SCIENCE EDUCATION

College of Natural Sciences and Mathematics

Department Chair: Vacant

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Faculty: Alan Colburn, Susan Gomez-Zwiep, Laura Henriques, Thomas Kelty, Patrick F. Kenealy, James Kisiel, William Straits

Advisors:

Single Subject Science Credential: Tim Williamson

Graduate Advisor: Alan Colburn, James Kisiel

Administrative Support Coordinator: Hellen Carcamo

Introduction

The department maintains close ties with teachers, schools and informal science institutions in the greater Long Beach area. It undertakes projects aimed at pre-college through university students. From the Head Start on Science project which develops a "sense of wonder" and excitement preschool and Kindergarten children, their teachers and parents to outreach and professional development for inservice elementary and secondary teachers, and support for preservice teachers and informal science educators, the department hosts a wide variety of grants and projects impacting the entire preK-16 and informal science education community. The department sponsors the Young Scientists' Camp programs, research seminars and the Association of Future Science Educators (AFSE) which is student chapter of California Science Teachers Association/National Science Teachers Association.

Graduate Programs

Master of Science in Science Education

The M.S. in Science Education is designed primarily for credentialed K-12 teachers and experienced informal educators.

Application

Prospective graduate students in M.S. in Science Education, including CSULB graduates, must formally apply for admission to CSULB as described previously in this catalog and must also apply directly to the Department of Science Education. All applicants must submit the following documents directly to the department office:

1. Completed departmental application form, including personal statement. The application form is available in the Department of Science Education office and on the internet [http://www.scienceteaching.org, click on "Masters Info"].
2. Two confidential recommendation letters, sent under separate cover, including one from an administrator or supervisor at a school/institution where the applicant is (or was) employed.

Prospective graduate students must also receive a positive recommendation following an interview with graduate faculty.

Review by the Graduate Studies Committee

The Graduate Studies Committee will review all completed applications and recommend either accepting the applicant as a Classified or Conditionally Classified graduate student, or denying admission. All accepted students should contact the departmental graduate advisor before their first semester for advisement and orientation.

Classified Graduate Student

The Department of Science Education will recommend for admission as a Classified graduate student any applicant who has met all prerequisites and been accepted by the Graduate Studies Committee.

Conditionally Classified Graduate Student

An applicant who fails to meet the criteria for Classified admission to the department may be considered by the Graduate Studies Committee for admission as a Conditionally Classified graduate student. The Graduate Studies Committee will determine what deficiencies each applicant has and specify what the individual must do to make up those deficiencies. The applicant must make up all such deficiencies before attaining Classified status.

Admission to the Department Prerequisites

In addition to the prerequisites for entrance into CSULB as a graduate student stated in this *Catalog*, the Science Education department requires:

- California Multiple Subject or science teaching credential, or the equivalent*;
- GPA of at least 3.0 for the last 60 units of study completed.
- Those students participating in the informal science option may substitute one or more years experience working as an educator in an informal learning setting; a letter of support is required.

Students are expected to exhibit high standards of writing proficiency. Students missing any admission criteria may only be admitted after receiving the approval of a department graduate faculty committee.

Option in Elementary and Middle School Science Education

This option is designed for teachers who are K-8 generalists. It may also be appropriate for Single Subject teachers interested in increasing the breadth of their scientific knowledge.

Program of Study

The Program of Study (30 units) includes successful completion of:

1. Take 6 units from the following:
   EDP 519, 520, 595, 596 or other courses chosen in consultation with advisor;
2. Take all the following Science Education core courses:
   SCED 550 Current Issues and Research in Science Education (3)
   Prerequisite: Admission to M.S. in Science Education program.

SCED 551 Science Teaching, Learning and Curriculum Models (3)
Prerequisites: Admission to M.S. in Science Education program and SCED 550.

SCED 552 Nature of Science (3)
Prerequisites: Admission to M.S. in Science Education program and SCED 550.

SCED 697 Directed Research (1-3)
Prerequisites: Consent of instructor and admission to M.S. in Science Education program.

