientists carefully consider questions and challenges raised by fellow scientists about the assumptions, procedures, and accuracy of their experiments. They understand that a fundamental aspect of scientific inquiry is that it is dynamic and self-correcting by

design. Conclusions, hypotheses, and theories are tested in every experiment and revised or rejected when they no longer correctly or accurately predict experimental results. Candidates understand that scientists must consider the safety, ethical concerns, risks, and costs and benefits of experiments to society.

2.1 Scientific Inquiry

- a. Distinguish among the terms hypothesis, theory, and prediction as used in scientific investigations
- b. Evaluate the usefulness, limitations, and interdisciplinary and cumulative nature of scientific evidence as it relates to the development of models and theories as representations of reality
- c. Recognize that when observations do not agree with an accepted scientific theory, either the observations are mistaken or fraudulent, or the accepted theory is erroneous or incorrect
- d. Understand that reproducibility of data is critical to the scientific endeavor
- e. Recognize that science is a self-correcting process that eventually identifies misconceptions and experimental biases
- h. Recognize that an inquiring mind is at the heart of the scientific method and that doing science involves thinking critically about the evidence presented, the usefulness of models, and the limitations of theories
- i. Recognize that theories are judged by how well they explain observations and predict results and that when they represent new ideas that are counter to mainstream ideas they often encounter vigorous criticism
- j. Recognize that when observations, data, or experimental results do not agree, the unexpected results are not necessarily mistakes; to discard the unusual in order to reach the expected is to guarantee that nothing but what is expected will ever be seen
- k. Know why curiosity, honesty, openness, and skepticism are so highly regarded in science and how they are incorporated into the way science is carried out

(Science Content Standards for California Public Schools, Grade 6: 7e; Grades 9-12, Investigation and Experimentation: 1f-g, 1n)

2.2 Scientific Ethics

- a. Understand that honesty is at the core of scientific ethics; first and foremost is the honest and accurate reporting of procedures used and data collected
- b. Know that all scientists are obligated to evaluate the safety of an investigation and ensure the safety of those performing the experiment
- c. Know the procedures for respectful treatment of all living organisms in experimentation and other investigations

2.3 Historical Perspectives

- a. Discuss the cumulative nature of scientific evidence as it relates to the development of models and theories
- b. Recognize that as knowledge in science evolves, when observations do not support an accepted scientific theory, the observations are reconsidered to determine if they are mistaken or fraudulent, or if the accepted theory is erroneous or incomplete (e.g., an erroneous theory is the Piltdown Man fossil; an incomplete theory is Newton's laws of gravity)

- c. Recognize and provide specific examples that scientific advances sometimes result in profound paradigm shifts in scientific theories
- d. Discuss the need for clear and understandable communication of scientific endeavors so that they may be reproduced and why reproduction of these endeavors is important

(Science Content Standards for California Public Schools, Grade 6: 7d; Grade 7: 7c, 7e; Grades 9-12, Investigation and Experimentation: 1k, 1n)

Domain 3. Science and Society

Candidates understand that science relies on basic human qualities such as reasoning, insight, curiosity, skill, and creativity – as well as on scientific habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. Candidates recognize their responsibility to increase scientific literacy so that the general population can understand current issues and appreciate their personal roles and responsibilities. Candidates know about possible hazards and take precautions that are the basis for creating a safe learning environment that benefits all students. They are familiar with established rules and guidelines that intend to ensure the safety of students and to protect the subjects and environments studied. Candidates understand that technology is the application of proven scientific knowledge for practical purposes serving human needs; however, science and technology are interrelated—one often propels the other.

3.1 Science Literacy

- a. Recognize that science attempts to make sense of how the natural and the designed world function
- b. Demonstrate the ability to apply critical and independent thinking to weigh alternative explanations of events
- c. Apply evidence, numbers, patterns, and logical arguments to solve problems
- d. Understand that, although much has been learned about the objects, events and phenomena in nature, there are many unanswered questions, i.e., science is a work in progress
- e. Know that the ability of science and technology to resolve societal problems depends on the scientific literacy of a society

3.2 Diversity

- a. Identify examples of women and men of various social and ethnic backgrounds with diverse interests, talents, qualities and motivations who are, or who have been, engaged in activities of science and related fields

3.3 Science, Technology, and Society

- a. Identify and evaluate the impact of scientific advances on society
- b. Recognize that scientific advances may challenge individuals to reevaluate their personal beliefs

(Science Content Standards for California Public Schools, Grades 9-12, Investigation and Experimentation: 1m, 1n)

3.4 Safety

- a. Choose appropriate safety equipment for a given activity (e.g., goggles, apron, vented hood)

- b. Discuss the safe use, storage, and disposal of commonly used chemicals and biological specimens
- c. Assess the safety conditions needed to maintain a science laboratory (e.g., eye wash, shower, fire extinguisher)
- d. Read and decode MSDS/OSHA (Material Safety Data Sheet/Occupational Safety and Health Administration) labels on laboratory supplies and equipment
- e. Discuss key issues in the disposal of hazardous materials in either the laboratory or the local community
- f. Be familiar with standard safety procedures such as those outlined in the Science Safety Handbook for California Schools (1999)

Social Science Subject Matter Requirements

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

Domain 1. World History

Candidates demonstrate knowledge of the foundations and contexts of the world history contained in the History-Social Science Content Standards for California Public Schools (1998) as outlined in the History-Social Science Framework for California Public Schools (2001) at a post secondary level of rigor. Candidates have both broad and deep conceptual understanding of the subject matter. Candidates study the people, major events, and issues of the major Western and non-Western civilizations from the origins of humankind to the present. In their study of world history, candidates apply higher-level thinking skills. These skills include, but are not limited to, the ability to analyze, interpret, compare and contrast, and synthesize information about significant historical issues in both written and oral presentation. Candidates utilize appropriate research skills and primary and secondary sources. They engage in historiographic thinking, and demonstrate awareness of multiple historical and geographic perspectives. Candidates appreciate the fundamental role geography plays in historical inquiry. They also understand and are able to apply the principles of political science and economics to historical analysis.

1.1 Ancient Civilizations

Candidates analyze the geography, history, and cultures of Africa, Eurasia, and the Americas from the origins of humankind to the decline of the Roman Empire. Candidates:

- a. Describe what is known of the early physical and cultural development of humankind from the Paleolithic era to the agricultural revolution, explaining how the methods of archaeology and anthropology contribute to the understanding of prehistory.
- b. Describe and analyze the impact of human interaction with the physical environment (e.g., climate, landforms, soils, water) on the development of the ancient cultures of Fertile Crescent (e.g. Sumerian, Babylonian, Hebrew), Persia, Egypt, Kush, Greece, India, China, Rome, and pre-Columbian America.
- c. Describe and analyze the religious, social, economic, and political structures of the ancient cultures of Mesopotamia, Persia, Egypt, Kush, Greece, India, China, Rome, and pre-Columbian America, and describe and analyze their intellectual, ethical, scientific, and artistic accomplishments and values.
- d. Describe and analyze the foundations of western political and philosophical thought in ancient Greek, Roman, and Judeo-Christian traditions.
- e. Describe and analyze the foundations of Asian political and philosophical thought found in ancient Chinese and Indian traditions (e.g., Legalism, Taoism, Confucianism, Hinduism, Buddhism).
- f. Describe and analyze the importance and patterns of expansion and contraction of empires, religions, and trade that influenced various regional cultures through the decline of the Roman Empire.

(History-Social Science Content Standards for California Public Schools: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 7.1, 10.1)

1.2 Medieval and Early Modern Times

Candidates trace and analyze historical interpretations of cause and effect, sequence, and correlation of the social, cultural, political, economic, and technological developments in Europe, Africa, Asia, and the Americas from A.D.500-1790. Candidates:

- a. Analyze the impact of geography, including both human and physical features, on the development of medieval and early-modern Asian, African (including sub-Saharan), Middle Eastern, pre-Columbian American, and European civilizations.
- b. Trace the decline of the Western Roman Empire and the development of the Byzantine Empire, and analyze the emergence of these two distinct European civilizations and their views on religion, culture, society, and politics.
- c. Describe the role and expansion of Christianity in medieval and early modern Europe and the Middle East.
- d. Identify the basic tenets of Islam, and describe Islamic society and culture between the beginning of the 7th century and the end of the 18th century.
- e. Analyze the religious and secular contributions of Islam to European, African and Asian civilizations and the impact of medieval Muslim civilization on Asia, Africa, and Europe between the beginning of the 7th century and the end of the 18th century.
- f. Analyze and compare and contrast the development of feudalism as a social, political, and economic system in Europe and Japan.
- g. Compare and contrast the geographic, political, economic, religious, and social structures of pre-Columbian American civilizations in North and South America between A.D. 500 and the end of the 18th century.
- h. Analyze the geographic, political, economic, religious, and social structures of Asia and Africa between A.D. 500 and the end of the 18th century.
- i. Analyze the art, literature, music, science, and technology of the Renaissance and their diffusion and impact throughout Europe.
- j. Analyze the political and religious transformations caused by the Reformation and their impact on Europe.
- k. Analyze the historical developments of the Scientific Revolution and the ideas of the Enlightenment and their effects on social, religious, political, economic, and cultural institutions.

(History-Social Science Content Standards for California Public Schools: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 7.11)

1.3 Modern World History

Candidates trace and analyze the major developments in the modern world from the late 18th century through the present. Candidates:

- a. Describe and evaluate the significance of the “Age of Exploration,” and the main ideas of the Enlightenment and their influences on social, political, religious, and economic thought and practice.
- b. Compare and contrast the American Revolution and the French Revolution and their enduring worldwide effects on political expectations for self-government and individual liberty.
- c. Describe and analyze the emergence of nationalism in the 18th and 19th centuries and its impact on Western, African, and Asian societies.
- d. Analyze the causes and effects of the Industrial Revolution, including its impact on science, technology, and society.

- e. Describe the emergence and origins of new theories regarding politics, economics, literature, and the arts in the 18th, 19th, and 20th centuries.
- f. Analyze the economic, political, social, and geographic factors contributing to the emergence of 19th-century imperialism, and evaluate its impact on Africa, Southeast Asia, China, India, Latin America, and the Philippines.
- g. Compare and contrast the social, political, and economic factors that influenced the Russian revolutions of 1905 and 1917.
- h. Analyze the origins and course of World War I and its effects on Europe and the rest of the world, including its impact on science, technology, the arts, politics, society, economics, and geography.
- i. Analyze the conflict between fascist and Marxist/communist ideologies, and the rise, goals, and policies of dictatorships and totalitarian governments between the two World Wars.
- j. Analyze the origins, course, and consequences of World War II, including the human cost of the war (e.g., the Holocaust), the resulting redrawing of boundaries, and the movement of peoples in Europe, Asia, Africa, and the Middle East.
- k. Analyze the international developments of the post-World War II era, including decolonization, nationalism, nation-building, the development of international organizations, and global migration.
- l. Analyze the Cold War from its origins in the post-World War II 1940s to the dissolution of the Soviet Union in 1991, including its impact on social, cultural, political, economic, technological, and geographic developments in the world.
- m. Analyze the emergence of a global economy and its impact on the environment, epidemiology, and demographics, and the development and impact of the information, technology, and communications revolutions.
- n. Describe the causes and effects of genocide in the 20th century, including, but not limited to, the Armenian genocide, the Holocaust, and post-World War II “ethnic cleansing.”
- o. Explain and evaluate the strategic importance of the Middle East and the volatile political relations within the region.

(History-Social Science Content Standards for California Public Schools: 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 10.9, 10.10, 10.11)

Domain 2. U.S. History

Candidates demonstrate knowledge of the foundations and contexts of the United States history contained in the History-Social Science Content Standards for California Public Schools (1998) as outlined in the History-Social Science Framework for California Public Schools (2001) at a post secondary level of rigor. Candidates have both broad and deep conceptual understanding of the subject matter. Candidates study the people and major events and issues of U. S. history from the colonization of North America to the present. In their study of U.S. history, they apply higher level thinking skills. These skills include, but are not limited to, the ability to analyze, interpret, compare and contrast, and synthesize information about significant historical issues in both written and oral presentation. Candidates utilize appropriate research skills and primary and secondary sources. They engage in historiographic thinking, and are aware of multiple historical and geographic perspectives. Candidates appreciate the fundamental role geography plays in historical inquiry, and they understand and apply the principles of political science and economics to historical analysis of U.S. history.

2.1 Pre-Revolutionary Era and the War for Independence

Candidates describe the pre-Revolutionary era from early European exploration and settlement through the War for Independence. Candidates:

- a. Describe the major American Indian cultural groups and their contributions to early American society.
- b. Explain and analyze the struggle for the control of North America among European powers and the emergence of the 13 colonies under English rule.
- c. Analyze the effects of English, French, Dutch, and Spanish colonial rule on social, economic, and governmental structures in North America, and the relationships of these colonies with American Indian societies.
- d. Describe the institutionalization of African slavery in the Western Hemisphere and analyze its consequences in sub-Saharan Africa.
- e. Analyze the causes for the War for Independence, the conduct of the war, and its impact on Americans.

(History-Social Science Content Standards for California Public Schools: 8.1, 8.2, 8.7, 11.1, 5.1, 5.3)

2.2 The Development of the Constitution and the Early Republic

Candidates describe and analyze the development of the political system of the United States and the ways that citizens participate in it through executive, legislative and judicial processes. Candidates:

- a. Describe and evaluate the impact of the Enlightenment and the unique colonial experiences on the writing of the Declaration of Independence, Articles of Confederation, the Federalist Papers, the Constitution, and the Bill of Rights.
- b. Examine the issues regarding ratification of the Constitution, and compare and contrast the positions of the Federalists and Anti-Federalists.

(History-Social Science Content Standards for California Public Schools: 8.1, 8.2, 8.3, 11.1, 12.1)

2.3 The Emergence of a New Nation

Candidates describe the social, political, and economic developments of the American people between the ratification of the Constitution and the Civil War. Candidates:

- a. Describe the differing visions of the early political parties and explain the reasons for the respective successes and failures of those parties.
- b. Compare the significant political and socioeconomic ideas and issues during the Jeffersonian and Jacksonian periods and contrast how they were implemented in policy and practice.
- c. Describe American foreign policy prior to the Civil War.
- d. Identify and describe the political, social, religious, economic, and geographic factors that led to the formation of distinct regional and sectional identities and cultures.
- e. Describe the purpose, challenges, and economic incentives associated with settlements of the West, including the concept of Manifest Destiny.
- f. Map and analyze the expansion of U.S. borders and the settlement of the West, and describe how geographic features influenced this expansion.
- g. Analyze the evolution of American Indian policy up to the Civil War.

- h. Describe and analyze the impact of slavery on American society, government, and economy, and the contributions of enslaved Africans to America, and trace the attempts to abolish slavery in the first half of the 19th century.
- i. Describe and compare and contrast early 19th-Century social and reform movements and their impact on antebellum American society (e.g., the Second Great Awakening, the temperance movement, the early women’s movement, utopianism).

(History-Social Science Content Standards for California Public Schools: 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.12, 11.1, 11.11, 11.2)

2.4 Civil War and Reconstruction

Candidates explain and analyze the political, economic, geographic, and social causes and consequences of the Civil War. Candidates:

- a. Interpret the debates over the doctrines of nullification and state secession.
- b. Compare and contrast the strengths and weaknesses of the Union and Confederacy.
- c. Describe the major military and political turning points of the war.
- d. Describe and analyze the physical, social, political, and economic impact of the war on combatants, civilians, communities, states, and the nation.
- e. Compare and contrast plans for Reconstruction with its actual implementation.
- f. Explain and assess the development and adoption of segregation laws, the influence of social mores on the passage and implementation of these laws, and the rise of white supremacist organizations.
- g. Analyze the relationship of the 13th, 14th, and 15th Amendments to Reconstruction, and compare and contrast their initial and later interpretations.

(History-Social Science Content Standards for California Public Schools: 8.10, 8.11, 11.1)

2.5 The “Gilded Age”

Candidates examine the relationship among post-Civil War economic development and political, social, and geographic issues and events in the second half of the 19th century. Candidates:

- a. Describe and analyze the role of entrepreneurs and industrialists and their impact on the United States economy.
- b. Describe and analyze the effects of industrialization on the American economy and society, including increased immigration, changing working conditions, and the growth of early labor organizations.
- c. Explain and analyze the causes for, and the impact of, Populism and Progressivism.
- d. Explain the development of federal Indian policy – including the environmental consequences of forced migration into marginal regions – and its consequences for American Indians.
- e. Analyze the impact of industrialism and urbanization on the physical and social environments of the United States.

(History-Social Science Content Standards for California Public Schools: 8.12, 11.2)

2.6 The U.S. as a World Power

Candidates trace and evaluate the emergence of the U.S. as an economic, diplomatic, and military world power in the early 20th century. Candidates:

- a. Evaluate the debate about American imperialistic policies before, during and following the Spanish-American War.
- b. Analyze the political, economic, and geographic significance of the Panama Canal, the “Open Door” policy with China, Theodore Roosevelt’s “Big Stick” Diplomacy, William Howard Taft’s “Dollar” Diplomacy, and Woodrow Wilson’s Moral Diplomacy.
- c. Evaluate the political, economic, social, and geographic consequences of World War I in terms of American foreign policy and the war’s impact on the American home front.

(History-Social Science Content Standards for California Public Schools: 11.4)

2.7 The 1920s

Candidates analyze the political, social, economic, technological, cultural, and geographic developments of the 1920s. Candidates:

- a. Analyze domestic events that resulted in, or contributed to, the Red Scare, Marcus Garvey’s Back to Africa movement, the Ku Klux Klan, the American Civil Liberties Union, the National Association for the Advancement of Colored People, and the Anti-Defamation League.
- b. Analyze the significance of the passage of the 18th and 19th Amendments as they related to the changing political and economic roles of women in society.
- c. Assess changes in American immigration policy in the 1920s.
- d. Describe new trends in literature, music, and art, including the Harlem Renaissance and the Jazz Age.
- e. Assess the impact of radio, mass production techniques, and the growth of cities on American society.

(History-Social Science Content Standards for California Public Schools: 11.5)

2.8 The Great Depression and the New Deal

Candidates analyze the social, political, economic, and geographic effects of the Great Depression and its impact on the changing role of government in economy and society. Candidates:

- a. Analyze the differing explanations for the 1929 stock market crash, Herbert Hoover’s and Congress’ responses to the crisis, and the implementation of Franklin Delano Roosevelt’s New Deal policies.
- b. Describe and assess the human toll of the Great Depression, including the impact of natural disasters and agricultural practices on the migration from rural Southern and Eastern regions to urban and Western areas.
- c. Analyze the effects of, and controversies arising from, New Deal policies, including the social and physical consequences of regional programs (e.g., the Tennessee Valley Authority, the Central Valley Project).
- d. Trace and evaluate the gains and losses of organized labor in the 1930s.

