292. Special Topics in Education (2-4)
Variable—2-4 hours. Prerequisite: completion of doctoral core courses in Education or consent of instructor. Special topics in education. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit.—II, III, (I, II, III)

294. Special Topics in Science, Agriculture and Mathematics Education (4)
Seminar—3 hours; term paper; project. Prerequisite: graduate standing. Critical study of special topics of research relevant to science, agricultural and mathematics education. Students and faculty present work-in-progress on a major research project, and critically analyze and discuss one another’s developing scholarly work. May be repeated for credit when topic differs.—II, III, (II, III) Ambrose, Ballard, White

298. Group Study (1-5)
(S/U grading only.)

299. Individual Study (1-6)
Independent study—3-18 hours. Individual study under the direction of a faculty member. (S/U grading only.)

299D. Research (1-12)
Independent study—3-36 hours. Research for individual graduate students. (S/U grading only.)

Professional

300. Reading in the Elementary School (4)
Lecture—3 hours; fieldwork—3 hours. Prerequisite: graduate standing. Principles, procedures, and curriculum materials for teaching of reading. Includes decoding skills with a special emphasis on phonics, comprehension skills, study skills, and reading in the content areas.—II Wallon, Passmore, Trexler

301. Reading in the Secondary School (4)
Discussion—4 hours. Prerequisite: graduate standing, enrollment in the secondary credential program, or consent of instructor. Principles, procedures, and materials for teaching reading in the secondary social sciences. Emphasis on philosophy, appropriate teaching methods, materials, and curriculum approaches for secondary social science classrooms.—I. (II) Martinez

302. Language Arts in the Elementary School (2)
Lecture—2 hours. Prerequisite: graduate standing. Principles, procedures, and materials for the teaching of oral and written expression, listening skills, drama, and children’s literature in elementary schools.—III (II, I, II)

303. Art Education in the Elementary School (2)
Lecture/discussion—2 hours. Prerequisite: admission to multiple subject credential program. Understanding the principles of education in the arts through participation. Development of concepts, introduction to media, and techniques suitable for the elementary school. Curriculum, pedagogy, and materials for teaching the visual and performing arts curriculum in elementary schools.—III (II)

304A. Teaching in the Elementary Schools (2-18)
Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular classrooms in elementary schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school achievement of children.—I. (I)

304B. Teaching in the Elementary Schools (2-18)
Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular classrooms in elementary schools. Current conceptions of elementary school curriculum, emphasis on contributions from the social, biological, and physical sciences. Emphasis on effective teaching methods.—II (II)

304C. Teaching in the Elementary Schools (2-18)
Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular classrooms in elementary schools. Evaluation of teaching materials including instructional technology. Current elementary school curriculum with an emphasis on contributions from fine arts and humanities.—III (III)

305A. Teaching in the Middle Grades (5-8)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades. Current conceptions of the middle grades curriculum with an emphasis on social, biological, and physical sciences. Emphasis on teaching methods.—II. (II) Ambrose, Ballard, White

Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology.—II. (II)

307. Methods in Elementary Science (2)
Lecture/discussion—2 hours. Prerequisite: acceptance into a teacher education program. Principles, procedures, and materials for teaching the biological and physical sciences in elementary schools.—I. (I) Passmore, Tresler

308. Methods in Elementary Social Studies (2)
Lecture/discussion—2 hours. Prerequisite: acceptance into a teacher education program. Principles, procedures, and materials for teaching history and the social sciences in elementary schools.—III (III) Rosa

309. The Teaching of Mathematics, K–9 (3)
Lecture/discussion—3 hours. Prerequisite: acceptance into a teacher education program. Mathematics curriculum and teaching methods for K–9 reflecting the needs of California’s diverse student populations.—I. (II, I, II)

322A. Pedagogical Preparation for Secondary Social Science I (3)
Lecture/discussion—2 hours; discussion—1 hour. Prerequisite: course 322A. Intermediate teaching methods and curriculum approaches for secondary social science teaching. State and national curriculum standards; application of learning theory to effective instruction; interdisciplinary teaching and active learning approaches; effective teaching strategies for English Learners.—I. (I) Rosa

322B. Pedagogical Preparation for Secondary Social Science II (3)
Lecture/discussion—2 hours. Prerequisite: course 322A. Intermediate teaching methods and curriculum approaches for secondary social science teaching. Interdisciplinary approaches to teaching major themes across social science content areas; teaching potentially controversial social science topics; teaching democratic civic values, student assessment and evaluation.—II. (II, I, II)