3. Take all the following science courses:

SCED 500 Life Science Applications for K-8 Teachers (3)
Prerequisites: Admission to M.S. in Science Education program; BIOL 200.

SCED 501 Earth Sciences Applications for K-8 Teachers (3)
Prerequisites: Admission to the M.S. in Science Education program and GEOL 102+104 or GEOL 106.

SCED 502 Physical Science Applications for K-8 Teachers (3)
Prerequisites: Admission to M.S. in Science Education program; PHSC 112.

4. Take the following course:

SCED 698 Thesis (1-3)
Prerequisites: Advancement to Candidacy for the M.S. in Science Education, 18 units of coursework required for M.S. Science Education completed, and consent of the chair of the thesis committee.

Option in Secondary Science Education

This option is aimed at teachers with a Single Subject credential in Science. Graduate students complete 9 units of graduate work in a Science discipline.

Program of Study

The Program of Study (30 units) includes successful completion of:

1. Take 6 units from the following:

EDP 519, 520, 595, 596, or other courses chosen in consultation with advisor.

2. Take all the following Science Education core courses:

SCED 550 Current Issues and Research in Science Education (3)
Prerequisite: Admission to M.S. in Science Education program.

SCED 551 Science Teaching, Learning and Curriculum Models (3)
Prerequisites: Admission to M.S. in Science Education program and SCED 550.

SCED 552 Nature of Science (3)
Prerequisites: Admission to M.S. in Science Education program and SCED 550.

SCED 697 Directed Research (1-3)
Prerequisites: Consent of instructor and admission to M.S. in Science Education program.

3. Take 9 units of graduate level science (chosen in consultation with advisor)

4. Take the following course:

SCED 698 Thesis (1-3)
Prerequisites: Advancement to Candidacy for the M.S. in Science Education, 18 units of coursework required for M.S. Science Education completed, and consent of the chair of the thesis committee.

Option in Informal Science Education

This option is aimed at educators currently working in non-classroom settings such as museums, zoos, and nature centers, as well as those charged with fostering the public understanding of science.

Program of Study

The Program of Study (33 units) includes the successful completion of:

1. Take all the following Science Education core courses:

SCED 550 Current Issues and Research in Science Education (3)
Prerequisite: Admission to M.S. in Science Education program.

SCED 551 Science Teaching, Learning and Curriculum Models (3)
Prerequisites: Admission to M.S. in Science Education program and SCED 550.

SCED 552 Nature of Science (3)
Prerequisites: Admission to M.S. in Science Education program and SCED 550.

SCED 553 Science Learning in Informal Settings (3)
Prerequisite: Admission to Science Education M.S. program; consent of instructor.

SCED 697 Directed Research (1-3)
Prerequisites: Consent of instructor and admission to M.S. in Science Education program.

2. Take 6 units of science courses from the following:

SCED 500, 501, 502, or other graduate-level science courses chosen in consultation with an advisor

3. Take 3 units research methodology from the following:

EDP 519, 520, 595, 596; REC 696, or other courses in consultation with an advisor

4. Take 3 units non-profit management or other practitioner-related course from the following:

REC 521, 528, or other courses in consultation with an advisor

5. Take 3 units elective, chosen in consultation with advisor

6. Take the following course:

SCED 698 Thesis (1-3)
Prerequisites: Advancement to Candidacy for the M.S. in Science Education, 18 units of coursework required for M.S. Science Education completed, and consent of the chair of the thesis committee.

Advancement to Candidacy

1. The regulations governing the master's degree are those in effect at the time of advancement to candidacy. A student must be designated as a Classified Student in good standing prior to advancing to candidacy.
2. A student must satisfy the general requirements of the University, including fulfilling the Graduation Writing Assessment Requirements (GWAR).
3. The student's M.S. program must be approved by a faculty graduate advisor, the department graduate advisor, the department chair, and the Associate Dean in the College of Natural Sciences and Mathematics.
4. Advancement to candidacy may take place upon satisfactory completion of six units in the M.S. program. A student must have been advanced to candidacy before initiating formal thesis research necessary to complete the M.S. degree.

Courses (SCED)

UPPER DIVISION

302. Elementary School Science Workshop (3)

Prerequisite: SCED 401.