(History-Social Science Content Standards for California Public Schools: 11.6)

2.9 World War II

Candidates analyze U.S. participation in World War II. Candidates:

- a. Explain the origins of American involvement in World War II, including reactions to events in Europe, Africa, and Asia.

- b. Analyze American foreign policy before and during World War II.
- c. Evaluate and analyze significant events, issues, and experiences during World War II, including:
 - ◆ Internment of people of Japanese ancestry
 - ◆ Allied response to the Holocaust
 - ◆ The experiences and contributions of American fighting forces, including the role of minorities (e.g., the Tuskegee Airmen, the 442nd Regimental Combat Unit, Navajo Code Talkers)
 - ◆ The role of women and minority groups at home
 - ◆ Major developments in aviation, weaponry, communications, and medicine
 - ◆ The significance and ramifications of the decision to drop the atomic bomb
- d. Assess American foreign policy in the aftermath of World War II, using geographic, political, and economic perspectives.

(History-Social Science Content Standards for California Public Schools: 11.7)

2.10 Post-World War II America

Candidates analyze the major issues in post-World War II America. Candidates:

- a. Describe and evaluate the significance of changes in international migration patterns and their impact on society and the economy.
- b. Describe the increased role of the federal government in response to World War II and the Cold War and assess the impact of this increased role on regional economic structures, society, and the political system.
- c. Describe the effects of technological developments on society, politics, and the economy since 1945.
- d. Analyze the major domestic policies of presidential administrations from Harry S Truman to the present.

(History-Social Science Content Standards for California Public Schools: 11.8)

2.11 Post-World War II U.S. Foreign Policy

Candidates analyze U.S. foreign policy since World War II and its impact on the world. Candidates:

- a. Trace the origins of the Cold War.
- b. Analyze the roles of the Truman Doctrine, the Marshall Plan, and military alliances, including the North American Treaty Organization (NATO), the South East Asian Treaty Organization (SEATO), and the Warsaw Pact.
- c. Trace the origins and consequences of the Korean War.
- d. Explain and analyze the relationship between domestic and foreign policy during the Cold War, including McCarthyism.
- e. Analyze the foreign policies of post-World War II presidential administrations and their effect on the Cold War.
- f. Trace the causes, controversies, and consequences of the Vietnam War, its effects on American combatants and civilians, and its continued impact on American society.

(History-Social Science Content Standards for California Public Schools: 11.8, 11.9, 11.11)

2.12 Civil Rights Movement

Candidates trace the reasons for and the development of civil rights from World War II to the present. Candidates:

- a. Examine and analyze the key people, events, policies, and court cases in the field of civil rights from varying perspectives.
- b. Describe the civil rights movements of African Americans and other minority groups and their impacts on government, society, and the economy.
- c. Analyze the development of the women’s rights movement and its connections to other social and political movements.

(History-Social Science Content Standards for California Public Schools: 11.10, 11.3)

Domain 3. California History

Candidates demonstrate knowledge of the foundations and contexts of the California history contained in the History-Social Science Content Standards for California Public Schools (1998) as outlined in the History-Social Science Framework for California Public Schools (2001) at a post secondary level of rigor. Candidates have both broad and deep conceptual understanding of the subject matter. Candidates study the history of California from the pre-Columbian period to the present. In this study of California history, they apply higher level thinking skills. These skills include, but are not limited to, the ability to analyze, interpret, compare and contrast, and synthesize information about significant historical issues in both written and oral presentation. Candidates utilize appropriate research skills and primary and secondary sources. They engage in historiographic thinking, and are aware of multiple historical and geographic perspectives. Candidates appreciate the fundamental role geography plays in historical inquiry, and they understand and are able to apply the principles of political science and economics to historical analysis of California history. Candidates understand the relationship between California and U.S. history while also recognizing the political, social, economic, and geographic conditions that make California unique.

3.1 Pre-Columbian Period Through the End of Mexican Rule

Candidates describe analyze the relationship between California’s physical geography and its history from the pre-Columbian period through the end of Mexican rule. Candidates:

- a. Describe the geography, economic life, and culture of California’s American Indian peoples, as well as their relationship with the environment.
- b. Define and assess the impact of Spanish exploration and colonization, including the establishment of the mission system, ranchos, and pueblos, and their influences on the development of the agricultural economy of early California.
- c. Describe the causes of the Mexican-American War and assess its impact on California.

(History-Social Science Content Standards for California Public Schools: 4.1, 4.2, 8.5, 8.8, 8.9)

3.2 From the Gold Rush to the Present

Candidates describe and analyze the history of California from the Gold Rush to the present. Candidates:

- a. Describe the discovery of gold and assess its consequences on the cultures, societies, politics, and economies of California, including its impact on California Indians and Californios.

- b. Describe the international migration to California in the 19th century, the social, economic, and political responses to this migration, and the contributions of immigrants to the development of California.
- c. Analyze key principles in California's constitutional and political development (including the Progressive Era reforms of initiative, referendum, and recall), and compare and contrast the California and U.S. Constitutions.
- d. Describe 20th century migration to California from the rest of the U.S. and the world, and analyze its impact on the cultural, economic, social, and political evolution of the state.
- e. Identify major environmental issues in California history and their economic, social, and political implications (e.g., water supply and delivery, air/water/soil quality, transportation, energy).

(History-Social Science Content Standards for California Public Schools: 4.3, 4.5, 8.5, 8.8, 8.12, 11.2)

Domain 4. Principles of American Democracy

Candidates demonstrate knowledge of the foundations and contexts of the American democracy contained in the History-Social Science Content Standards for California Public Schools (1998) as outlined in the History-Social Science Framework for California Public Schools (2001) at a post secondary level of rigor. Candidates have both broad and deep conceptual understanding of the subject matter. Candidates study the principles of American democracy and analyze how those principles are put into practice in American politics and government. In their study of American democratic principles and practices, candidates apply higher level thinking skills. These skills include the ability to analyze the effect of governmental structures, economic conditions, and social forces on the distribution and use of power. These skills also include the ability to articulate and defend basic values and principles of democratic government. Candidates utilize appropriate research skills and primary and secondary sources. The study of social science must move beyond rote memorization. Therefore, candidates understand and are able to apply the principles and methodologies of political science, economics, and geography to the study of American democracy. Candidates recognize that knowledge and understanding of the social sciences are intrinsic to political analysis.

4.1 Principles of American Democracy

Candidates explain and analyze the fundamental principles and moral values of American democracy as expressed in the U.S. Constitution and other essential documents. Candidates:

- a. Analyze the influence of ancient Classical and Enlightenment political thinkers and the pre-Revolutionary colonial and indigenous peoples' experience on the development of the American government, and consider the historical contexts in which democratic theories emerged.
- b. Explain and analyze the principles of the Declaration of Independence and how the U.S. Constitution reflects a balance between classical republican and classical liberal thinking.
- c. Evaluate the Founding Fathers' contribution to the establishment of a constitutional system as articulated in the Federalist Papers, constitutional debates, and the U.S. Constitution.
- d. Describe the significance of the Bill of Rights and the 14th Amendment as limits on government in the American constitutional process as compared to English Common Law.
- e. Describe the nature and importance of law in U.S. political theory, including the democratic procedures of law making, the rule of adherence to the law, and the role of civil disobedience.

- f. Analyze the significance and evolving meaning of the principles of American democracy: autonomy/liberty, equality, basic opportunity, debate and deliberation, and representation.
- g. Describe the meaning and importance of each of the rights guaranteed in the Bill of Rights and analyze the reciprocal nature of citizenship, including the obligation to obey the law, serve as a juror, vote, pay taxes, and pursue various avenues of participation open to citizens.
- h. Explain the basis and practice of acquiring American citizenship.

(History-Social Science Content Standards for California Public Schools: 11.1, 12.1, 12.2, 12.3, 12.4)

4.2 Fundamental Values and Principles of Civil Society

Candidates describe and analyze the fundamental values and principles of civil society. Candidates:

- a. Explain and analyze the historical role of religion, religious diversity, and religious discrimination and conflict in American life.
- b. Analyze citizen participation in governmental decision-making in a large modern society and the challenges Americans faced historically to their political participation.
- c. Analyze the evolving practices of citizen collaboration and deliberation, and special interest influence in American democratic decision-making.
- d. Compare and contrast the role of the individual in democratic and authoritarian societies.
- e. Explain how civil society provides opportunities for individuals to promote private or public interests.

(History-Social Science Content Standards for California Public Schools: 12.2, 12.9)

4.3 The Three Branches of Government

Candidates compare and contrast the roles and responsibilities of the three branches of government as established by the U.S. Constitution and describe how these roles and responsibilities have evolved throughout U.S. history. Candidates:

- a. Analyze Articles I, II, and III as they relate to the legislative, executive, and judicial branches of government.
- b. Analyze how and why the existing roles and practices of the three branches of government have evolved.
- c. Describe and analyze the issues that arise as a result of the checks and balances system.
- d. Explain the process by which the Constitution is amended.

(History-Social Science Content Standards for California Public Schools: 12.3, 12.6, 12.9, 12.10, 11.5)

4.4 Landmark U.S. Supreme Court Cases

Candidates analyze landmark U.S. Supreme Court interpretations of the Constitution and the continuing debate about judicial restraint and judicial activism. Candidates:

- a. Analyze the changing interpretations of the Bill of Rights and later constitutional amendments.
- b. Evaluate the effects of the Court's interpretations of the Constitution in *Marbury v. Madison*, *McCullough v. Maryland*, and *United States v. Nixon*.

- c. Describe and analyze the controversies that have resulted over the changing interpretations of civil rights, including, but not limited to, those in *Plessy v. Ferguson*; *Brown v. Board of Education*; *Miranda v. Arizona*; *Roe v. Wade*; *Regents of the University of California v. Bakke*; *Adarand Constructors, Inc. v. Peña*; *United States v. Virginia (VMI)*, and *Bush v. Palm Beach County Canvassing Board*.

(History-Social Science Content Standards for California Public Schools: 12.4)

4.5 Issues Regarding Campaigns for National, State, and Local Elective Offices

Candidates describe the process by which officials are elected and analyze issues regarding political campaigns. Candidates:

- a. Analyze the origin, development, and role of political parties.
- b. Describe the means that citizens use to participate in the political process.
- c. Explain the function and evolution of the College of Electors and analyze its role in contemporary American politics.
- d. Describe and evaluate issues of state redistricting and the political nature of reapportionment.

(History-Social Science Content Standards for California Public Schools: 12.5)

4.6 Powers and Procedures of the National, State, Local and Tribal Governments

Candidates compare the processes of law and policy-making at each of the three levels of government, and contrast them to each other and to tribal governments. Candidates:

- a. Identify the various ways in which federal, state, local, and tribal governments are organized.
- b. Analyze the issues that arise out of the divisions of jurisdiction among federal, state, local, and tribal governments at each level of government; consider their impacts on those different levels of government.
- c. Analyze the sources of power and influence in democratic politics, such as access to and use of the mass media, money, economic interests, and the ability to mobilize groups.

(History-Social Science Content Standards for California Public Schools: 12.6, 8.3)

4.7 The Media in American Political Life

Candidates debate positions on the influence of the media on American political life. Candidates:

- a. Describe the significance of a free press, including the role of the broadcast, print, and electronic media in American society and government.
- b. Analyze the interaction between public officials and the media to communicate and influence public opinion.

(History-Social Science Content Standards for California Public Schools: 12.7, 12.8)

4.8 Political Systems

Candidates compare and contrast the origins, characteristics, and development of different political systems. Candidates:

- a. Explain and analyze different political systems and the philosophies that underlie them, including the parliamentary system.

- b. Analyze problems of new democracies in the 19th and 20th centuries and their internal struggles.

(History-Social Science Content Standards for California Public Schools: 12.8)

4.9 Tensions within our Constitutional Democracy

Candidates analyze tensions within our constitutional democracy. Candidates:

- a. Analyze the constitutional interpretations of the First Amendment’s statement about the separation of church and state.
- b. Debate the adequacy of the solution of majority rule and the role of minority rights in a majority-rules system.

(History-Social Science Content Standards for California Public Schools: 12.9)

Domain 5. Principles of Economics

Candidates demonstrate knowledge of the foundations and contexts of the economics contained in the History-Social Science Content Standards for California Public Schools (1998) as outlined in the History-Social Science Framework for California Public Schools (2001) at a post secondary level of rigor. Candidates have both broad and deep conceptual understanding of the subject matter. Candidates study the principles of economics, both in relation to the United States economy and to the international economy. In their study of economics they apply higher level thinking skills. These skills include, but are not limited to, the ability to analyze, interpret, compare, contrast and synthesize information about significant issues in both written and oral presentation. Candidates utilize research skills and different methods of analysis, including the use of marginal analysis, equilibrium analysis, micro and macro analysis and positive and normative analysis skills. They use the skills of economic analysis to explain rational behavior of people and groups encountering experiences of everyday life in the form of tables and numbers, graphical analysis and single equations. Candidates demonstrate how solutions are derived from each form of economic analysis, how they are equivalent, and how they translate from one to another. Economic themes are intrinsic to all of the social science content domains. Therefore, candidates demonstrate the ability to explore issues that feature both theoretical and applied economics.

5.1 Economic Terms and Concepts and Economic Reasoning

Candidates explain the meaning of common economic terms and concepts (e.g., supply and demand) and use economic reasoning (e.g., the equivalence and convertibility of the different forms of economic analysis). Candidates:

- a. Describe the causal relationship between scarcity and choices, and explain opportunity cost and marginal benefit and marginal cost.
- b. Identify the difference between monetary and non-monetary incentives and how changes in incentives cause changes in behavior.
- c. Debate the role of private property as an incentive in conserving and improving scarce resources, including renewable and nonrenewable natural resources.
- d. Describe and analyze the debate concerning the role of a market economy versus a planned economy in establishing and preserving political and personal liberty (e.g., through the works of Adam Smith).

(History-Social Science Content Standards for California Public Schools: 12.1)

5.2 Elements of America’s Market Economy in a Global Setting

Candidates analyze the elements of America’s market economy in a global setting. Candidates:

- a. Describe and analyze the relationship of the concepts of incentives and substitutes to the law of supply and demand.
- b. Describe the effects of changes in supply and/or demand on the relative scarcity, price, and quantity of particular products.
- c. Explain and analyze the roles of property rights, competition, and profit in a market economy.
- d. Explain and analyze how prices reflect the relative scarcity of goods and services and perform the function of allocation in a market economy.
- e. Explain the process by which competition among buyers and sellers determines a market price.
- f. Describe the effect of price controls on buyers and sellers.
- g. Analyze how domestic and international competition in a market economy affects the quality, quantity, and price of goods and services produced.
- h. Explain the role of profit as the incentive to entrepreneurs in a market economy.
- i. Describe the functions of the financial markets.

(History-Social Science Content Standards for California Public Schools: 12.2)

5.3 The Relationship between Politics and Economics

Candidates explain and analyze the debate over the role of the government in the economy and the relationship between politics and economics. Candidates:

- a. Analyze the effects of federal, state, and local policies on the distribution of resources and economic decision-making.
- b. Describe the economic and social effects of government fiscal policies.
- c. Describe the aims and tools of monetary policy and its economic and social effects.
- d. Assess the tradeoff between efficiency and equality in modern mixed economies, using social policies as examples.
- e. Apply the principles of economic decision-making to a current or historical social problem in America (e.g., land development, resource availability, environmental quality, composition of the economy).

(History-Social Science Content Standards for California Public Schools: 12.3, 12.1, 12.6)

5.4 Elements of the U.S. Labor Market in a Global Setting

Candidates describe and analyze the operations of the U.S. labor market. Candidates:

- a. Describe the circumstances surrounding the establishment of principal American labor unions, procedures that unions use to gain benefits for their members, and the effects of unionization, the minimum wage, and unemployment insurance.
- b. Analyze the current U.S. economy and the global labor market that helps support it, including the types of goods and services produced, the types of skills in demand, the effects of rapid technological change, inter- and intra-regional shifts in employment, and the impact of international competition.
- c. Analyze wage differences between jobs and professions, using the laws of supply and demand and the concept of productivity.

- d. Analyze the effects of international mobility of capital, labor, and trade on the U.S. economy.

(History-Social Science Content Standards for California Public Schools: 12.4)

5.5 Aggregate Economic Behavior of the American Economy

Candidates describe the macroeconomic forces at work at the level of the aggregate sectors of the economy. Candidates:

- a. Describe how measures of economic output are adjusted using indexes.
- b. Define, calculate, and analyze the significance of the changes in rates of unemployment, inflation, and real Gross Domestic Product.
- c. Distinguish between short- and long-term interest rates and explain their relative significance.

(History-Social Science Content Standards for California Public Schools: 12.5)

5.6 International Trade and the American Economy

Candidates describe and analyze issues of international trade and explain how the U.S. economy affects, and is affected by, economic forces beyond the United States' borders. Candidates:

- a. Use the concept of comparative advantage to identify the costs of and gains from international trade.
- b. Compare and contrast the arguments for and against trade restrictions during the Great Depression with those among labor, business, and political leaders today.
- c. Analyze the significance of the changing role of international political borders and territorial sovereignty in a global economy (e.g., General Agreement on Trade and Tariffs (GATT), North American Free Trade Agreement (NAFTA), World Trade Organization (WTO), European Union (EU)).
- d. Describe how international currency exchange rates are determined and their significance.

(History-Social Science Content Standards for California Public Schools: 12.6)

Domain 6. Principles of Geography

Candidates demonstrate knowledge of the foundations and contexts of the geography contained in the History-Social Science Content Standards for California Public Schools (1998) as outlined in the History-Social Science Framework for California Public Schools (2001) at a post secondary level of rigor. Candidates have both broad and deep conceptual understanding of the subject matter. Candidates study the principles of geography and their application to the study of history, political science, and economics. In their study of geography, they apply higher level thinking skills. These skills include (but are not limited to) the ability to analyze, interpret, compare and contrast, and synthesize information regarding the geographic character of landscapes, societies, and ecosystems across the earth. They know the five basic themes of geography as stated in the 2000 History-Social Science Framework: location; place; human and environmental interaction; movement; and regions. Candidates use basic map and globe skills, such as latitude/longitude, relative location, distance/direction, scale, legend, map projections, and distortion categories to describe and analyze the world from a geographic perspective.

6.1 Tools and Perspectives of Geographic Study

Candidates use the tools, theories, and methodologies of geography to analyze the history and current issues of the world's peoples and places. Candidates:

- a. Describe the criteria for defining regions and identify why places and regions are important.
- b. Explain the nature of map projections and use maps, as well as other geographic representations and technologies (including remote sensing and geographic information systems) to acquire, process, and report information from a spatial perspective.