323A. Physical Science in the Secondary School (3)
Laboratory/discussion—2 hours; discussion/laboratory—1 hour. Prerequisite: acceptance into a teacher education program. Activity-based overview of concepts and processes in secondary school physical sciences. Emphasis upon philosophy, appropriate teaching methods, materials, assessment and evaluation of learning. State secondary standards. —II. (I, II, III) Passmore, Pomeroy

323B. Life Sciences in the Secondary School (3)
Laboratory/discussion—2 hours; discussion/laboratory—1 hour. Prerequisite: acceptance into a teacher education program. Effective teaching based overview of concepts and processes in secondary school biological and life sciences. Emphasis upon philosophy, appropriate teaching methods, materials, assessment and evaluation of learning, and issues.—II. (II) Passmore, Pomeroy

324A. Methods and Technology in Secondary Mathematics I (4)
Lecture/discussion—4 hours. Prerequisite: admission into a teacher education program or consent of instructor. Introduction to methods and curriculum for teaching mathematics at the secondary level. Introduction to applications of computer technology as instructional, technological, and communication tools for mathematics teachers.—I. (I) Wallace

324B. Methods in Secondary Mathematics II (3)
Lecture/discussion—3 hours. Prerequisite: admission into a teacher education program or consent of instructor. Expansion of methods and curriculum for teaching mathematics at the secondary level. Intermediate applications of computer technology as instructional, technological, and communication tools in mathematics teaching.—II. (II) Wallace

325. Research and Methods in Secondary English Language Arts (4)
Discussion—4 hours. Prerequisite: admission to graduate standing or credential program in Education or consent of instructor. Research on teaching and learning in the language arts. Principles, procedures and materials for improving the writing, reading and oral language of secondary students, with special attention to students from culturally and linguistically diverse populations.—I. (II) Holmes

326. Teaching Language Minority Students in Secondary Schools: Methods and Research (4)
Seminar—3 hours; fieldwork—3 hours. Prerequisite: graduate standing in Education of consent of instructor. Research on principles, procedures and curricula for teaching discipline-specific concepts to language minority students in secondary schools. Secondary language acquisition principles and instructional strategies.

327A. Teaching Methods for Secondary Foreign Language/Spanish, Part I (3)
Lecture—3 hours. Prerequisite: acceptance into a teacher education program or consent of instructor. Introduction to methods for teaching Spanish as a foreign and a heritage language in secondary schools. State and National Standards. Theories on second language acquisition. Lesson plans. Effective teaching strategies and class management. Open to Graduate Teaching Credential students.

327B. Teaching Methods for Secondary Foreign Language/Spanish, Part II (3)
Lecture—3 hours. Prerequisite: course 327A or consent of instructor. Continuation to methods for teaching Spanish as a foreign and a heritage language in secondary schools. Research and practice on foreign and heritage language teaching. Expansion of effective teaching strategies and class management. Open to Graduate Teaching Credential students.

398. Group Study (1-5)
(S/U grading only.)

399. Individual Study (1-5)
(S/U grading only.)

Education (A Graduate Group)
Cynthia Passmore, Chairperson of the Group
Faculty
Leonard Abbeduto, Ph.D., Professor; Director of UC Davis MIND Institute and Tsakopoulos-Vismara Endowed Chair (Psychiatry and Behavioral Sciences)
Endocrinology and Metabolism

Christopher Thaisis, Ph.D. (Clark Kerr Presidential Chair and Director, University Writing Program) Ross Thompson, Ph.D., Professor (Psychology) Thomas Timar, Ph.D., Professor (Education) Cary Trellex, Ph.D., Associate Professor (Education) Yuuko Uchikoshi Tankovich, Ed.D., Associate Professor (Education) Stefano Vareas, Ph.D., Professor (Native American Studies) Kenneth Veross, Ph.D., Professor (Geology) Karen Watson-Gegeo, Ph.D., Professor (Education) Tobin White, Ph.D., Associate Professor (Education) Carl Whithaus, Ph.D., Professor, Director (University Writing Program) I. Phillip Young, Ph.D., Professor (Education)

Graduate Study. The Graduate Group in Endocrinology and Metabolism offers courses of study and research leading to the Ph.D. degree. Students may concentrate in: language, literacy and culture; learning and mind sciences; mathematics education; school organization and educational policy; or science and agriculture education. Students may also combine these fields of study with designated emphasis areas such as Critical Theory; Second Language Acquisition, Women’s Studies, and Writing, Rural, and Composition Studies. Detailed information regarding graduate study may be obtained by writing the Graduate Coordinator at [http://education.ucdavis.edu/programs/PhDoverview.html](http://education.ucdavis.edu/programs/PhDoverview.html).