Practicum on development and use of “hands-on” elementary school science teaching/learning activities, units, and learning centers.

Letter grade only (A-F). (Lecture 2 hrs., workshop 2 hrs.) Course fee may be required.

401. A Process Approach to Science (3)

Prerequisite: BIOL 200; PHSC 112; GEOL 106, or both GEOL 102 and 104; all with a "C" or better grade.

Processes of science as they relate to life, earth, and physical sciences. Practical approaches to understanding how science works modeled and integrated throughout.

Letter grade only (A-F). (Lecture 2 hrs., laboratory 3 hrs.) Course fee may be required.

403. Integrated Science (3)

Prerequisites: All credential breadth requirements for the Single Subject Teaching Credential Program in Science, three-fourths of the credential specializations courses, and consent of instructor. Enrollment limited to students who intend to pursue a Single Subject Credential in Science.

Requires presentations, discussions, critical evaluation by students on selected interdisciplinary topics in sciences, and field work in integrated science assignments.

Letter grade only (A-F). (Lecture 3 hrs.)

404. The Nature of Science and Scientific Reasoning for Teachers (3)

Prerequisites: At least three-fourths of the credential specialization courses for Single Subject Teaching Credential in science and consent of instructor. Enrollment limited to students who intend to pursue a Single Subject Credential in Science.

Course has three aims. The first is students better understand nature of science – its history, philosophy, psychology, and sociology. Second, students better understand methods of science and how to critically evaluate reports about scientific investigations. Finally, students learn how to apply these understanding to the 6-12 classroom.

Letter grade only (A-F). (Lecture 3 hrs.)

475. Teaching and Learning Science, K-8 (3)

Prerequisites: Admission to the Multiple Subject Credential Program. SCED 401 or a bachelor's degree.

Methods for teaching elementary school science. Development of sequenced, integrated inquiry-based science lessons addressing the needs of all learners.

Letter grade only (A-F). Course fee may be required. (Lec 2 hrs., activity 2 hrs.) 60 contact hours, however, actual contact hours vary as course is offered with an on-line distance component (see *Schedule of Classes* footnote). 10 hours minimum of fieldwork in classrooms where at least 25% of students are classified as English learners, or concurrent enrollment in EDEL 482.

490A. Selected Topics in Science Education (1-3)

Prerequisite: Consent of instructor.

Topics in science education.

May be repeated to a maximum of 6 units with different topics in different semesters. (Lecture 1-3 hrs)

490B. Selected Topics in Life Science Education (1-3)

Prerequisite: Consent of instructor.

Topics in life science education.

May be repeated to a maximum of 6 units with different topics in different semesters. Letter grade only (A-F). (Lecture 1-3 hrs)

490C. Selected Topics in Earth/Space Science Education (1-3)

Prerequisite: Consent of instructor.

Topics in earth and space science education.

May be repeated to a maximum of 6 units with different topics in different semesters. Letter grade only (A-F). (Lecture 1-3 hrs)

490D. Selected Topics in Physical Science Education (1-3)

Prerequisite: Consent of instructor.

Topics in physical science education.

May be repeated to a maximum of 6 units with different topics in different semesters. Letter grade only (A-F). (Lecture 1-3 hrs)

496. Directed Studies in Science Education (1-3)

Prerequisites: Consent of instructor.

Supervised study of current topics in science education.

Letter grade only (A-F). May be repeated to a maximum of 3 units with different topics in different semesters.

GRADUATE LEVEL

500. Life Science Applications for K-8 Teachers (3)

Prerequisites: Admission to M.S. in Science Education program; BIOL 200.

Emphasizes major themes and processes in life sciences, focusing on deepening understanding of concepts and approaches to teaching material in K-8. Approaches to developing/teaching inquiry-based/experiential learning units in biology modeled and integrated throughout course.

Letter grade only (A-F). (Seminar 3 hrs.)

501. Earth Sciences Applications for K-8 Teachers (3)

Prerequisites: Admission to the M.S. in Science Education program and GEOL 102+104 or GEOL 106.