(History-Social Science Content Standards for California Public Schools, Grades 6-12, Historical and Social Science Analysis Skills, Chronological and Spatial Thinking, #3)

6.2 Geographic Diversity of Natural Landscapes and Human Societies

Candidates make inter- and intra-regional comparisons and analyze the geographic diversity of human societies, using such concepts as density, distribution, growth, demographic transition, culture, and place identification. Candidates:

- a. Analyze how unique ecologic settings are encouraged by various combinations of natural and social phenomena, including bio-geographic relationships with climate, soil, and terrain.
- b. Analyze the patterns and networks of economic interdependence across the earth's surface during the agricultural, industrial, and post-industrial revolutions, including the production and processing of raw materials, marketing, consumption, transportation, and other measures of economic development.
- c. Describe the processes, patterns, and functions of human settlements from subsistence agriculture to industrial metropolis.
- d. Analyze the forces of cooperation and conflict among peoples and societies that influence the division and control of the earth's surface (e.g., boundaries and frontiers, the control of resources, centripetal vs. centrifugal forces, spheres of influence).

(History-Social Science Content Standards for California Public Schools: 11.6.3, 10.5.2, 12.2.6, 7.2.1, 8.12.1, 10.5.2, 11.2.6)

6.3 Culture and the Physical Environment

Candidates describe and analyze and discuss the geographic interactions between human activities and the physical environment in the past and present, and plan for the future.

Candidates:

- a. Describe and analyze ways in which human societies and settlement patterns develop in response to the physical environment, and explain the social, political, economic, and physical processes that have resulted in today's urban and rural landscapes.
- b. Recognize the interrelationship of environmental and social policy.

(History-Social Science Content Standards for California Public Schools: 6.1.1, 6.1.2, 6.2.1, 6.2.2, 6.4.1, 6.5.1, 6.6.1, 6.6.7, 6.7.3, 7.3.2, 7.3.4, 7.4.2, 7.4.4, 7.6.1, 7.6.3, 7.7.1, 7.8.2, 7.8.3, 7.11.3, 8.6.1, 8.6.2, 8.7.1, 8.8.5, 8.12.1, 8.12.5, 10.3.5, 10.4.1, 10.4.2, 10.10.1, 11.1, 11.2.2, 11.2.6, 11.4, 11.5.7, 11.6.3, 11.8.6, 11.11.5, 6.2.8, 6.6.2, 6.7.1, 7.4.1, 10.10, 6.4.6, 6.5.2, 6.5.6, 7.1.2, 7.2.4, 7.7.3, 8.3.5, 8.5.2, 8.8.6, 8.10.2, 8.10.7, 10.5.2, 10.6.2, 10.8.3, 11.4.2, 11.7.2, 11.9.3)

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

Throughout their course of study, candidates for a teaching credential have opportunities to demonstrate their ability to apply higher-level thinking, writing, and presentation skills to their study of the social sciences. These skills include (but are not limited to) the ability to analyze, interpret, compare and contrast, and synthesize information about significant social, political, economic, and geographic issues in written, oral, and visual form. Candidates understand, critically assess, and use the different types of information found on the internet and in archives, libraries, museums, and other repositories. They utilize chronological, spatial, interdisciplinary, and thematic thinking. They consider the impact of cultural, political, and ethical perspectives on issues and their interpretation.

Candidates understand the nature of historiography and the necessity of historical revision. They are able to distinguish valid arguments from fallacious arguments in historical interpretations. They identify bias and prejudice in historical interpretations, and evaluate major debates among historians concerning alternative interpretations of the past. Within this evaluation, candidates analyze authors' use of evidence and the distinctions between sound generalizations and misleading oversimplifications. They construct and test hypotheses; collect, evaluate, and employ data from multiple primary and secondary sources; and present it in oral, written, and visual forms.

Candidates demonstrate the connections, causal and otherwise, between particular historical events and larger social, cultural, economic, political, and technological trends. They recognize the complexity of historical causes and effects, including the limitations on determining historical causation. They interpret past events and issues within their historical context rather than solely in terms of present-day norms and values, while understanding that the past and its interpretations can have contemporary relevance. They understand the contingent nature of historical events and recognize that events could have taken other directions.

Candidates draw upon and apply methodologies and approaches of the social sciences to inform their study of history. With regard to methodology, candidates are familiar with issues of hypothesis generation and testing. They are also familiar with the strengths and weaknesses of different methods for gathering data, such as observation, archival research, content analysis, in-depth interviewing, surveys, and experimentation. Candidates understand both qualitative and quantitative methods of data analysis and their respective strengths and weaknesses.

Candidates are aware of the analytical perspectives characteristic of the social sciences as a whole. The social sciences all regard certain issues as fundamental, but address them quite differently. Key points of divergence include how to understand the relationship between the individual and society and whether to focus on culture and language or social structure and behavior. Candidates are able to address the ethical questions raised by social analysis, including such fundamental debates as relativism vs. universalism and individualism vs. collectivism.

(History-Social Science Content Standards for California Public Schools: Grades 6-8 and 9-12: Historical and Social Sciences Analysis Skills)

**California
Commission on Teacher Credentialing**

**Meeting of
June 6, 2002**

AGENDA ITEM NUMBER: **PREP - 1**

COMMITTEE: **Preparation Standards Committee**

TITLE: **Approval of Subject Matter Preparation Programs
Submitted by Colleges and Universities**

XX **Action**

_____ **Information**

_____ **Report**

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

Prepared By: _____ **Date: 5/17/02** _____
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Consultant, Professional Services Division

Approved By: _____ **Date: 5/17/02** _____
Margaret Olebe, Ph. D.
Administrator, Professional Services Division

Approved By: _____ **Date: 5/17/02** _____
Mary Vixie Sandy
Director, Professional Services Division

Authorized By: _____ **Date: _____**
Dr. Sam W. Swofford
Executive Director

**Approval of Subject Matter Preparation Programs Submitted by Colleges
and Universities**

Professional Services Division

May 1, 2002

Executive Summary

This item contains a listing of subject matter programs recommended for approval by the appropriate review panels, according to procedures adopted by the Commission.

Fiscal Impact Summary

The Professional Services Division is responsible for reviewing proposed preparation programs, consulting with external reviewers, as needed, and communicating with institutions and local education agencies about their program proposals. The Commission budget supports the costs of these activities. No augmentation of the budget will be needed for continuation of the program review and approval activities.

Recommendation

That the Commission approve the subject matter preparation programs listed on page five.

Approval of Subject Matter Preparation Programs Submitted by Colleges and Universities

Professional Services Division

May 1, 2002

Subject Matter Preparation Program Review Panel Recommendations

Background

Subject Matter Program Review Panels are responsible for the review of proposed subject matter preparation programs. This item contains a listing of subject matter programs recommended for approval since the last Commission meeting by the appropriate review panels, according to procedures adopted by the Commission.

Summary Information on Single Subject Matter Preparation Programs Awaiting Commission Approval

For the following proposed preparation programs, each institution has responded fully to the Commission's standards and preconditions for subject matter preparation for Single Subject Teaching Credentials. Each of the programs has been reviewed thoroughly by the Commission's Subject Matter Program Review Panels and has met all applicable standards and preconditions established by the Commission and are recommended for approval by the appropriate subject matter review panel.

Recommendation

That the Commission approve the following programs of subject matter preparation for Single Subject Teaching Credentials.

HEALTH SCIENCE

- California State University, Long Beach

**California
Commission on Teacher Credentialing**

**Meeting of
June 6, 2002**

AGENDA ITEM NUMBER: **PREP - 2**

COMMITTEE: **Preparation Standards Committee**

TITLE: **Proposed Exploration for the Restructuring of the
Single Subject Credential for Mathematics Teachers**

Action

Information

Report

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

Prepared By: _____ **Date:** 5/17/02

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Margaret Olebe, Ph. D.
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Approved By: _____ **Date:** 5/17/02

Mary Vixie Sandy
Director, Professional Services Division

Authorized By: _____ **Date:** _____

Dr. Sam W. Swofford
Executive Director

Proposed Exploration for the Restructuring of the Single Subject Credential for Mathematics Teachers

Professional Services Division

May 17, 2002

Executive Summary

There is a need to increase the number of fully certified single subject mathematics teachers in the State of California. Of the approximately 16,000 mathematics teachers in California's public schools during the 2000-2001 school year, nearly 2200 were teaching under emergency permits or waivers. That year, only 704 mathematics teachers were certified (preliminary and professional clear, including those from out of state programs) in California. Class size reductions in ninth grade mathematics courses have made the shortage of fully certified teachers more severe. The K-12 student academic content standards in mathematics have recently raised expectations as to what mathematics all students should know, requiring their teachers to have more content preparation, especially at the middle school level. As California moves toward including algebra and geometry content in the middle school mathematics curriculum (requiring teachers with single subject mathematics credentials), the demand for mathematics teachers will increase.

At its May 2001 meeting, the Commission authorized a field study that would explore the impact of a two-tiered mathematics credential. The purpose of this agenda item is to provide a summary of the data gathered from the study and seek direction from the Commission about the options to be considered for increasing the pool of individuals who are qualified to teach the mathematics courses in which the majority of students are enrolled.

Fiscal Impact Summary

Implementing the recommendations in this report can be accomplished within the base-budget of the Professional Services Division.

Recommendation

Staff recommends that:

1. The single subject mathematics credential be bifurcated into a basic and an advanced level;
2. The examination to determine subject matter competency be adapted to allow for an examination route for the basic and advanced level of credential.
3. The current single subject mathematics panel be charged with identifying appropriate Subject Matter Requirements for each mathematics credential level and the courses that would be authorized to be taught under each credential.

Proposed Exploration for the Restructuring of the Single Subject Credential for Mathematics Teachers

Professional Services Division

May 17, 2002

Background

There is currently a need to increase the number of fully certified single subject mathematics teachers in the State of California. Of the approximately 16,000 mathematics teachers in the State of California during the 2000-2001 school year, nearly 2200 were teaching under emergency permits or waivers. That year, only 704 mathematics teachers were certified (preliminary and professional clear, including those from out of state programs) in California. Class size reductions in ninth grade mathematics courses have made the shortage of fully certified teachers more severe. The K-12 student academic content standards in mathematics have recently raised expectations as to what mathematics all students should know, requiring their teachers to have more content preparation, especially at the middle school level. As California moves toward including algebra and geometry content in the middle school mathematics curriculum (requiring teachers with single subject mathematics credentials), the demand for mathematics teachers will increase.

Teacher candidates in California are required to demonstrate competence in the subject matter they will be authorized to teach. 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). The Single Subject Mathematics Credential authorizes the holder to teach mathematics at all levels. The current subject matter requirements for mathematics reflects this broad authorization and includes substantial content of mathematical concepts at a very advanced level. Consequently, a credentialed mathematics teacher is fully authorized and has been prepared to teach all mathematics courses, including calculus and other advanced courses. Yet, in the 1999-2000 school year, more than 97% of high school mathematics classes (enrolling 97% of all mathematics students) were below calculus or other advanced course level. This means that at present mathematics teachers are required to be prepared to teach courses that they are unlikely to teach.

One possible way to increase the number of appropriately prepared mathematics teachers would be to modify the mathematics credential. A change in the structure of the credential and in the content requirements for teachers might encourage more prospective mathematics teachers to obtain certification. Concurrent changes in the exam route to demonstrating subject matter competency might also reduce the barriers to certification for career changers.

Since March 2001, the Commission staff have been engaged in an effort to align the content requirements of the subject matter preparation programs and subject matter examinations with the academic content standards for students in grades K-12 in English, mathematics, science, and social science. The Executive Director appointed subject matter panels in each of these areas to

advise Commission staff on the development of new subject matter program standards and examinations in these subject areas. The mathematics advisory panel has been developing recommendations for new program standards and exam specifications and has explored ways to increase the number of individuals who are qualified to teach the majority of basic and intermediate courses offered in middle schools and high schools throughout the state.

While the panel has indicated its commitment to high subject matter standards for mathematics teachers, it is concerned that current subject matter standards may not focus on knowledge that is most applicable to K-12 teaching, particularly at the level of coursework most commonly undertaken by students at the middle school and high school levels (e.g., pre-algebra, algebra and geometry). In that current subject matter requirements include advanced concepts not directly applicable to most K-12 instruction (e.g., real analysis, topology, differential equations) the panel has expressed an opinion that these requirements create an artificial barrier to mathematics certification, dissuading or preventing prospective mathematics teachers from obtaining their credentials.

In its deliberations, the Single Subject Mathematics Advisory Panel has explored possible changes in the existing credential structure and in content requirements that might encourage more individuals to obtain mathematics certification. The panel has considered separating the credential into a basic and advanced level. Under such a credential structure, a basic credential would authorize the holder to teach basic and intermediate level mathematics courses, while an advanced credential would authorize the teaching of advanced mathematics courses as well.

At its May 2001 meeting, the Commission authorized a field study that would explore the impact of a two-tiered mathematics credential. The purpose of this item is to provide a summary of the data gathered from the study and seek direction from the Commission about the options to be considered for increasing the pool of individuals who are qualified to teach the mathematics courses in which the majority of students are enrolled.

Study Background

During Fall 2001, Commission staff developed surveys for the purpose of gathering responses from field about the potential impact of a two-tiered credential structure. In developing the survey instruments, input was sought from the single subject mathematics panel, the Association of California School Administrators (ACSA), and mathematics education specialists at the State Department of Education (SDE). Different versions of the surveys were developed for *human resource directors* of school districts, *high school and middle school principals*, *high school and middle school mathematics teachers*, *mathematics faculty* at institutions that have Commission-approved mathematics subject matter programs, and *mathematics education faculty* at institutions with single subject credential programs.

Survey questions were designed around the following key policy issues:

- The projected impact a two-tiered credential would have on the work of district administrators and school site principals

- The impact a two-tiered credential system would have on the pool of potential mathematics teachers
- Whether respondents favored the idea of a two-tiered mathematics credential
- What subject matter content should be required of prospective mathematics teachers and the kinds of courses in a middle school or high school setting that would be authorized by the basic mathematics credential.

All survey versions included a cover letter that provided background information on the need for more qualified mathematics teachers and explained how to complete and return the survey. Surveys were sent to sample populations from each of the groups identified above in early January 2002, with a one month response time allowed. In addition, the surveys were also placed on the Commission’s web site for other interested parties to download and return.

Numbers of Survey Responders

Table 1 shows the number of surveys that were sent and returned and those that were downloaded from the CTC web site or other electronic source (e.g, email sent by the Association of California School Administrators to its membership) and returned. Only the District Administrators (Human Resource Directors or equivalent positions) data included substantial numbers of downloaded surveys. No differences in patterns of responses were noted between the administrators who were sent surveys and those receiving their surveys electronically, and data are reported for the combined total. The number of responses were judged sufficient to provide insight into professional responses to the proposed credentialing changes.

Table 1. Surveys Sent, Downloaded, and Returned.

Recipients	Sent	Downloaded	Total Returned
Human Resource Directors	98	25	58
Middle & High School Principals	513	6	166
Middle & High School Math Teachers	576	49	342
Mathematics Faculty	49	4	31
Mathematics Education Faculty	74	2	21

Respondents with Shortages of Fully-Certified Mathematics Teachers

Field responses were received from a range of respondents, including some from districts or schools that were affected by a mathematics teacher shortage. In analyzing the responses, a district or school was considered to be affected by a mathematics teacher shortage if the estimated percent of less than fully certified mathematics teachers was greater than 20%.

In the surveys for administrators (human resource directors and principals), respondents were asked to estimate the approximate percent of less than fully certified mathematics teachers

serving as the teacher of record at the middle school level and in the basic and advanced levels of high school mathematics courses. Thirty eight percent (38%) of responders stated that their district/school had such a shortage at the middle school level. Twenty eight percent (28%) cited shortages at the high school basic mathematics course level and 13% at the high school advanced course level. The surveys did not define precisely what courses were in the basic and advanced levels. **Impact of a Two-Tiered Mathematics Credential System on the Potential Pool of Mathematics Teachers**

Surveys to all groups of responders asked for a response to the question: Do you believe that a two-tiered mathematics credential would increase the potential pool of well qualified mathematics teachers for middle school level, basic high school level, and advanced high school level mathematics courses? Table 2 gives the percent responses for each group to this question.

Table 2. Would a Two-Tiered Mathematics Credential Increase the Potential Pool of Mathematics Teachers (by Course Level)?

	Middle School			High School Basic			High School Advanced		
	Yes	No	Unsure	Yes	No	Unsure	Yes	No	Unsure
HR Directors	65%	24%	11%	61%	22%	18%	20%	50%	30%
Principals	67%	18%	15%	69%	18%	13%	30%	46%	24%
Math Teachers	73%	9%	18%	69%	14%	17%	25%	51%	24%
Math Faculty	68%	16%	16%	48%	26%	26%	0%	87%	13%
MathEd Faculty	68%	21%	11%	74%	21%	5%	20%	75%	5%

Response patterns were similar for all five groups of responders, showing that responders believed a two-tiered credential would increase the potential pool of teachers for middle and basic high school courses, and a lesser belief in the pool increase for teachers of advanced high school mathematics courses.

Support for a Two-Tiered Mathematics Credential

All groups were also asked to respond to the question: Do you favor the creation of a two-tiered mathematics credential? Table 3 gives the number and percent responses for each group to this question.

Table 3. Numbers of Responders and Percents of Support for a Two-Tiered Mathematics Credential

	Yes		No		Unsure	
	Number	%	Number	%	Number	%
HR Directors	34	62%	13	24%	8	15%
Principals	104	63%	27	16%	35	21%
Math Teachers	224	66%	46	14%	68	20%
Math Faculty	8	28%	12	41%	9	31%
Math Ed Faculty	13	62%	4	19%	4	19%

More than 60% of administrators, principals, mathematics teachers and mathematics education faculty supported the creation of a two-tiered mathematics credential. Lesser support was given by the mathematics faculty responders. Within this group less than half responded negatively to the creation of such a credential.

Basic Mathematics Credential Preparation and Courses Authorized to Be Taught

The three groups of mathematics educators (middle and high school mathematics teachers, mathematics faculty and mathematics education faculty) were asked to identify the types of mathematics subject matter knowledge that should be required for a basic mathematics credential. Content areas were identified by commonly used labels for the areas most often found within mathematics subject matter programs (e.g., number theory, mathematical proof, differential equations). Of the 14 topics listed, all three groups agreed on the inclusion of seven topic areas (college algebra, pre-calculus, number theory, probability, statistics, modern geometry, and history of mathematics) and the exclusion of one (advanced calculus). The mathematics and mathematics education faculty also supported inclusion of calculus and mathematical proof. There was less support for inclusion of linear algebra, differential equations, abstract algebra and discrete mathematics.