Preparation. Students should have earned a Bachelor’s or M.A. degree or the equivalent in a discipline relevant to their proposed emphasis program. For example, students applying for the mathematics education emphasis should have earned the B.A. or M.A. or M.A.T. degree in mathematics or mathematics education.

Graduate Advisers. Michal Kurlaender, Lee Martin

Graduate Coordinator, Mary M. Reid

Courses. See Education, School of, on page 236.

Endocrinology and Metabolism

See Internal Medicine (IMD), on page 406.

Engineering

[College of Engineering]

Enrique J. Lavernia, Ph.D., Dean Bruce Hartough, Ph.D., Associate Dean—Academic Personnel and Planning Jean S. VanderGheynst, Ph.D., Associate Dean—Research and Graduate Studies Jean-Pierre Delplanque, Ph.D., Associate Dean—Undergraduate Studies Bruce White, Ph.D., Executive Associate Dean


Undergraduate Study

The college has seven departments: Biological and Agricultural Engineering, Biomedical Engineering, Chemical Engineering, Chemical Engineering and Materials Science, Civil and Environmental Engineering, Computer Science Engineering, Electrical and Computer Engineering, Mechanical and Aerospace Engineering.

Graduate Study

Graduate degrees [M.S., M.Engr., Ph.D., D.Engr.] are offered in the following engineering disciplines:

- Biological Systems Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil and Environmental Engineering
- Computer Science
- Electrical and Computer Engineering
- Materials Science and Engineering
- Mechanical and Aerospace Engineering
- Transportation Technology and Policy

The Major Programs

Eleven majors, leading to the B.S. degree, are open to students.

- Aerospace Science & Engineering
- Biochemical Engineering
- Biological Systems Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Computer Science and Engineering
- Electrical Engineering
- Materials Science and Engineering
- Mechanical Engineering

Minor Programs

The College of Engineering offers nine undergraduate minors:

- Biomedical Engineering [Department of Biomedical Engineering]
- Computational Biology [Department of Computer Science]
- Construction Engineering and Management [Department of Civil and Environmental Engineering]
- Electrical Engineering [Department of Electrical and Computer Engineering]
- Energy Science and Technology [Department of Biological and Agricultural Engineering]
- Energy Policy [Department of Biological and Agricultural Engineering]
- Energy Efficiency [Department of Biological and Agricultural Engineering]
- Materials Science [Department of Chemical Engineering and Materials Science]
- Sustainability in the Built Environment [Department of Civil and Environmental Engineering]

Courses in Engineering (ENG)

Students are encouraged to carefully adhere to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Lower Division

1. Introduction to Engineering (1)

Lecture—1 hour. Open to first year students only. Introduction to the role of engineers in the acquisition and development of engineering knowledge, the differences and similarities among engineering fields, and the work ethic and skills required for engineering. [P/NP grading only.] GE credit: SE—I, II, III

4. Engineering Graphics in Design (3)

Lecture—2 hours, laboratory—3 hours. Engineering design, descriptive geometry, pictorial sketching, computer-aided graphics, and their application in the solution of engineering problems. GE credit: SciEng | SE, VL—I, II, III

Quarter Offered: I—Fall; II—Winter; III—Spring; IV—Summer, 2013-2016 offering in parentheses.

Pre-Fall 2011 General Education (GE): ArtHum—Arts and Humanities; ScLsEng—Science and Engineering; SocScs—Social Sciences; DivDom—Domestic Diversity; Wrt—Writing Experience

Fall 2011 and on Revised General Education (GE): AH—Arts and Humanities; SE—Science and Engineering; SS—Social Sciences; ACHG—American Cultures; DD—Domestic Diversity, OL—Oral Skills, QL—Quantitative, SL—Scientific, VL—Visual, WC—World Cultures; WE—Writing Experience