Investigates earth science topics with focus on deepening connections between concepts in earth science and matter and energy cycling, providing applications of earth science concepts and activities in K-8 classrooms and schools.

Letter grade only (A-F). (Seminar 3 hrs.)

502. Physical Science Applications for K-8 Teachers (3)

Prerequisites: Admission to M.S. in Science Education program; PHSC 112.

Investigates physical science topics with focus on deepening students’ science understanding while showcasing applications of physical science for students’ personal lives and their K-8 classrooms and schools.

Letter grade only (A-F). (Seminar 3 hrs.)

550. Current Issues and Research in Science Education (3)

Prerequisite: Admission to M.S. in Science Education program. SCED 550 is a core course in the M.S. in Science Education.

Introduces students to body of research and practical knowledge shared by science education community. Includes choosing, studying, and discussing articles from science education literature relevant to key issues in science education. Course requirements include attending science teacher’s conventions.

Letter grade only (A-F). (Seminar 3 hrs.)

551. Science Teaching, Learning and Curriculum Models (3)

Prerequisites: Admission to M.S. in Science Education program and SCED 550. SCED 551 is a core course in the M.S. in Science Education.

Introduces students to professional literature about science teaching and learning. Traces historical development of elementary/secondary science curriculum models. Students examine role science and education organizations played in reforming science curriculum, and analyze curricula from variety of teaching/learning perspectives.

Letter grade only (A-F). (Seminar 3 hrs.)

552. Nature of Science (3)

Prerequisites: Admission to M.S. in Science Education program and SCED 550.

A core course in the M.S. in Science Education. Looks at science from historical, philosophical, psychological, and sociological perspectives. Examines perceptions of science and scientists, especially views of science in different cultures and times. Discusses using these perspectives to teach students about nature of science.

Letter grade only (A-F). (Seminar 3 hrs.)

553. Science Learning in Informal Settings (3)

Prerequisite: Admission to Science Education M.S. program; consent of instructor. SCED 553 is a core course required of all Science Education M.S. candidates who have declared an option in informal science learning.

Examines unique characteristics of non-school learning settings and how they promote (or hinder) scientific understanding. These 'non-school settings' include science museums, zoos, aquaria, nature centers and even homes, where media such as television and the Internet play a prominent role. Multiple theoretical perspectives will be examined. Students will engage in their own research project in order to better understand an informal learning.

Letter grade only (A-F). (Seminar 3 hrs.)

560. Science Education Research Methods (3)

Prerequisites: Admission to the M.S. in Science Education program.

Examination and application of science education research methodology including various types of qualitative and quantitative methods, research designs, sampling methods, inferential statistics and hypothesis testing, interpretation and use of science education research instruments and development of a research proposal.

Letter grade only (A-F). (Seminar 3 hrs.)

580. Introduction to College Science Teaching -1 (1)

Prerequisite: Admission to Master's-level program in CNSM.

Addresses the fundamentals of college science instruction with an emphasis on immediate classroom application. Strategies for active learning, student assessment, and teacher development are introduced.

Letter grade only (A-F). (Seminar 1 hr)

590. Selected Topics in Science Education (1-3)

Prerequisite: Consent of instructor. (Undergraduates enroll in SCED 490; graduate students enroll in SCED 590).

Topics in Science Education. Course content will vary from section to section.

May be repeated to a maximum of 6 units with different topics in different semesters. Topics announced in the Schedule of Classes. Letter grade only (A-F). (Seminar 1-3 hrs.)

697. Directed Research (1-3)

Prerequisites: Consent of instructor and admission to M.S. in Science Education program.

Independent investigation of a research problem or directed project, under the direction of a faculty member.

May be repeated to a maximum of 3 units with different topics in the same semester. Letter grade only (A-F).

698. Thesis (1-3)

Prerequisites: Advancement to Candidacy for the M.S. in Science Education, 18 units of coursework required for M.S. Science Education completed, and consent of the chair of the thesis committee.

Planning, preparation, and completion of the thesis project in Science Education. Enrollment in more than 2 units in a given semester requires departmental approval.

Letter grade only (A-F).