Given their responses to what would constitute appropriate subject matter preparation for a basic credential, the three groups of mathematics educators were also asked to identify the mathematics courses that a basic mathematics credential would be authorized to teach. Again, responses were on a 5 point Likert Scale from "can be taught" to "cannot be taught," with mean scores of 1-2.5 considered as supporting the authorization for teaching of that course, and scores over 3.5 considered as a non-supportive for authorization. The course choices were taken from the areas identified in the K-12 student academic content standards and frameworks that are typically taught in high schools. All three groups agreed that algebra and geometry could be taught with a basic mathematics credential, and that linear algebra, mathematics analysis, advanced placement probability and statistics, and calculus could not. There was support by mathematics and mathematics education faculty for the teaching of algebra 2, and less support generally for probability and statistics and trigonometry.

The above data are a reasonable starting point for discussions to determine the level of mathematics knowledge required and courses authorized to be taught by holders of a basic mathematics credential, should the Commission approve creation of a two-tiered mathematics credential. They have the following limitations:

- Course titles were used as surrogates for the Subject Matter Requirements (SMRs) currently under development by the single subject mathematics panel. The possible basic and advanced level credentials should be referenced to those SMRs.
- Presumably, respondents had little opportunity to discuss the possibilities and consequences of such a bifurcated credential, especially across the three groups of mathematics educators. Such discussions are an essential part of developing specific proposals for a bifurcated credential.

Impact of a Two-Tiered Mathematics Credential on the Work of District/School Administrators

One issue of concern noted by ACSA has been the possible affect of a two-tiered mathematics credential on the work of district and school administrators. The surveys to these groups asked specific questions about the perceived impact of a two-tiered mathematics credential on their work. Human resource directors were asked about how the two-tiered system would affect assigning teachers to schools, monitoring assignments in mathematics, and bargaining with the union. Middle and high school principals were asked how the two-tiered credential would impact their assignments of teachers to courses and to describe other areas of potential change. Responses are summarized in Table 4:

Table 4. Potential Impact on District and School Administrators of Creating a Two-Tier Math Credential.

Position	Task	Some Change	No Change
HR Directors	Assign Teachers to Schools	65%	35%
	Monitor Assignments	58%	42%
	Bargaining	19%	81%
Principals	Assign Teachers to courses	56%	44%

Opinions varied about the nature of these changes. Some saw the two-tiered system as increasing their assignment flexibility, while others anticipated a decrease in flexibility. The outcome varied for some depending on whether they saw the potential change as increasing or decreasing the pool of potential teachers. Administrators raised issues about the number of regulations that might result, the additional workloads in hiring more mathematics teachers, and possible reclassifications of existing personnel. A rich set of administrator comments were captured and analyzed from the surveys, providing insight into how to work effectively with administrators to minimize potential negative impacts of the proposed change in the mathematics credential. Recall that both administrators groups favored the creation of the two tiered credential.

Summary

The survey responses indicate that there is support for a two-tiered mathematics credential. Respondents view a basic and advanced credential structure as a means of increasing the pool of individuals who are certified to teach mathematics, by enhancing opportunities for mathematically-adept individuals to become qualified to teach basic and intermediate mathematics courses in a middle school or high school setting.

Many respondents took advantage of the opportunity to make comments on their returned surveys, explaining the rationale for their responses, and elaborating on the issues that a two-tiered system would present. Many of the comments centered on the issues of teacher quality, and the adequacy of content preparation for the lower level mathematics courses, with strong opinions expressed on both sides of the argument. For others, the quantity issue was paramount,

again with assertions on both sides as to the overall affect on the pool of legitimizing a pathway that focused on the mathematics preparation of content taught in earlier high school mathematics courses. There seemed to be less disagreements about the benefits of a two-tiered system to middle school mathematics teachers (their quality and size of the pool). Other comments focused on the practicalities of creating a two-tiered system, and the adjustments that would be needed to implement it successfully. These comments have been summarized, with the summaries and raw data made available for future discussions on the two-tiered credential in mathematics.

The state has experienced a shortage of qualified mathematics teachers for several years. Moreover, the demand for credentialed mathematics teachers exceeds the number of individuals who obtain a mathematics credential or supplementary authorization in mathematics each year. The California State University has recently released a report indicating a slow decline in the number of students majoring in mathematics at state university campuses. This shortage is projected to continue in the future due to the relatively small enrollments in mathematics subject matter programs, anticipated growth in the student population, and policy initiatives that will require students to take algebra and geometry earlier in their school careers.

Recommendations

The study results indicate that a two-tiered mathematics credential may enhance opportunities for talented individuals to become credentialed mathematics teachers. In theory, the two-tiered credential structure could lead to an increase the pool of teachers who are qualified to teach basic and intermediate mathematics courses in our public schools. Yet, important policy questions must be answered in order to more fully understand how such a credential structure could be part of the state's strategy to address the shortage of qualified mathematics teachers.

The courses that would be authorized by the basic and advanced credentials remains an important policy question. Which courses in the high school curriculum should be authorized by someone who holds an advanced credential? Which courses in the middle school and high school curriculum should be taught by someone with a basic mathematics credential? There are also important policy questions concerning the content that would be included in a subject matter programs, and implementation strategies in order to mitigate negative impacts on districts or school sites with unique circumstances. How and in what way should the content of a subject matter program leading to a basic credential differ from that required for the advanced credential? The staff recommend that the Commission direct staff to work with the Mathematics Subject Matter panel to identify the appropriate content and authorization levels for each credential and to develop recommendations for implementation strategies for a two-tiered credential.

Given the above field data and prior considerations by the single subject mathematics panel, staff recommends the following actions to the Commission:

1. That the single subject mathematics credential be bifurcated into a basic and an advanced level;

2. That the examination to determine subject matter competency be adapted to allow for an examination route for the basic and advanced level of credential; and
3. That the current single subject mathematics panel be charged with identifying appropriate SMRs for each mathematics credential level and the courses that would be authorized to be taught under each credential.

If the Commission acts in favor of these recommendations, staff will develop specific proposals for the bifurcation of the credential for discussion and action at the July 2002 Commission meeting.

Report on Collaborative Pilot Technology Partnership with Palo Alto Research Center (PARC)

Professional Services Division

April 29, 2002

Executive Summary

At its meeting of September 6, 2001, the Commission approved new Standards under SB 2042 for Elementary Subject Matter Preparation Programs and for Professional Teacher Preparation Programs, and an Implementation Plan for transitioning to these new sets of Standards. At its meeting of October 4, 2001, the Commission approved new Blended Program Standards under SB 2042, and at its meeting of March 7, 2002, the Commission approved new Induction Program Standards under SB 2042. As part of the program documents review process for program applications from institutions responding to the SB 2042 standards, Commission staff have been working with experts from the Palo Alto Research Center Incorporated (PARC) in a pilot technology-based process to facilitate electronic field reading of program documents as well as web-based readers' responses to program documents submitted to the Commission. This report documents these efforts and indicates next steps in the technology-facilitated implementation process.

Fiscal Impact Summary

The base budget of the Professional Services Division has been used to date to support the overall SB 2042 program documents reading process. The technology services from PARC have been provided at no cost to the Agency as part of the collaborative technology pilot process.

Policy Issues To Be Discussed

How can the documents review process for the SB 2042 program applications be facilitated through technology?

Report on Collaborative Pilot Technology Partnership with Palo Alto Research Center Incorporated (PARC)

Professional Services Division

April 22, 2002

Background Information

At its meeting of September 6, 2001, the Commission approved the adoption of new Standards of Quality and Effectiveness for Elementary Subject Matter Preparation and for Professional Teacher Preparation Programs. The Commission also approved an Implementation Plan that provides for a two-year transition, including an "early adoption" phase, for currently approved programs to rewrite and resubmit their program applications for approval under the new Teacher Preparation Standards to the Commission.

At its meeting of October 4, 2001, the Commission approved new Blended Program Standards under SB 2042, and at its meeting of March 7, 2002, the Commission approved new Induction Program Standards under SB 2042.

At the Commission meeting of April 11, 2002, staff provided an update on the implementation efforts and technical assistance being provided for programs making the transition to the SB 2042 standards. That update included a brief overview of the two major creative uses of technology to support SB 2042 implementation, including (1) the establishment of a special section on the CCTC website for items relating to the new standards and to the implementation process, so that institutions/programs could check frequently for updates; and (2) participation in piloting new web-based technology, developed by Palo Alto Research Center Incorporated (PARC), to facilitate statewide communications with and among the regional teams. Through this collaborative pilot technology partnership with PARC, staff has recently expanded the creative use of technology to include facilitation of the SB 2042 program documents review process.

The partnership with PARC came about originally through the Commission's "Preparing Tomorrow's Teachers to Use Technology" federal grant. Written into that grant application was a plan to participate in the "Summer Intern" program offered through a separate collaborative partnership between PARC and ACSA (Association of California School Administrators). ACSA was also one of the Commission's collaborative partners within the "Preparing Teachers to Use Technology" grant application. A Commission staff member participated during Summer, 2001, in the PARC Intern program, and, during that experience, met the PARC "Sparrow" software team. The Sparrow team was interested in working with educators to see how best the web-based interactive software they had developed might fit the needs of educators. It appeared at that time that the work the Commission was about to embark on in terms of a statewide transition to new teacher preparation program standards would be an appropriate pilot test model for the application of Sparrow technology to large-scale educational projects. An agreement was developed between PARC and the Commission to establish the collaborative pilot technology project, beginning in Fall, 2001.

The remainder of this agenda item will describe the progress made through the collaborative pilot technology project, and indicate the next steps in the process.

A. Description of the PARC "Sparrow" Software and PARC Contributions to the Pilot Technology Partnership.

"Sparrow" is essentially a web-based, group sharable and group editable software program that allows for messages and documents to be viewed, edited, modified and/or exchanged in real time among any numbers of users, independent of the particular equipment configurations and locations of the users. The software is flexible, and the Sparrow pages can be reconfigured to meet the needs of particular or specific tasks and/or users. The specific pages developed for CCTC use will be described in the section below. The Sparrow site is secure, with protected login and passwords.

The PARC team has contributed extensive time, material, equipment and labor to the successful Sparrow technology pilot with the Commission. The PARC team has been willing to accommodate, upon request of the CCTC staff, consistently-expanding uses and applications of the Sparrow software for the SB 2042 documents reading process.

B. Uses of Sparrow in the SB 2042 Implementation Process

1. Regional Technical Assistance Teams: The initial use of Sparrow was as a vehicle to facilitate the communication process among the five Regional Technical Assistance Teams. The specific Sparrow pages developed for this purpose include:

- *To Do Lists* for the Regional Technical Assistance Teams (to enable teams to keep track of their own team assignments in facilitating regional technical assistance meetings)
- *Main message page* to enable communications among CCTC staff and Regional Team staff, and to post questions and answers, as well as reference documents of general interest to team members.

Each regional team member was able to log on to the Sparrow site at any time and from any computer to access the needed information or to post a question or document.

2. SB 2042 Program Documents Reading Process: The use of Sparrow has expanded with the onset of the SB 2042 program documents review process. The software is now being used not only to facilitate general communications among CCTC staff and the entire cadre of readers, and to post documents submitted by institutions, but also to facilitate secure communications among only the members of the individual program documents review teams. For the document review process, the specific Sparrow pages (which are internally linked for user convenience) include:

- *Main teams access page* to enable general communications (posting messages, asking and answering questions, uploading and downloading documents of a general and/or reference nature)

- **Forms page**, to enable downloading of individual program review forms by members of the review teams.
- **Individual team pages**, to enable secure communications only among members of the individual teams, and to enable the shared development of the team's Summary Review Form (posted to the individual review team pages as per each team's reading assignment) that will ultimately provide feedback to the institution(s) that submitted the program(s) being reviewed by the team. Each team has three members.

Both the main page and the individual team pages are login and password protected to ensure security and confidentiality of the information and of the documents review process. The main page login and password were developed by PARC; the individual team page passwords were individually selected by the reader teams and inputted by PARC staff to the Sparrow system.

A demonstration of the Sparrow system and of several Sparrow pages will be provided at the Commission meeting by PARC Sparrow team members.

C. Next Steps

We anticipate using the Sparrow pilot software in an additional way to facilitate the reading process for subsequent SB 2042 documents submission windows. By being able to post large documents to this secure website, we can allow readers to access particular documents for review without the necessity to travel to Sacramento. This process will be particularly expedient to allow review teams to access additional information submitted subsequently by institutions to address any standard(s) identified during the review team's initial document reading to have not yet been met.

The use of the Sparrow pilot software will also be extended to the review of documents submitted in response to the SB 2042 Induction standards, beginning with the September, 2002 documents submission window. Documents review teams of three readers each will be trained on using this software during the September 16-18, 2002, documents review process.

*California
Commission on Teacher Credentialing*

*Meeting of
June 6, 2002*

AGENDA ITEM NUMBER: **PREP -4**

COMMITTEE: **Preparation Standards Committee**

TITLE: **Recommendation to Award a Contract to Conduct a
Study of the Impact of BTSA on Student Learning**

 X **Action**

 Information

Strategic Plan Goal(s):
**Goal 1: Promote educational excellence through the preparation and certification
of professional educators**

Prepared By: _____ **Date:** _____
 Amy Jackson
 Administrator of Examinations and Research

Approved By: _____ **Date:** _____
 Mary Vixie Sandy
 Director, Professional Services Division

Authorized By: _____ **Date:** _____
 Dr. Sam Swofford
 Executive Director

**Recommendation to Award a Contract to Conduct a Study of the Impact of
BTSA on Student Learning**

**Professional Services Division
June 6, 2002**

Executive Summary

California's Title II Teacher Quality Enhancement State Grant, which the Commission administers on behalf of the Governor's Office, includes a budget item of \$450,000 in 2001-2002 for the purpose of studying the impact of the state's teacher induction program, the Beginning Teacher Support and Assessment (BTSA) program, on student learning. This agenda report provides background information about the proposed scope of work for the study. An in-folder item will follow on June 6, 2002, recommending a contractor to complete the study under the direction of Commission staff.

Policy Issues to be Resolved by the Commission

Should the Commission authorize the Executive Director to award a contract to the winning bidder to be announced at the June 7, 2002 Commission meeting, to study the impact of BTSA on student learning?

Fiscal Impact Statement

The costs for funding the study will be paid entirely from the Title II Teacher Quality Enhancement State Grant funds.

Recommendation

Staff recommends that the Commission authorize the Executive Director to award a contract to the winning bidder to be announced in an in-folder item at the June 7, 2002 Commission meeting.

Recommendation to Award a Contract to Conduct a Study of the Impact of BTSA on Student Learning

Professional Services Division

June 6, 2002

Background

California's Title II Teacher Quality Enhancement State Grant, which the Commission administers on behalf of the Governor's Office, includes a budget item of \$450,000 in 2001-2002 for the purpose of studying the impact of the state's teacher induction program, the Beginning Teacher Support and Assessment (BTSA) program, on student learning. This agenda report provides background information and describes the scope of work for the study. An in-folder item will follow on June 7, 2002, recommending a contractor to complete the study under the direction of Commission staff.

Summary of the Request for Proposals

In spring of 2002, the Commission's Executive Director released a Request for Proposals seeking a contractor to conduct a study of the impact of the state's teacher induction program, the Beginning Teacher Support and Assessment (BTSA) program, on student learning. The study is to focus on programs using the state's prototype formative assessment, the California Formative Assessment and Support System for Teachers (CFASST), and on student learning in Reading/language arts in grades 3 through 5. The Contract will consist of (1) collecting and analyzing data related to teachers, their classrooms, and their students' learning, and (2) producing a written report on the findings. The data will include measures of the programs' effects on the teachers as well as measures of the teachers' effects on student learning. Commission staff will complete a review and evaluation of proposals submitted in response to the Request for Proposals on May 31, 2002 and prepare a recommendation for presentation to the Commission. Background on the BTSA program, the CFASST system and sources of student performance data are presented next, followed by an overview of the scope of work for this project. The proposal evaluation criteria and worksheets are included in Attachment A.

Beginning Teacher Support and Assessment Program (BTSA)

Established in 1992 based on a four-year pilot project, BTSA [co-sponsored by the California Department of Education (CDE) and The California Commission on Teacher Credentialing (CCTC)] provides opportunities for fully-prepared first and second year teachers to expand and deepen their teaching knowledge and skill. The BTSA Program also provides a smooth transition into the complex responsibilities of teaching, increases the retention of beginning teachers, and improves learning opportunities for their K-12 students.

The BTSA Program is designed for new teachers who have met all of the State's initial teaching credential standards. BTSA teachers have earned baccalaureate degrees, passed the CBEST, met

all subject matter standards, and completed professional preparation including either (1) at least one semester of supervised teaching or (2) at least one year of internship teaching in a public school. A distinctive feature of the BTSA Program is the use of an Individual Induction Plan (IIP) that the new teacher co-develops with the assistance of a support provider who does not serve in a traditional supervisory role. In developing the IIP, the new teacher and support provider are informed by the results of a systematic formative assessment of the new teacher's practice in relation to the California Standards for the Teaching Profession (CSTP). The formative assessment identifies, in relation to the CSTP, the areas of prior development and needed further growth in teaching. BTSA teachers have sufficient background in teaching to utilize the results of comprehensive formative assessments of their teaching practice in consultation with their assigned mentors.

California Formative Assessment and Support System for Teachers (CFASST)

CFASST is a formative assessment process that provides support for beginning teachers and is designed to assist beginning teachers' professional development. The support and assessment system is both structured and flexible, and consists of a series of events that focus teachers through a "plan, teach, reflect, apply" process, that blends teaching knowledge with performance. CFASST is grounded in a developmental view of teaching and integrates the CSTP and the California Student Academic Content Standards. It is intended to be used by first- and second-year teachers with the assistance of an experienced teacher (referred to in the rest of this document as a "support provider"); in doing so it promotes collaboration and communication among beginning teachers and experienced teachers.

Beginning teachers are supported in their development as professionals through an on-going process of planning and teaching lessons, reflecting on the results, and making informed adjustments to their instruction. They become skilled at analyzing their practice, sharing ideas and knowledge about teaching with other new teachers, and learning from experienced colleagues. CFASST assessment components consist of the following:

1. **Class, School, District and Community Profile.** The beginning teacher and support provider define the beginning teacher's teaching context, students' strengths and needs, and implications for instruction. This document is periodically updated to reflect changes in the student roster or teaching context.
2. **Inquiry.** A four- to six- week exploration of a critical teaching topic. An inquiry includes a structured series of activities in which beginning teachers and support providers investigate a particular aspect of practice in depth using a problem solving process of plan, teach, reflect and apply. Each inquiry closes with a collaborative assessment of the beginning teacher's practice using the Description of Practice (DOP) scales.
3. **Profile of Practice.** A trained support provider conducts formal observations of a beginning teacher's instruction. The process includes designing instruction, conducting the lesson, collecting student work, and reflecting on practice. This method also follows

the plan, teach, reflect and apply process and concludes with an assessment using the DOPs.

4. Individual Induction Plan. An organizer that a beginning teacher and support provider create to focus and guide professional development and further education. The IIP is linked directly to evidence based findings from CFASST events and assessments of practice. The IIP acts as the super-organizer for the teacher's development goals during each year of the process.

The activities in CFASST differ between Year One and Year Two, with Year Two being focused more closely on instruction and assessment based on state-adopted academic content standards.

Research on CFASST has shown that programs vary in the quality of their implementation, i.e., the quality and quantity of feedback on teaching practice. These small scale studies, relying upon classroom observations and/or interviews with beginning teachers, support providers, and program staff, suggest that this variation affects teaching practice. Potential Contractors should be aware that CFASST has recently been revised substantially, responding to evaluation results; the revision is in its first full year of implementation. In addition, when CFASST was in the pilot stage, not all programs were able to assist all teachers in completing the entire set of events. Therefore the experiences of teachers who participated in CFASST in earlier years is not comparable to that of present teachers.

Data on Student Learning

Teachers and districts use a variety of assessments to measure student learning. There is a single set of existing measures of student learning that are standardized across California. The 2001 Standardized Testing and Reporting (STAR) Program, authorized by Senate Bill 376 (Alpert) in October 1997, includes three components; the Stanford Achievement Test, Ninth Edition, Form T (SAT-9); the California Standards Tests in language arts and mathematics; and the Spanish Assessment of Basic Education, 2nd Edition (SABE/2).

The SAT-9 was administered to nearly all California students in grades 2 through 11 between 1999 and 2001. Because the SAT-9 is a nationally-normed test that has not changed in any way over the four years that it has been administered in California, results from 2001 can be compared directly to results from 1999 and 2000. The results of the SAT-9 are used for California's Academic Performance Index (API). Student achievement data aggregated at the school level are available from the California Department of Education's website (www.cde.ca.gov); student achievement data aggregated at the classroom level must be obtained from individual districts.

Scope of Work

The RFP describes the purpose of the work related to the data collection, analysis, and reporting that the Commission expects the contractor to implement. The intent of the study is to produce findings about the effects of BTSA programs on student learning that are generalizable to the

greatest extent possible. The response to this section of the RFP in the winning bid will be included in the Commission's in-folder item on June 6.

TASK 1: Collection of Data

A plan for sampling beginning teachers and collecting data will be proposed in the response to this RFP. Upon award of the contract, the Project Officer will discuss with the Contractor relevant BTSA data to afford the Contractor a deeper understanding of available data. In light of this new information, the Contractor will refine the proposed methodology, including data collecting instruments, and the analysis plan.

Once the analysis plan has been approved by the Project Officer, the Contractor will collect data on beginning teachers instructing students in English in grades 3 through 5. This task will involve working directly with schools districts and county offices of education that sponsor BTSA programs. As data is being collected, the Contractor will inform the Project Officer of any difficulties that would affect the integrity of the data or the analysis plan. The Project Officer will work with the Contractor to resolve any problems encountered, modifying the data collection and analysis plan as needed.

TASK 2: Analysis of Data

A plan for analyzing the data proposed to be collected will be described in the response to this RFP, and revised in conjunction with the activities described in Task 1. The Contractor will carry out the revised analysis plan according to the methodology and data approved by the Project Officer.

TASK 3: Reporting of Data

The Contractor will present for review by the Commission staff a report reflecting the preliminary findings based on the data analysis completed in Task 2. Following the Commission staff's review of these findings, the Contractor will make the revisions resulting in a final written report. The report should be useful and informative to policymakers, educators, and the general public so that they can understand both the study and its findings. The report will meet the content and format requirements of the Project Officer. The Contractor will provide an electronic version of the format in Microsoft Word 98 for MacIntosh. In addition to the report, the Contractor will submit electronic copies of data files used for analysis. The Commission's staff will complete the report in final form for the Commission's consideration.

Critical Project Dates

The following critical project dates were described in the RFP.

Monthly	Meet with Commission staff to provide project updates.
June, 2002	Meet with Commission staff to establish a methodology and data collection and analysis plan.
Sept., 2003	Provide a written report on preliminary findings.
Nov., 2003	Provide a full written report on the impact of BTSA on student learning in grades 3 through 5 in the area of English/Language Arts.

Attachment A: Proposal Evaluation Criteria

	Maximum Score
<p>(1) <u>Plan for Data Collection, Analysis, and Completion of Reports.</u> The proposal provides a feasible workplan to complete the scope of work outlined in Part Two of this RFP. Sufficient detail is provided to know what the bidder plans to do. The bidder clearly understands the key issues involved in the tasks to be performed. The proposal presents clear evidence that the bidder will provide high quality products and services.</p> <ul style="list-style-type: none"> • Task 1 15 • Task 2 10 • Task 3 5 	30
<p>(2) <u>Project Schedule.</u> The proposal includes a well-organized, properly sequenced, and feasible project schedule for completion of all three tasks and meets the critical project dates specified in Part Three of this RFP.</p>	10
<p>(3) <u>Bidder Capability.</u> The proposal demonstrates that the bidder has (a) experience and expertise in similar studies, and (b) sufficient resources to conduct the contracted tasks and provide the contracted products and services with high quality within the proposed timeline. The bidder possesses expertise in all areas essential to the project. The proposal includes a sound, feasible plan to organize managers and staff members to deliver the required products and services efficiently and with high quality. Key duties would be assigned to individuals with essential expertise, experience, and time to complete their responsibilities.</p> <ul style="list-style-type: none"> • Bidder experience 5 • Bidder resources 5 • Sound, feasible organizational plan 5 • Qualifications and experience of key staff 10 	25
<p>(4) <u>Project Costs.</u> The costs proposed by the bidder are reasonable in relation to the products and services to be provided, and competitive in relation to the costs proposed by other bidders.</p>	25
<p>(5) <u>Presentation.</u> The proposal is clearly written, to the point, and well-organized. Ideas are presented logically and all requested information is presented skillfully without redundancy.</p>	10
Maximum Possible Score	100

**Recommendation to Award a Contract to Conduct a Study of the Impact of
BTSA on Student Learning**

Professional Services Division

June 6, 2002

Executive Summary

California's Title II Teacher Quality Enhancement State Grant, which the Commission administers on behalf of the Governor's Office, includes a budget item of \$450,000 in 2001-2002 for the purpose of studying the impact of the state's teacher induction program, the Beginning Teacher Support and Assessment (BTSA) program, on student learning. This agenda report provides background information about the proposed scope of work for the induction study. Professional Services staff recommends that the Commission enters into a contractual agreement with Educational Testing Service to complete the study under the direction of Commission staff.

Policy Issues to be Resolved by the Commission

Should the Commission authorize the Executive Director to award a contract Educational Testing Service, to study the impact of BTSA induction on student learning?

Fiscal Impact Statement

The costs for funding the study will be paid entirely from the Title II Teacher Quality Enhancement State Grant funds.

Recommendation

Staff recommends that the Commission authorize the Executive Director to award a contract to Educational Testing Service at the June 7, 2002 Commission meeting.

- Contract Number TCC-1075

- Contractor Educational Testing Service

- Contracting Period July 2002 until August 31, 2003

- Purpose of the Contract To study the impact of BTSA induction on student learning.

- Method of Procurement Request for Proposals

- Total Contract Amount \$449,938

- Source of Funding Title II Teacher Quality Enhancement State Grant Funds

Recommendation to Award a Contract to Conduct a Study of the Impact of BTSA on Student Learning

Professional Services Division

June 6, 2002

Background

California's Title II Teacher Quality Enhancement State Grant, which the Commission administers on behalf of the Governor's Office, includes a budget item of \$450,000 in 2001-2002 for the purpose of studying the impact of the state's teacher induction program, the Beginning Teacher Support and Assessment (BTSA) program, on student learning. This agenda report provides background information and describes the scope of work for the study. Staff recommends that the Commission authorize the Executive Director to award a contract to Educational Testing Service to study the impact of BTSA induction on student learning.

Summary of the Request for Proposals

In spring of 2002, the Executive Director released a Request for Proposals seeking a contractor to conduct a study of the impact of the state's teacher induction program, the Beginning Teacher Support and Assessment (BTSA) program, on student learning. The study is to focus on programs using California's prototype formative assessment, the California Formative Assessment and Support System for Teachers (CFASST), and on student learning in Reading/language arts in grades 3 through 5. The Contract will consist of (1) collecting and analyzing data related to teachers, their classrooms, and their students' learning, and (2) producing a written report on the findings. The data will include measures of the programs' effects on the teachers as well as measures of the teachers' effects on student learning. Commission staff completed a review and evaluation of proposals submitted in response to the Request for Proposals on May 31, 2002 and prepared a recommendation for presentation to the Commission. Background on the BTSA program, the CFASST system and sources of student performance data are presented next, followed by an overview of the scope of work for this project. The proposal evaluation criteria and worksheets are included in Attachment A.

Beginning Teacher Support and Assessment Program (BTSA)

Established in 1992 based on a four-year pilot project, BTSA [co-sponsored by the California Department of Education (CDE) and The California Commission on Teacher Credentialing (CCTC)] provides opportunities for fully-prepared first and second year teachers to expand and deepen their teaching knowledge and skill. The BTSA Program also provides a smooth transition into the complex responsibilities of teaching, increases the retention of beginning teachers, and improves learning opportunities for their K-12 students.

The BTSA Program is designed for new teachers who have met all of the State's initial teaching credential standards. BTSA teachers have earned baccalaureate degrees, passed the CBEST, met

all subject matter standards, and completed professional preparation including either (1) at least one semester of supervised teaching or (2) at least one year of internship teaching in a public school. A distinctive feature of the BTSA Program is the use of an Individual Induction Plan (IIP) that the new teacher co-develops with the assistance of a support provider who does not serve in a traditional supervisory role. In developing the IIP, the new teacher and support provider are informed by the results of a systematic formative assessment of the new teacher's practice in relation to the California Standards for the Teaching Profession (CSTP). The formative assessment identifies, in relation to the CSTP, the areas of prior development and needed further growth in teaching. BTSA teachers have sufficient background in teaching to utilize the results of comprehensive formative assessments of their teaching practice in consultation with their assigned mentors.

California Formative Assessment and Support System for Teachers (CFASST)

CFASST is a formative assessment process that provides support for beginning teachers and is designed to assist beginning teachers' professional development. The support and assessment system is both structured and flexible, and consists of a series of events that focus teachers through a "plan, teach, reflect, apply" process, that blends teaching knowledge with performance. CFASST is grounded in a developmental view of teaching and integrates the CSTP and the California Student Academic Content Standards. It is intended to be used by first- and second-year teachers with the assistance of an experienced teacher (referred to in the rest of this document as a "support provider"); in doing so it promotes collaboration and communication among beginning teachers and experienced teachers.

Beginning teachers are supported in their development as professionals through an on-going process of planning and teaching lessons, reflecting on the results, and making informed adjustments to their instruction. They become skilled at analyzing their practice, sharing ideas and knowledge about teaching with other new teachers, and learning from experienced colleagues. CFASST assessment components consist of the following:

1. **Class, School, District and Community Profile.** The beginning teacher and support provider defines the beginning teacher's teaching context, students' strengths and needs, and implications for instruction. This document is periodically updated to reflect changes in the student roster or teaching context.
2. **Inquiry.** A four- to six- week exploration of a critical teaching topic. An inquiry includes a structured series of activities in which beginning teachers and support providers investigate a particular aspect of practice in depth using a problem solving process of plan, teach, reflect and apply. Each inquiry closes with a collaborative assessment of the beginning teacher's practice using the Description of Practice (DOP) scales.
3. **Profile of Practice.** A trained support provider conducts formal observations of a beginning teacher's instruction. The process includes designing instruction, conducting the lesson, collecting student work, and reflecting on practice. This method also follows the plan, teach, reflect and apply process and concludes with an assessment using the DOPs.

4. Individual Induction Plan. An organizer that a beginning teacher and support provider create to focus and guide professional development and further education. The IIP is linked directly to evidence based findings from CFASST events and assessments of practice. The IIP acts as the super-organizer for the teacher's development goals during each year of the process.

The activities in CFASST differ between Year One and Year Two, with Year Two being focused more closely on instruction and assessment based on state-adopted academic content standards.

Research on CFASST has shown that programs vary in the quality of their implementation, i.e., the quality and quantity of feedback on teaching practice. These small-scale studies, relying upon classroom observations and/or interviews with beginning teachers, support providers, and program staff, suggest that this variation affect teaching practice. Potential Contractors should be aware that CFASST has recently been revised substantially, responding to evaluation results; the revision is in its first full year of implementation. In addition, when CFASST was in the pilot stage, not all programs were able to assist all teachers in completing the entire set of events. Therefore the experiences of teachers who participated in CFASST in earlier years is not comparable to that of present teachers.

Data on Student Learning

Teachers and districts use a variety of assessments to measure student learning. There is a single set of existing measures of student learning that are standardized across California. The 2001 Standardized Testing and Reporting (STAR) Program, authorized by Senate Bill 376 (Alpert) in October 1997, includes three components; the Stanford Achievement Test, Ninth Edition, Form T (SAT-9); the California Standards Tests in language arts and mathematics; and the Spanish Assessment of Basic Education, 2nd Edition (SABE/2).

The SAT-9 was administered to nearly all California students in grades 2 through 11 between 1999 and 2001. Because the SAT-9 is a nationally normed test that has not changed in any way over the four years that it has been administered in California, results from 2001 can be compared directly to results from 1999 and 2000. The results of the SAT-9 are used for California's Academic Performance Index (API). Student achievement data aggregated at the school level are available from the California Department of Education's website (www.cde.ca.gov); student achievement data aggregated at the classroom level must be obtained from individual districts.

Scope of Work

The RFP describes the purpose of the work related to the data collection, analysis, and reporting that the Commission expects the contractor to implement. The intent of the study is to produce

findings about the effects of BTSA induction programs on student learning that are generalizable to the greatest extent possible. The RFP requires completion of the following three tasks.

TASK 1: Collection of Data

A plan for sampling beginning teachers and collecting data was proposed in the response to the RFP. Upon award of the contract, the Project Officer will discuss with the Contractor relevant BTSA data to afford the Contractor a deeper understanding of available data. In light of this new information, the Contractor will refine the proposed methodology, including data collecting instruments, and the analysis plan.

Once the Project Officer has approved the analysis plan, the Contractor will collect data on beginning teachers instructing students in English in grades 3 through 5. This task will involve working directly with schools districts and county offices of education that sponsor BTSA programs. As data is being collected, the Contractor will inform the Project Officer of any difficulties that would affect the integrity of the data or the analysis plan. The Project Officer will work with the Contractor to resolve any problems encountered, modifying the data collection and analysis plan as needed.

TASK 2: Analysis of Data

A plan for data analysis was described in the response to the RFP, and will be revised in conjunction with the activities described in Task 1. The Contractor will carry out the revised analysis plan according to the methodology and data approved by the Project Officer.

TASK 3: Reporting of Data

The Contractor will present for review by the Commission staff a report reflecting the preliminary findings based on the data analysis completed in Task 2. Following the Commission staff's review of these findings, the Contractor will make the revisions resulting in a final written report. The report should be useful and informative to policymakers, educators, and the general public so that they can understand both the study and its findings. The report will meet the content and format requirements of the Project Officer. The Contractor will provide an electronic version of the format in Microsoft Word 98 for MacIntosh. In addition to the report, the Contractor will submit electronic copies of data files used for analysis. The Commission's staff will complete the report in final form for the Commission's consideration.

Critical Project Dates

The following critical project dates were described in the RFP.

Monthly	Meet with Commission staff to provide project updates.
June, 2002	Meet with Commission staff to establish a methodology and data collection and analysis plan.
Sept., 2003	Provide a written report on preliminary findings.
Nov., 2003	Provide a full written report on the impact of BTSA on student learning in grades 3 through 5 in the area of English/Language Arts.

The Proposal Review Process and Results

The proposals submitted in response to the RFP were reviewed according to guidelines established in the *State Contracting Manual* for conducting competitive bidding procedures. A five-member Proposal Review Team participated in the evaluation and scoring of the proposals.

The Proposal Review Team

The Proposal Review Team was comprised of individuals with various areas of expertise so each team member's unique perceptions would complement those of other team members. No team member was expected to be an "expert" in all areas to be evaluated, nor was the outcome of the proposal review process unduly influenced by any one person or point of view. For this proposal review, all of the individuals on the team were Commission staff. Proposal Review Team members are listed below:

- Teri Clark
Consultant, Teacher Development Programs
Professional Services Division

- Kendyll Stansbury
Consultant, Teacher Development Programs
Professional Services Division

- Michael McKibben
Consultant, Teacher Development Programs
Professional Services Division

- Leyne Milstein
Consultant
Office of Governmental Relations

- Amy Jackson
Administrator, Examinations and Research
Professional Services Division

Results of the Proposal Review Process

Table A shows, for each of the three proposals, the total score awarded at the conclusion of the review process.

Bidder	Scores (Total Possible Score = 500)
Educational Testing Service (ETS)	401
RMC/WestEd	283
Adaptive Solutions Consulting	174

Recommendation

Staff recommends that the Commission authorize the Executive Director to enter into a contract with Educational Testing Service to study the impact of BTSA induction on student learning.

Attachment A: Proposal Evaluation Criteria

	Maximum Score
<p>(1) <u>Plan for Data Collection, Analysis, and Completion of Reports.</u> The proposal provides a feasible work plan to complete the scope of work outlined in Part Two of this RFP. Sufficient detail is provided to know what the bidder plans to do. The bidder clearly understands the key issues involved in the tasks to be performed. The proposal presents clear evidence that the bidder will provide high quality products and services.</p> <ul style="list-style-type: none"> • Task 1 15 • Task 2 10 • Task 3 5 	30
<p>(2) <u>Project Schedule.</u> The proposal includes a well-organized, properly sequenced, and feasible project schedule for completion of all three tasks and meets the critical project dates specified in Part Three of this RFP.</p>	10
<p>(3) <u>Bidder Capability.</u> The proposal demonstrates that the bidder has (a) experience and expertise in similar studies, and (b) sufficient resources to conduct the contracted tasks and provide the contracted products and services with high quality within the proposed timeline. The bidder possesses expertise in all areas essential to the project. The proposal includes a sound, feasible plan to organize managers and staff members to deliver the required products and services efficiently and with high quality. Key duties would be assigned to individuals with essential expertise, experience, and time to complete their responsibilities.</p> <ul style="list-style-type: none"> • Bidder experience 5 • Bidder resources 5 • Sound, feasible organizational plan 5 • Qualifications and experience of key staff 10 	25
<p>(4) <u>Project Costs.</u> The costs proposed by the bidder are reasonable in relation to the products and services to be provided, and competitive in relation to the costs proposed by other bidders.</p>	25
<p>(5) <u>Presentation.</u> The proposal is clearly written, to the point, and well organized. Ideas are presented logically and all requested information is presented skillfully without redundancy.</p>	10
Maximum Possible Score	100

**California
Commission on Teacher Credentialing**

**Meeting of
June 6, 2002**

AGENDA ITEM NUMBER: PREP-5

COMMITTEE: Preparation Standards Committee

TITLE: Report on the Relationship between AB 75
Criteria for Administrator Training and
Requirements for the Professional Clear
Administrative Services Credential

XX Action

XX Information

Strategic Plan Goal(s):

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

Prepared By: _____ **Date:** _____
**Mary Vixie Sandy, Director
Professional Services Division**

Authorized By: _____ **Date:** _____
**Dr. Sam W. Swofford
Executive Director**

Report on the Relationship between AB 75 Criteria for Administrator Training and Requirements for the Professional Clear Administrative Services Credential

Professional Services Division

May 20, 2002

Executive Summary

The Commission studied issues and options in the preparation and licensure of administrators for several months. During its March 2002 meeting, the adopted an action plan to accomplish the following objectives:

- Provide greater flexibility to districts in employing individuals for administrative positions at the district level;
- Recast administrator standards, preparation and induction to focus on instructional leadership, and success for all students;
- Authorize alternative, accredited, standards-based routes to the credential, including preparation offered by local school districts;
- Ensure licensure portability for administrators prepared in other states;
- Restructure the professional clear credential requirements to focus on mentoring, support and assistance;
- Allow capable, experienced individuals to demonstrate their knowledge, skills and abilities, consistent with credential requirements, through a combination of written and performance-based measures.

One of the key questions that is before the Commission in its reform of this credential is the relationship between the AB 75 training for administrators and the requirements for earning a Professional Clear Administrative Services Credential. The State Board of Education will be acting during their May 2002 meeting to approve local education agencies as providers of AB 75 administrator training programs. Staff is reviewing the AB 75 criteria with a design team appointed by the Executive Director and will bring a more detailed analysis of the relationship between AB 75 and the requirements for the professional clear credential as an in-folder item in June.

Policy Question

What is the relationship between AB 75 Administrator Training Programs and the requirements for a Professional Clear Administrative Services Credential?

California Commission on Teacher Credentialing

*Meeting of
June 6, 2002*

AGENDA ITEM NUMBER: PREP – 5 IN-FOLDER

COMMITTEE: Preparation Standards Committee

**TITLE: Report on the Relationship Between AB 75 Criteria for
Administrator Training and the Requirements for the
Professional Administrative Services Credential**

 Action

 XX **Information**

Strategic Plan Goal(s):

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

Prepared By: _____ **Date:** _____
Mary Vixie Sandy, Director
Professional Services Division

Prepared By: _____ **Date:** _____
Leyne Milstein, Consultant
Office of Governmental Relations

Authorized By: _____ **Date:** _____
Sam W. Swofford, Ed.D.
Executive Director

**Report on the Relationship Between AB 75 Criteria
for Administrator Training and the Requirements for the Professional
Administrative Services Credential**

**Professional Services Division
June 5, 2002**

Executive Summary

During its March 2002 meeting, the Commission adopted an action plan to accomplish the following objectives regarding the Administrative Services Credential:

- Provide greater flexibility to districts in employing individuals for administrative positions at the district level;
- Recast administrator standards, preparation and induction to focus on instructional leadership, and success for all students;
- Authorize alternative, standards-based routes to the credential, including preparation offered by local school districts;
- Ensure licensure portability for administrators prepared in other states;
- Restructure the professional clear credential requirements to focus on mentoring, support and assistance;
- Allow capable, experienced individuals to “test out” of credential requirements, through a combination of written and performance-based measures.

To implement the action plan, the Commission is sponsoring legislation and pursuing changes in Title 5 regulations, and the Executive Director has appointed a design team to assist staff in revising standards of quality and effectiveness for Administrative Service Credential preparation programs. This agenda report provides an update on the work of the design team and provides some analysis of AB 75 (Steinberg, 2001) and its relationship to the requirements for earning a professional administrative services credential.

Policy Question

How does AB 75 relate to the requirements for earning a professional administrative services credential?

Fiscal Impact Summary

The recommendations in this report can be implemented within the Commission’s base budget.

Report on the Relationship Between AB 75 Criteria for Administrator Training and the Requirements for the Professional Administrative Services Credential

Professional Services Division June 4, 2002

Background

The structure and content of administrator preparation has been a topic of great discussion in California for the last eighteen months, and as such, has received considerable attention from the Commission. During its March 2002 meeting, the Commission adopted an action plan to accomplish the following objectives:

- Provide greater flexibility to districts in employing individuals for administrative positions at the district level;
- Recast administrator standards, preparation and induction to focus on instructional leadership, and success for all students;
- Authorize alternative, standards-based routes to the credential, including preparation offered by local school districts;
- Ensure licensure portability for administrators prepared in other states;
- Restructure the professional clear credential requirements to focus on mentoring, support and assistance;
- Allow capable, experienced individuals to “test out” of credential requirements, through a combination of written and performance-based measures.

To implement the action plan, the Commission is sponsoring legislation and pursuing changes in Title 5 regulations, and the Executive Director has appointed a design team to assist staff in revising standards of quality and effectiveness for Administrative Service Credential preparation programs. This agenda report provides an update on the work of the design team and provides some analysis of AB 75 (Steinberg, 2001) and its relationship to the requirements for earning a professional administrative services credential.

New Options for Earning an Administrative Services Credential

Following months of testimony and analysis of policy options regarding the content and structure of administrator preparation, the Commission took action to establish new options for earning the preliminary and professional Administrative Services Credential, as depicted in Table 1 on the next page. Under this new system, candidates for an administrative services credential will have multiple, standards-based options to choose from in order to obtain a preliminary or professional credential. The Commission sought to both increase the supply of qualified administrators and improve preparation through these reforms. New standards to govern these options are under development, and will be presented to the Commission for information and consideration in September or October.

Table 1: Proposed Standards-Based Options for Earning an Administrative Services Credential

PRE-REQUISITES	OPTIONS FOR PRELIMINARY CREDENTIAL	OPTIONS FOR PROFESSIONAL CREDENTIAL
<ul style="list-style-type: none"> ◆ CBEST ◆ Teaching or Services Credential ◆ Three years experience 	<ul style="list-style-type: none"> ◆ College or university based program ◆ IHE or LEA sponsored internship ◆ Approved program offered by an alternative provider ◆ CCTC approved Assessment 	<ul style="list-style-type: none"> ◆ College or university based program ◆ Approved program offered by an alternative provider ◆ AB 75 Principal Training Program ◆ Mastery of accredited fieldwork performance standards ◆ CCTC Approved Performance Assessment

Standards for the Administrative Services Credential

In March, 2002, the Commission directed staff to revise the standards governing preparation programs for the Administrative Services Credential, and to align them with the new California Professional Standards for Educational Leaders. In addition, the Commission directed that the requirements for earning the Professional Credential be recast to focus on mentoring, support and assistance. In May 2002, the Executive Director appointed a design team to assist staff in making revisions to the standards in response to Commission direction. The design team met for the first time on May 31, 2002, and there was strong consensus regarding use of the CPSELs as appropriate outcomes for administrators completing any option leading to the Preliminary Credential.

The options that will be enabled for earning the Professional Credential will require substantial revisions in the Commission’s existing standards as well. The Commission’s sponsored bill, SB 1655 (Scott) and proposed revisions to Title 5 regulations, in addition to last year’s AB 75 and existing law governing college and university based programs create an array of options that vary widely in their intensity, content and structure. Staff proposes to “unify” these disparate options by focusing standards for the professional credential on mentoring, support and assistance to new administrators, pursuant to Commission direction. Using the CPSEL standards as the “unifying concept” for the *preliminary* credential will ensure that all administrators enter the profession, regardless of their “route”, with a common knowledge and skill base. The particular route to a *professional* credential will depend on the needs of the new administrator as they are mentored into the profession. One of the questions that needs to be addressed is the extent to which training offered pursuant to AB 75 will count toward the requirements for the Professional Credential. The next sections of this report provide a summary of the requirements for the AB

75 Principal Training Program, and a brief analysis of the comparability of these requirements to the CPSEL standards.

Overview of the AB 75 Principal Training Program

AB 75 (Steinberg, Chapter 697 2001) establishes the Principal Training Program to provide professional development training to school-site administrators. The measure provides authorization to, and incentive funding for, Local Education Agencies (LEAs) to provide the training and requires the State Board of Education (SBE) to develop criteria for the approval of training providers, in consultation with the Commission on Teacher Credentialing (Commission) and other experts. In addition to state funding of \$15 million, the Gates Foundation has provided incentive matching funds for AB 75 professional development efforts in the amount of \$18 million. Funding is sufficient (at this time) to prepare all principals and vice-principals over a three-year period. Finally, the measure authorizes the Commission to approve an AB 75 training program as meeting a portion or all of the requirements to fulfill the standards for a professional clear administrative services credential.

Current Status

The SBE convened an advisory group of principals, district administrators, and other experts to develop and review the criteria for the approval of training providers. The Advisory Group met several times between October 2001 and January 2002 to develop and refine the criteria and requirements. On February 7, 2002 the SBE approved the draft criteria and requirements for the approval of training providers (technical amendments and additional detail from the Sacramento County Office of Education pending), which were finalized in the spring of 2002. The California Department of Education, in conjunction with the SBE released a request for proposals and the SBE acted to approve the release of funds to LEAs during their May 2002 meeting. No providers have been approved to offer the training as of this date. Pursuant to legislative intent, priority for the use of AB 75 and related funding will be given to key administrative staff in “low-performing” and “hard-to-staff” schools.

Summary of Requirements and Criteria

The criteria and requirements for the Principal Training Program are grounded in the SBE adopted K-12 academic content standards and curriculum framework with the ultimate goal of improving student academic achievement. Thus, the AB 75 criteria were developed with the clear expectation that training providers focus all training on improving student achievement through the...”thoughtful implementation of standards-based instruction, curriculum frameworks, instructional materials and the use of pupil assessment instruments”¹.

AB 75 training providers will be expected to design programs to fit the needs of individual local education agencies (LEAs), schools, and principals and differentiate the training program options to address various levels of principal experiences, current competencies and prior training. In cases where there is substantial evidence that an individual principal has already mastered the

¹ SBE AB 75 Draft Criteria

basic (and advanced, if available) content being offered by the provider, the individual principal may waive out of the training module(s) offered by the provider and instead participate in an alternative course of professional development. It is the responsibility of the LEA, in consultation with the provider and the individual, to determine an alternative course of professional development that is equal in time duration and rigor to the standard training. The requirements for individual principals to waive out of the standard training offered by the providers and proceed into an alternative course of professional development are detailed in the SBE criteria.

AB 75 requires that principals receive training in the following content areas, identified in subsection 44511(a):

- (1) School financial and personnel management.
- (2) Core academic standards.
- (3) Curriculum frameworks and instructional materials aligned to the state academic standards.
- (4) The use of pupil assessment instruments, specific ways of mastering the use of assessment data from the Standardized Testing and Reporting Program and school management technology to improve pupil performance.
- (5) The provision of instructional leadership and management strategies regarding the use of instructional technology to improve pupil performance.
- (6) Extension of the knowledge, skills and abilities acquired in the preliminary administrative preparation program that is designed to strengthen the ability of administrators to serve all pupils in the school to which they are assigned.

AB 75 content areas (a) (1) through (6) are required by law. AB 75 content area (b), below, is optional.

(b) The additional instruction and training areas that may be considered to improve pupil learning and achievement based upon the needs of participating school site administrators include pedagogies of learning, motivating pupil learning, collaboration, conflict resolution, diversity, parental involvement, employee relations and the creation of effective learning and workplace environments.

The AB 75 criteria specifies that training in these content areas will be provided in two phases, an Institute and a Follow-Up Practicum. The entire training program is divided into 3 modules aligned with general competencies. Each module includes guidelines for both the Institute phase and the Follow-Up Practicum phase. The Follow-Up Practicum offers significant opportunities for individualization and mentoring. Follow-up activities are expected to be tailored to the appropriate skill level and experience of the individual. The three modules are defined as follows:

Module 1: *Leadership & Support of Student Instructional Programs*

Module 1 should emphasize the knowledge and actions required to lead and assist teachers in fully implementing the standards-based instructional programs approved by

the local school board; and to plan, monitor and act on assessment data for improving instruction and student achievement.

Module 2: *Leadership & Management for Instructional Improvement*

Module 2 should clearly focus on the elements necessary to align monetary and human resources to appropriate priorities to support and monitor effectiveness of instruction and improvement on student achievement.

Module 3: *Instructional Technology to Improve Pupil Performance*

Module 3 should focus on technology applications, which link and support Module 1 and Module 2 in addition to serving a key role for process and system-wide improvements. Under the special funding and program considerations detailed by the Gates Foundation, technology will not be merely a stand-alone component of the training, but will be embedded throughout the training as a tool to support the principal's work as an instructional leader.

The requirements for the breadth and depth of the training curriculum for the modules is further detailed in the SBE criteria.

Providers may apply for approval to provide training in one or more modules and can only provide training for modules for which the SBE has approved them. LEAs can use an external provider for one or two modules, and apply to be their own provider for the remaining module(s). This will enable LEAs to create an effective program using a team of providers each with focused expertise and quality track records.

It is important to note that in order for schools to receive funding under AB 961 (Steinberg and Vasconcellos 2001), the High Priority Grant Program for Low Performing Schools, all principals in low-performing schools must participate in AB 75 training. Therefore, those principals may be required to complete preliminary requirements, professional clear requirements and AB 75 training, unless the Commission recognizes AB 75 training as equivalent, under new standards, to the professional clear credential requirements.

The Commission's direction to staff, to align new standards for administrator preparation with the CPSEL standards, raises the question, how will the Principal Training Program authorized under AB 75 relate to this "vision" of a competent administrator? A preliminary analysis shows a high degree of overlap, conceptually, between the domains of the CPSEL standards and the broad domains of the AB 75 criteria for training, as depicted in Table 2 on the next page. Training approved under AB 75 will focus more deeply on issues that are part of CPSELs Standard 2, with less attention to the full range of issues represented in the six CPSELs. In addition, training approved under AB 75 will focus on particular methods of improving school performance in the areas of reading and mathematics, and on ways to improve student achievement in low-performing schools. Given that in the future, all administrators will enter their second phase of preparation (leading to the professional credential) having had a comprehensive preparation in all aspects of the CPSELs, staff is leaning toward a recommendation that the Commission recognize AB 75 training, offered in a context wherein the candidate is mentored, supported and assisted, as fully meeting the requirements for the

professional credential in the future. This analysis is offered to stimulate discussion among Commissioners in order to inform staff regarding the Commission’s preferences in this matter.

Table 2: Comparison between California Professional Standards for Educational Leaders and AB 75 Criteria for the Principal Training Program.

CPSEL Standards	AB 75 Criteria
<p>Standard 1: A school administrator is an educational leader who promotes the success of all students by facilitating the development, articulation, implementation and stewardship of a vision of learning that is shared and supported by the school community.</p>	<p>44511(a)(6) Extension of the knowledge, skills and abilities acquired in the preliminary administrative preparation program that is designed to strengthen the ability of administrators to serve all pupils in the school to which they are assigned.</p>
<p>Standard 2: A school administrator is an educational leader who promotes the success of all students by advocating, nurturing, and sustaining a school culture and instructional program conducive to student learning and staff professional growth.</p>	<p>44511(a) (2) Core academic standards. 44511(a) (3) Curriculum frameworks and instructional materials aligned to the state academic standards. 44511(a) (4) The use of pupil assessment instruments, specific ways of mastering the use of assessment data from the Standardized Testing and Reporting Program and school management technology to improve pupil performance. 44511(a)(5) The provision of instructional leadership and management strategies regarding the use of instructional technology to improve pupil performance. 44511(a)(6) Extension of the knowledge, skills and abilities acquired in the preliminary administrative preparation program that is designed to strengthen the ability of administrators to serve all pupils in the school to which they are assigned. AB 75 Optional Area (b) The additional instruction and training areas that may be considered to improve pupil learning and achievement based upon the needs of participating school site administrators include pedagogies of learning, motivating pupil learning, collaboration, conflict resolution, diversity, parental involvement, employee relations and the creation of effective learning and workplace environments.</p>

<p>Standard 3: A school administrator is an educational leader who promotes the success of all students by ensuring management of the organization, operations and resources for a safe, efficient, and effective learning environment.</p>	<p>44511(a)(1) School financial and personnel management. 44511(a)(6) Extension of the knowledge, skills and abilities acquired in the preliminary administrative preparation program that is designed to strengthen the ability of administrators to serve all pupils in the school to which they are assigned.</p>
<p>Standard 4: A school administrator is an educational leader who promotes the success of all students by collaborating with families and community members, responding to diverse community interests and needs, and mobilizing community resources.</p>	<p>44511(a)(6) Extension of the knowledge, skills and abilities acquired in the preliminary administrative preparation program that is designed to strengthen the ability of administrators to serve all pupils in the school to which they are assigned. AB 75 Optional Area (b) The additional instruction and training areas that may be considered to improve pupil learning and achievement based upon the needs of participating school site administrators include pedagogies of learning, motivating pupil learning, collaboration, conflict resolution, diversity, parental involvement, employee relations and the creation of effective learning and workplace environments.</p>
<p>Standard 5: A school administrator is an educational leader who promotes the success of all students by modeling a personal code of ethics and developing professional leadership capacity.</p>	<p>44511(a)(6) Extension of the knowledge, skills and abilities acquired in the preliminary administrative preparation program that is designed to strengthen the ability of administrators to serve all pupils in the school to which they are assigned.</p>
<p>Standard 6: A school administrator is an educational leader who promotes the success of all students by understanding, responding to and influencing the larger political, social, economic, legal and cultural context.</p>	<p>44511(a)(6) Extension of the knowledge, skills and abilities acquired in the preliminary administrative preparation program that is designed to strengthen the ability of administrators to serve all pupils in the school to which they are assigned.</p>

**BILLS FOLLOWED BY THE
CALIFORNIA COMMISSION ON TEACHER CREDENTIALING**

**In-Folder
June 4, 2002**

SPONSORED BILLS

Bill Number – Author – Version Summary	Previous and Current CCTC Position Version (Date Adopted)	Status
SB 57 – Scott – Amended 8/30/01 Provides a “fast track” credential option for private school teachers and others who can demonstrate their knowledge, skills and abilities in the classroom.	Sponsor – Introduced version – (Dec. 2000)	Signed by the Governor. Chapter 269, Statutes of 2001.
SB 299 – Scott – Amended 8/30/01 Clarifies the Education Code Sections related to the Committee of Credentials and makes numerous non-controversial, technical and clarifying changes to the Education Code.	Sponsor – Introduced version – (Dec 2000)	Signed by the Governor. Chapter 342, Statutes of 2001.
SB 1655 - Adds Alternative, Standards-Based Routes to both the Preliminary and Professional Administrative Services Credentials.	Sponsor - As Drafted 2/21/02, SB 328 - (February 2002)	Assembly Education Committee. Hearing scheduled on June 12, 2002.
SB 1656 - Clarifies language in the Education Code to ensure that applications of and credentials held by registered sex offenders are automatically denied or revoked respectively.	Sponsor - Amended 1/7/02, SB 326 - (January 2002)	Assembly Education Committee. Hearing scheduled on June 12, 2002.

ASSEMBLY BILLS OF INTEREST TO CCTC

Bill Number – Author – Version Subject	Previous and Current CCTC Position Version (Date Adopted)	Status
<p>AB 75 – Steinberg – Amended 8/28/01 Creates a voluntary program to provide training to California’s principals and vice-principals to include academic standards, leadership skills, and the use of management and diagnostic technology. This is a Governor’s Initiative and the Governor’s Budget includes \$15 million for this program.</p>	<p>Watch – Introduced – (Feb 2001) Support – 2/22/01 – (March 2001)</p>	<p>Signed by the Governor. Chapter 697, Statutes of 2001</p>
<p>AB 272 – Pavley - Amended 7/18/01 Would make a holder's first clear multiple or single subject teaching credential valid for the life of the holder after two renewal cycles, if the holder meets specified requirements.</p>	<p>Oppose - Introduced version - (March 2001)</p>	<p>Vetoed.</p>
<p>AB 401 – Cardenas – Amended 5/01/01 Requires the SPI to contract with an independent evaluator to determine if there is a difference in the distribution of resources (including credentialed teachers and pre-intern, intern and paraprofessional programs) between low-performing schools and high-performing schools within school districts. The report would be due by January 1, 2004 and subject to funding through the Budget Act.</p>	<p>Watch – Introduced version – (April 2001)</p>	<p>Chapter 647, Statutes of 2001.</p>
<p>AB 721 – Steinberg – Amended 4/17/01 The CCTC could award grants to teacher preparation programs to develop or enhance programs to recruit, prepare and support new teachers to work and be successful in low performing schools.</p>	<p>Support – 3/29/01- (April 2001)</p>	<p>Assembly Committee on Appropriations suspense file.</p>
<p>AB 833 – Steinberg – Amended 7/18/01 Requires the SPI to calculate a teacher qualification index measuring a student's access to experienced credentialed teacher for each school.</p>	<p>Watch – 3/29/01 – (April 2001)</p>	<p>Vetoed.</p>

Bill Number – Author – Version Subject	Previous and Current CCTC Position Version (Date Adopted)	Status
AB 961 – Steinberg, Vasconcellos, Ortiz, Diaz et. al. – Amended 9/14/01 Establishes the High Priority Schools Grant Program to allocate \$200 million to low performing schools in API deciles one through five, with a priority for funding on the first and second deciles.		Signed by the Governor. Chapter 749, Statutes of 2001.
AB 1148 - Wyland – Amended 4/17/01 Would require the Legislative Analyst’s Office to identify the variables that account for significant differences in test performance in elementary and high schools where the schools have similar resources.	Watch – Introduced version – (April 2001)	Assembly Committee on Appropriations suspense file.
AB 1232 – Chavez – Amended 5/17/01 Would establish the California State Troops to Teachers Act. Retired officers or noncommissioned officers who agree to teach for five years and participate in a paraprofessional, pre-internship or internship program would be eligible for a bonus payment.	Seek Amendments – Introduced version – (March 2001) Support – 5/01/01 (May 2001)	Assembly Committee on Appropriations suspense file.
AB 1241 – Robert Pacheco – Amended 8/22/01 Would require the Chancellor of the California Community Colleges to submit a written report on the feasibility of the development of a uniform teacher preparation program.	Seek Amendments – Introduced version – (April 2001) Watch – 4/05/01 – (May 2001)	Signed by the Governor. Chapter 714 Statutes of 2001.
AB 1307 – Goldberg – Amended 8/28/01 Would require the CCTC to adopt regulations that provide credential candidates with less than 24 months to complete the program to not meet new requirements under specified conditions.	Oppose, Unless Amended – Introduced version – (April 2001) Approve – 6/27/01 (July 2001)	Signed by the Governor. Chapter 565 Statutes of 2001.
AB 1431 – Horton – Amended 9/7/01 Creates a pilot program, in a minimum of three districts, to provide a 3-day training program for substitute teachers in low performing schools. Requires Los Angeles Unified to be one of the three participants in the pilot program.	Watch – Introduced version – (April 2001)	Vetoed.

Bill Number – Author – Version Subject	Previous and Current CCTC Position Version (Date Adopted)	Status
AB 1462 - Nakano - Requires the Commission to be a member of a committee charged with increasing the number and improving the quality of vocational education teachers.	Watch - (1/29/02) - (February 2002)	Senate Education Committee. Scheduled for hearing on June 5, 2002.
AB 1662 – R. Pacheco – Amended 4/30/01 Would require a master's degree for the Pupil Personnel Services Credential.	Oppose – 5/02/01 – (May 2001)	Assembly Committee on Appropriations suspense file.
AB 2053 - Jackson - Authorizes beginning special education teachers to take part in BTSA even if they have taught previously on another credential, as funds are available. Provides the option to expedite inductions for special education teachers.	Support - 2/15/02-(March 2002)	Assembly Committee on Appropriations suspense file.
AB 2120 - Simitian- Would state the intent of the Legislature to develop a professional development block grant for teachers in K-12 by consolidating several of those programs.	Oppose - 2/19/02- (February 2002)	Assembly Committee on Appropriations suspense file.
AB 2160 - Goldberg - Expands the scope of collective bargaining to include the use of mentors and professional training and development among other things.	Oppose-2/2/02-(March 2002) Oppose Unless Amended-4/11/02 (May 2002)	Assembly third reading file. Not expected to be taken up for consideration this session.
AB 2288 - Chavez - Would require the Commission to convene a commission to complete a study on the implementation and expansion of the Troops to Teachers program.	Seek Amendments- 2/21/02- (April 2002)	Assembly Committee on Appropriations suspense file.
AB 2566 - Pavley - This bill would provide support for more pre-interns to improve their retention rate and give them the knowledge, skills, and abilities necessary to teach. This measure considers the State's current fiscal condition by imposing the requirement that the bill will be implemented when state or federal funds are available.	Support- 4/18/02 - (May 2002)	Assembly Committee on Appropriations suspense file.

Bill Number-Author - Version Summary	Previous and Current CCTC Position Version (Date Adopted)	Status
AB 2575 - Leach - Requires the Commission to issue a professional clear single subject credential to a candidate who passes CBEST, has a master's degree in the subject to be authorized by the credential, takes Commission approved pedagogical courses and has teaching or professional experience.	Oppose - 2/21/02 - (March 2002)	Senate Education Committee. Scheduled to be heard on June 12, 2002.
AB 2616 - Lowenthal/Liu- Appropriates \$1,570,000 from the General Fund to CSU to establish distance learning and other off-campus options to increase the number of teachers for visually impaired students.	Support-2/21/02- (March 2002)	Senate Rules Committee. Not yet assigned to a policy committee.
ACR 177 - Diaz- Would urge school districts to support teachers prepared in other countries.	Support-3/20/02-(April 2002)	Senate Education Committee. Scheduled for hearing on June 5, 2002.

SENATE BILLS

Bill Number – Author – Version Subject	Previous and Current CCTC Position Version (Date Adopted)	Status
<p>SB 321 - Alarcon – Amended 7/18/01 Would allow school districts to provide a 30-day training program for teachers they hire on an emergency permit. Provides \$2 million for implementation to be dispersed to LAUSD after Commission approval of training program. Provided \$125K to Commission for administrative costs.</p>	<p>Seek Amendments – Introduced version – (April 2001)</p>	<p>Signed by the Governor Chapter 576, Statutes of 2001. Deleted \$2 million for implementation.</p>
<p>SB 508 – Vasconcellos – (April 8, 2002 Proposed Conference Report). Would make non-controversial changes to the High Priority Schools Grant Program (AB 961) passed last year.</p>	<p>Watch – 4/23/01 (May 2001)</p>	<p>Signed by the Governor. Chapter 42, Statutes of 2002.</p>
<p>SB 572 – O’Connell – Amended 5/03/01 Prohibits school districts from limiting the years of service credit used to determine the salary of a teacher coming from another school district.</p>	<p>Support, If Amended – Introduced version – (April 2001) Watch – 5/03/01 – (May 2001)</p>	<p>Assembly Committee on Appropriations. Not yet scheduled for hearing.</p>
<p>SB 688 - O’Connell – Amended 6/4/01 Would make beginning teachers in regional occupation centers and programs eligible for BTSA.</p>	<p>Approve – Introduced version – (April 2001)</p>	<p>Assembly Appropriations Committee suspense file.</p>
<p>SB 743 – Murray – Amended 8/23/01 Would require the CCTC to develop a plan that addresses the disproportionate number of teachers serving on emergency permits in low-performing schools in low-income communities. The plan is due by July 1, 2002 and includes a \$32,000 appropriation from the General Fund.</p>	<p>Watch – Introduced version of SB 79– (Feb 2001)</p>	<p>Vetoed.</p>

Bill Number – Author – Version Subject	Previous and Current CCTC Position Version (Date Adopted)	Status
SB 792 – Sher – Amended 7/03/01 Would require the CCTC to issue a two-year subject matter credential after earning a baccalaureate degree and passage of CBEST and a clear credential after completion of 40 hours of preparation and professional development, if any, and passage of the teacher preparation assessment.	Oppose – Introduced version – (March 2001) Oppose – 4/5/01 – (April 2001)	Assembly Education Committee. Failed passage.
SB 837 – Scott – Amended 9/5/01 Would specify the documentation that a school district must provide the CCTC to justify a request for an emergency permit. This bill would also increase the state grant and district match for the pre-intern program and permit the CCTC to allow for district hardship.	Support – Introduced version – (March 2001)	Signed by the Governor. Chapter 585, Statutes of 2001.
SB 900 – Ortiz – Amended 3/28/01 Would increase efficiency in processing information requests by grouping those agencies with similar standards and information needs together.	Support, If Amended – 3/28/01 – (April 2001)	Assembly Public Safety Committee. Scheduled for hearing on June 11, 2002.
SB 1250- Vincent - This measure would allow some retired teachers to be exempt from CBEST if they complete a teacher refresher course.	Oppose, Unless Amended - 4/3/02 - (May 2002)	Assembly Committee on Education. Scheduled for hearing on June 12, 2002.
SB 1483 - McClintock - Amends the Education Code to change the membership of the Commission. Also corrects a technical error.	Watch - 2/19/02 - (March 2002)	Senate Rules Committee. Not yet assigned to Committee.
SB 1547- (As Proposed to be Amended) Soto- Requires the Commission to issue certificates that authorize the holder to instruct limited- English-proficient pupils.	Oppose- 2/20/02- (April 2002) Oppose Unless Amended - 4/17/02 - (May 2002)	Senate Education Committee. Failed passage on 5/1/02. Held in Committee.

Bill Number-Author-Version Summary	Previous and Current CCTC Position Version (Date Adopted)	Status
SB 2029 - Alarcon - Allows district intern programs that satisfy Commission adopted standards to offer a program in all areas of special education.	Support- 2/22/02 - (March 2002)	Senate Floor.

Revised on June 4, 2002

Bill Analysis
California Commission on Teacher Credentialing
(For Information Only)

Bill Number:	Senate Bill 1408
Author:	Senator John Vasconcellos
Sponsor:	Author
Subject of Bill:	High School Exit Exam
Date Introduced:	February 13, 2002
Date of Last Amendment:	May 28, 2002
Status in Leg. Process	Senate Appropriations Committee
Current CTC Position:	None
Recommended Position:	None: This bill is being presented for information only
Date of Analysis:	May 31, 2002
Analyst:	Anne L. Padilla

Summary of Current Law

Current law, commencing with Education Code Section 60850, establishes the High School Exit Examination and requires that beginning with the 2003-04 school year, every high school student successfully pass the exit exam prior to graduation.

Summary of Current Activity by the Commission

The Commission has no jurisdiction over the High School Exit Examination. This item is being presented for information only.

Analysis of Bill Provisions

As amended on April 29, 2002, SB 1408 would have established an exception to the requirement that all students pass the high school exam by allowing school boards to waive this requirement for any student who meets all of the following requirements:

- The student or the student's parent or guardian requests a waiver;

- The student otherwise meets all coursework and state and local requirements for graduation;
- The student meets any one of the following criteria (which was to be cited by the school board when approving the waiver):
 1. received over 30 percent of his/her K-12 education in classrooms that lacked credentialed teachers (defined as teachers with preliminary or professional clear credentials);
 2. received over 50 percent of his/her K-12 education in classrooms that lacked adequate and appropriate instructional materials (as defined);
 3. was not enrolled in, or did not receive, instruction in curriculum determined to be necessary to answer questions and perform tasks on the high school exit exam;
 4. did not receive adequate educational opportunity to successfully complete the tasks required on the high school exit exam because of a combination of classrooms that lacked credentialed teachers and appropriate instructional materials.

In addition, the bill required that school boards waiving the high school exit exam requirements annually report to the Superintendent of Public Instruction on the number and percentage of waivers granted; the criteria used to justify approval of each waiver, and a correction plan, as specified. School districts were also required to report the numbers of exam waivers as a part of their Accountability Report Card results.

The May 28, 2002 amendments to SB 1408, deleted the high school exit exam waiver provisions specified in the earlier version of the bill and added provisions to require the governing boards of school districts granting high school graduation diplomas to: 1) compile data annually on items 1-4 (above) for grades 7-12 only; and 2) prepare an appropriate correction plan for any school district in which at least five percent of students fail any part of the high school exit exam, as specified. Additionally, the new amendments delete the requirement that the data be included as a part of Accountability Report Card reporting.

Analysis of Fiscal Impact of Bill

No fiscal impact on the Commission.

As amended on May 28, 2002, costs to school districts are now estimated to be \$100,000 in 2002-03, and \$200,000 in 2003-04.

Organizational Positions on the Bill

None noted.

Comment:

While still firmly committed to the goals of SB 1408 as outlined in previous versions of the bill, the author decided to amend the measure to significantly reduce the costs so that the bill could move out of the fiscal committee.

REPORT ON THE DRAFT REPORT OF THE JOINT COMMITTEE TO DEVELOP A MASTER PLAN FOR EDUCATION – KINDERGARTEN THROUGH UNIVERSITY

Summary

This agenda item summarizes the May 2002 draft of the Master Plan for Education submitted by the Joint Committee to Develop a Master Plan for Education – Kindergarten through University. This agenda item summarizes the Committee's key governance and teacher preparation and certification recommendations. Attached is EdSource's summary of all of the Committee's recommendations.

Background

The Committee is charged with developing a new master plan for California's next generation of students. The new Master Plan will build on California's existing Master Plan for Higher Education, expand to include K-12 education and the many interfaces between K-12 and postsecondary education. The Committee addressed a broad range of issues - teaching and learning, enrollment, funding and governance - across all systems of education.

The Committee created seven working groups of practitioners, researchers, and other stakeholders within and outside of education to develop specific recommendations for the Committee's consideration. The Committee issued a draft in May 2002 and plans to approve a final Master Plan in August 2002.

Recommendations

The Committee made more than 100 recommendations impacting all aspects of public education in California in the draft Master Plan. This paper summarizes the recommendations on governance and teacher preparation and certification.

Key Governance Recommendations

- The Governor should be accountable for all state-level K-12 education agencies. The Commission on Teacher Credentialing is already part of the Executive Branch and accountable to the Governor.
- The Governor should appoint a Chief Education Officer who would establish learning expectations, provide an accountability system, apportion resources, and serve as the director of the Department of Education. This recommendation was controversial; a minority disagreed and promoted the current governance structure.
- The Superintendent of Public Instruction should remain an elected position and serve as a State inspector general for public education.

- The executive director and staff of the State Board of Education should be eliminated.
- The State Board of Education members should be drawn from and represent distinct geographical regions and only make policy.
- An independent agency should collect K-16 data, including cross-segmental and cross-level data.

Key teacher Preparation and Certification Recommendations

The State should require that every teacher is adequately prepared before assuming responsibility for a classroom of students.

- The State should immediately require teachers serving on emergency permits enter a pre-internship program and be supported to complete teacher preparation as soon as is feasible.
- The State should increase the capacity of California's postsecondary education systems to prepare larger numbers of qualified educators for public schools and preschools. Capacity should be increased where there are large numbers of teachers serving on emergency permits, where projected shortages of teachers are greatest, and from among non-White racial and ethnic groups.
- The State should adopt more rigorous education requirements and certification standards for all individuals who teach young children in center-based settings or who supervise others who care for young children. Although the Committee did not mention the Commission, the Commission issues credentials for service in state licensed, publicly funded, center-based child care and development programs.

The State should focus more resources and attention on hard-to-staff schools.

- The State should provide additional resources to attract and retain the finest educators for schools with high concentrations of students living in poverty.
- The State should require teacher preparation, teacher induction and ongoing professional development programs and activities to focus on teaching children with diverse needs, races, nationalities, and languages; on teaching children who bring particular challenges to the learning process; and on teaching in urban settings.
- The State should provide short-term grant funding to create additional professional development schools that partner with institutions of postsecondary education and low-performing schools.

The State should establish a career ladder that rewards exceptional teachers for staying in the classroom.

- The State should provide incentive funding to school districts to create career ladders that reward teachers for demonstrated knowledge, expertise, and effective practice.
- The State should promote recognition that becoming and remaining a qualified and effective teacher is, as with mastery of any profession, a long-term, developmental process.

Miscellaneous

- The State should empower and encourage school boards to include teaching excellence, as determined through districts' employee performance evaluations, as a significant factor in decisions that affect compensation.
- School districts should provide more resources, such as additional staff and professional development, to principals in low-performing schools.
- School districts should increase salaries for administrators serving in low-performing schools.

Public Participation

The Committee established several ways for the public to participate. The Committee will hold public hearings in May and June 2002. The public may also electronically log, fax, or mail their testimony, or participate in a two week long online dialogue.

**California
Commission on Teacher Credentialing**

**Meeting of
June 6, 2002**

AGENDA ITEM NUMBER:

COMMITTEE: Fiscal Policy and Planning

TITLE: Third Quarter Report of Revenues and Expenditures for Fiscal Year 2001-2002

Action

Information

Report

Strategic Plan Goal(s): GOAL #2

Improve the coordination between Commissioners and staff in carrying out the Commission's duties, roles, and responsibilities

- **Develop a method of fiscal accountability so the Commission can exercise its fiduciary responsibilities.**

Prepared By: _____ **Date:** _____
Angela Velasco, Analyst
Fiscal and Business Services

Prepared By: _____ **Date:** _____
Crista Hill, Manager
Fiscal and Business Services

Reviewed By: _____ **Date:** _____
Leyne Milstien, Consultant
Office of Governmental Relations

Approved By: _____ **Date:** _____
Joe Gee, Director
Information Technology and
Support Management Division

Authorized By: _____ **Date:** _____
Sam W. Swofford, Ed.D.
Executive Director

BACKGROUND

As previously scheduled on the Commission's quarterly agenda calendar, staff is presenting the Commission's actual revenue and expenditure data for the third quarter of Fiscal Year (FY) 2001-02.

SUMMARY

The attached charts depict the Commission's revenue and expenditure balances as of March 30, 2002. The following comments provide explanations for certain key points:

Chart 1 – Revenues

- All revenue percentages were calculated as a ratio of the actual revenue collected compared to the amounts projected in the 2002-03 Governor's Budget.
- The revenue received and deposited in the Teacher Credentials Fund (0407) for FY 2001-02 is aligned with the projections in the 2002-03 Governor's Budget.
- Revenues collected and deposited in the Test Development and Administration Account (0408) include all funds received as of March 30, 2002.

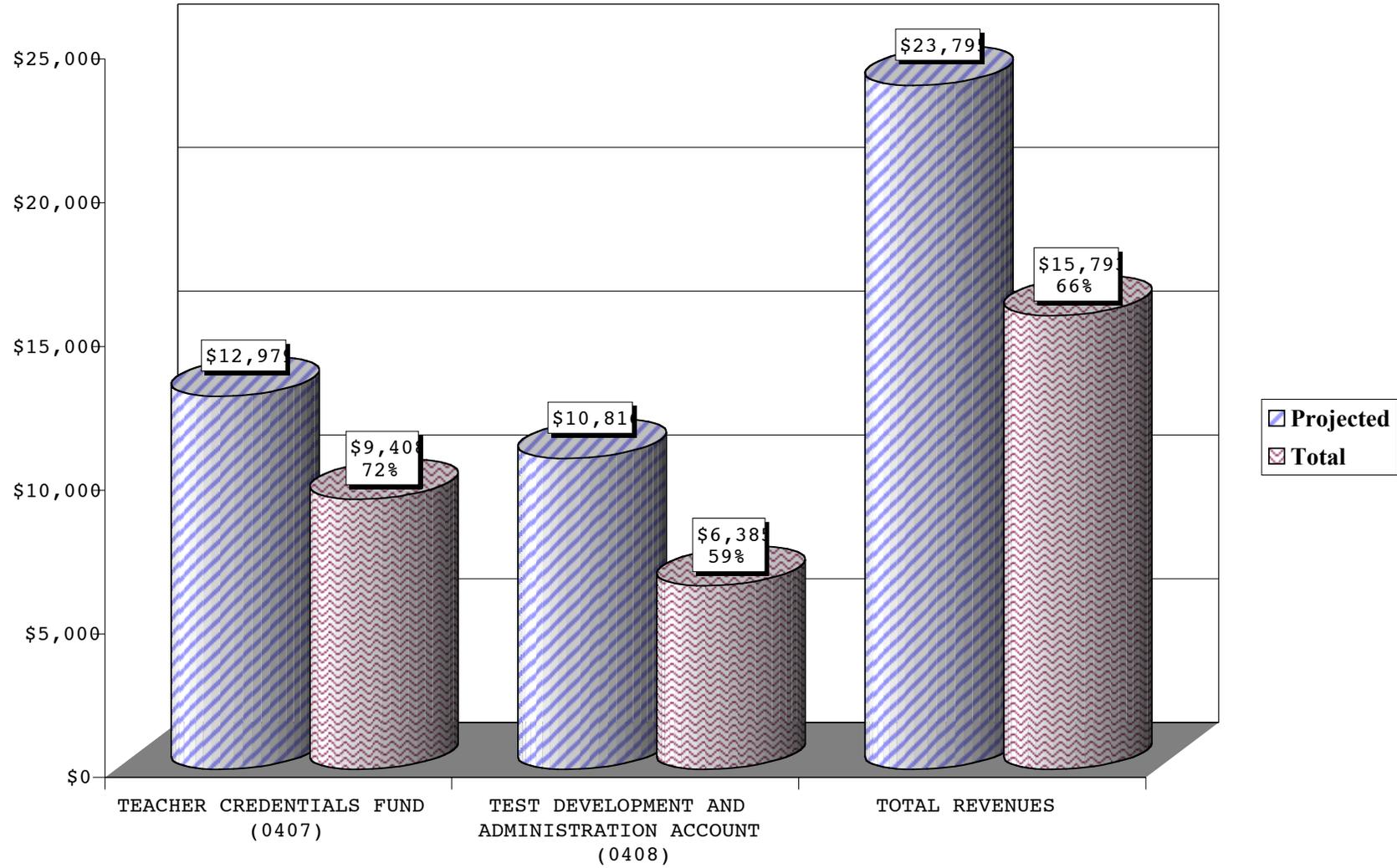
Chart 2 - Expenditures

- "Personal Services" costs expended are in comparison with the budgeted amounts.
- The total "Operating Expenses and Equipment" expenditures include actual expenditures plus encumbrances (expenses that the Commission has obligated itself to spend at a future date).

Staff is available to answer any questions the Commissioners may have.

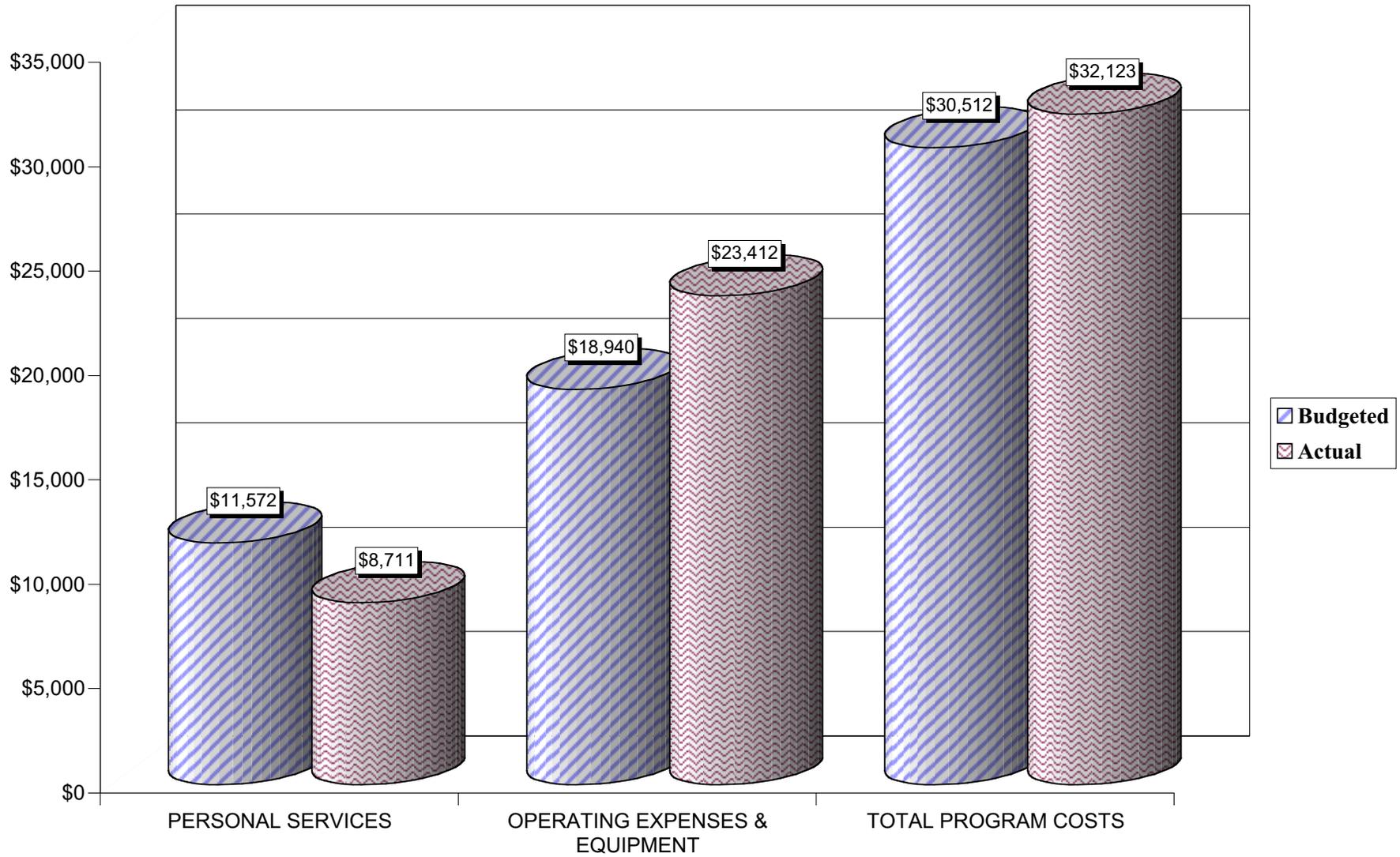
Commission on Teacher Credentialing
Quarter Ending March 30, 2002
(Amounts in Thousands)

Chart 1 - Revenue



Commission on Teacher Credentialing
Quarter Ending March 30, 2002
(Amounts in Thousands)

Chart 2 - Expenditures



BACKGROUND

In May 2002, the Commission's portion of the 2002-03 Governor's Budget was considered in hearings before Assembly and Senate Budget Subcommittees. The issues up for consideration at the hearings were the result of the Legislative Analyst's Office recommendations.

SUMMARY

As new developments occur during the budget hearing process, staff will provide Commissioners with an update regarding the status of the Commission's proposed budget at the Commission meeting.

California
Commission on Teacher Credentialing

Meeting of
June 6, 2002

AGENDA ITEM NUMBER: C&CA - 1

COMMITTEE: Credentialing and Certificated Assignment Committee

TITLE: Proposed Amendments to Title 5 Regulations Concerning the Administrative Services Credential Authorization and Services Teachers May Provide.

Action

Information

Strategic Plan Goal(s):

Sustain high quality standards for the preparation of professional educators.

Prepared By: _____

**Terri H. Fesperman, Assistant Consultant
Certification, Assignment
and Waivers Division**

Date: 5/24/02

Approved By: _____

**Dale Janssen, Acting Director
Certification, Assignment
and Waivers Division**

Date: 5/24/02

Authorized By: _____

**Sam W. Swofford, Ed.D.
Executive Director**

Date: 5/24/02

Proposed Amendments to Title 5 Regulations Concerning the Administrative Services Credential Authorization and Services Teachers May Provide

May 13, 2002

Summary

This item proposes amendments to Title 5 Regulations pertaining to the authorization statement for the Administrative Services Credential and for services teachers may provide.

Fiscal Impact

There will be a minor cost to the agency related to disseminating the information to school districts and county offices of education and holding a public hearing. Such costs are contained within the budget of the Certification, Assignment and Waivers Division.

Policy Issues to be Resolved

Should the Commission define more specifically the authorization for the Administrative Services Credential? Are the proposed authorizations appropriate for the Administrative Services Credential and services that teachers may provide?

Recommendation

Staff recommends that the Commission approve the amendment to Title 5 Regulations pertaining to the authorization for the Administrative Services Credential for purposes of beginning the rulemaking files for submission to the Office of Administrative Law and scheduling a public hearing.

Background

The Commission has been studying issues and options in the preparation and licensure of administrators for several months. In March 2002, the Commission approved an action plan with several objectives concerning the Administrative Services Credential. One of those objectives was to provide greater flexibility to districts in employing individuals for administrative positions at the district level.

In July of 2000, the Commission approved regulations that focused on the authorization for the Administrative Services Credential and also for services that teachers may provide. The regulations identified and differentiated the responsibilities for an administrator and a teacher by broadly describing the types of services an administrator at the site, district or county level may provide and to allow a fully credentialed teacher to serve as a program coordinator. Teachers regularly serve as program coordinators at school-sites while under the supervision of credentialed administrators. Serving in these positions provides a career ladder for teachers, some of whom may want to pursue an administrative services credential. Additionally, this allows the school district to study the teacher's potential for administrative leadership.

Recent discussions at the Commission meetings regarding the role of the administrator have centered on two issues concerning the types of duties that may be provided at the school site, district, and county level:

- 1) those that require an individual to hold an Administrative Services Credential and
- 2) those that may be provided by a teacher.

The existing Title 5 Regulations for the authorization of the Administrative Services Credential may be used for assignments at the school site, district or county level. Education Code Section 44065 lists thirteen areas of responsibility and allows the Commission to determine which credentials authorize the service for these areas of responsibility, administrative or non-administrative. Some of the duties listed in the section such as evaluating the work of instructors and the instructional program for pupils are clearly administrative while others such as the in-service training of teachers, principals, or other certificated staff is not exclusively an administrative duty.

Education Code Section 44860 states when a principal is required to hold an administrative credential at a school site. Additional sections of the Education Code require some individuals in district and county level positions to hold an Administrative Services Credential. The proposed changes to the Section 80054.5 focus on the need for an administrative credential for administrators providing site-based instructional leadership and school management at a school site. Allowing other certificated personnel to provide some of the services currently listed in Section 80054 would enable site administrators to focus on the role of instructional leadership and would provide more flexibility in staffing positions at the district or county level office. Staff is proposing the amendments to Title 5 Section 80054.5 with the elements summarized below:

- Subsection (a) *authorization for the school site administrator holding an Administrative Services Credential* -the authority to establish requirements for credentials appears in subsection (d) of §44225. EC §44065(a) gives the Commission the authority to designate in regulations which of the subsections of EC §44065(a) consist of rendering service in directing, coordinating, supervising or administrating. Based on this authority, the proposed change to subsection (a) focuses on the specific duties administrators provide at the site level while holding the Administrative Services Credential including
 - (a)(1) *evaluating quality and effectiveness of instructional services* as found in EC §44065(a)(12) (the interpretation and evaluation of the school instructional program),
 - (a)(2) *evaluation of certificated staff* as found in EC §44065(a)(1) (work of instructors and the instructional program for pupils); school site administrators may be evaluated by individuals at the district or county level office,
 - (a)(3) *student and employee discipline* as found in EC §44065(a)(8) (activities connected with the enforcement of the laws relating to compulsory education, coordination of child welfare activities involving the school and the home, and the school adjustment of pupils) pursuant to Charter 6 of Part 27 of Division 4 of Title 2 of the Education Code commencing with Section 48900

- Subsection (b) was revised to list the *duties an individual holding an Administrative Services Credential serving at the school site, district or county level may provide if the credential is required by the employer.*
- Subsections (c) and (d) changed only with the *lettering of the subsections.*

Title 5 §80054.5. Services Credential with a Specialization in Administrative Services; Authorization.

(a) An individual must hold a Services Credential with a Specialization in Administrative Services to provide the services described below in grades twelve and below, including preschool, and in classes organized primarily for adults:

- (1) evaluating quality and effectiveness of instructional services at the school site level,
- (2) evaluation of certificated personnel employed at the school site level, with the exception of the site administrator, and
- (3) student and employee discipline services of certificated personnel at the school site level as found in subsections (b)(3) and (4) of this section.

(a)(b) The holder of a A Services Credential with a Specialization in Administrative Services authorizes the holder to may provide the services described below in grades twelve and below, including preschool, and in classes organized primarily for adults.

- (1) Development, coordination, and assessment of instructional programs;
- (2) Evaluation of certificated and classified personnel;
- (3) Student discipline, including but not limited to suspension and expulsion, pursuant to Article 1 of Chapter 6 of Part 27 of Division 4 of Title 2 of the Education Code commencing with Section 48900;
- (4) Certificated and classified employee discipline, including but not limited to suspension, dismissal, and reinstatement, pursuant to Chapters 4 and 5 of Part 25 of Division 3 of the Education Code commencing with Section 44800;
- (5) Supervision of certificated and classified personnel;
- (6) Management of school site, district or county level fiscal services;
- (7) Recruitment, employment, and assignment of certificated and classified personnel; and
- (8) Development, coordination, and supervision of student support services including but not limited to extracurricular activities, pupil personnel services, health services, library services, and technology support services.

~~(b)(c)~~ Nothing in these regulations is intended to impinge upon the authority of the local governing board to authorize classified personnel to supervise other classified employees.

(e)(d) Nothing in these regulations is intended to limit the employment and assignment authority of local governing boards under Education Code Sections 44270.2, 44065(d), 44069(c), 44834, or any other provision that may provide local discretion in the assignment of personnel.

Note: Authority cited: Section 44225, Education Code. Reference: Section 44065, 44069, 44270.2, 48900, and 44834, Education Code.

Proposed Amendments to Regulations for Services a Teacher May Provide

Staff is proposing to amend Title 5 §80020.4.1 to clarify the types of services an individual holding a teaching credential based on a bachelor's degree and teacher preparation program including student teaching may provide in the area of program coordination at a school site. The proposed changes will clarify for the districts and counties the types of duties an individual may provide while holding a teaching credential in addition to serving in a classroom. Staff is proposing the amendments to Title 5 Section 80020.4.1 with the elements summarized below:

- Subsections (a) through (e) removes the specific title of program coordinator and replaces it with wording to describe the types of duties (develop, direct, implement, or coordinate programs) an individual may provide at the school site.

Title 5 Section 80020.4.1. Services a Teacher Serving as Program Coordinator May Provide.

- (a) The holder of a California teaching credential based on a baccalaureate degree and a teacher preparation program, including student teaching or the equivalent may ~~serve as staff development or curricular development program coordinator~~ develop, direct, implement, or coordinate programs designed to improve instruction and enhance student learning at the school site, ~~school district, or county level~~ in grades twelve and below, including preschool, and in classes organized primarily for adults.
- (b) The holder of a California designated subjects adult teaching credential may ~~serve as staff development or curricular development program coordinator~~ develop, direct, implement, or coordinate programs designed to improve instruction and enhance student learning for adult teaching subject areas.
- (c) The holder of a California designated subjects vocational teaching credential ~~serve as staff development or curricular development program coordinator~~ develop, direct, implement, or coordinate programs designed to improve instruction and enhance student learning for vocational teaching subject areas.
- (d) Irrespective of the provisions set out in this section, only individuals who hold either the Reading and Language Arts Specialist Credential or Administrative Services Credential may develop, direct, implement, and coordinate school district or county reading programs. Effective July 1, 2004, school site reading programs may only be developed, directed, implemented, or coordinated by individuals who hold the Reading and Language Arts Specialist Credential, Restricted Reading Specialist Credential, Reading Certificate, or Administrative Services Credential.

- (e) An individual who has served ~~as a reading coordinator~~ developed, directed, implemented, or coordinated reading programs for a minimum of three years prior to July 1, 2004, on the basis of a California teaching credential based on a baccalaureate degree and a teacher preparation program, including student teaching or the equivalent, shall be authorized to continue in such assignment. Verification of this teaching experience must be kept on file in the office of the employing agency for purposes of the monitoring of certificated assignments pursuant to Education Code Section 44258.9(b).

Note: Authority cited: Section 44225(q), Education Code. Reference: Sections 44225(d) and 44258.9(b), Education Code.