Science and Mathematics Education

The Graduate Group in Science and Mathematics Education (known informally as SESAME) offers an interdisciplinary graduate program leading to a doctoral degree in science, mathematics, technology, and engineering education. The program is designed to give graduates advanced expertise in a STEM discipline as well as in educational theory and research methodologies.

This Graduate Group was established so individuals with training or experience in a mathematical, scientific, or technical discipline can pursue advanced studies focused on educational issues in these disciplines. SESAME produces scholars who can communicate effectively with scientists, mathematicians, and engineers as well as with educational researchers and practitioners. SESAME students are expected to attain a level of expertise equivalent to that of a Master's student in their chosen discipline.

Thesis work typically consists of basic research on learning or cognition in a STEM field or the development of improved pedagogical approaches based on relevant models and research. Upon satisfactory completion of their studies and thesis work, students will obtain the degree of Ph.D. in Science and Mathematics Education.

SESAME also offers a Learning Sciences Certificate in Instructional Design, Learning Technologies, and Education Research (https://sesame.berkeley.edu/learning-sciences-certificate-program/).

Admission to the University

Applying for Graduate Admission

Thank you for considering UC Berkeley for graduate study! UC Berkeley offers more than 120 graduate programs representing the breadth and depth of interdisciplinary scholarship. A complete list of graduate academic departments, degrees offered, and application deadlines can be found on the Graduate Division website (http://grad.berkeley.edu/programs/list/).

Prospective students must submit an online application to be considered for admission, in addition to any supplemental materials specific to the program for which they are applying. The online application can be found on the Graduate Division website (http://grad.berkeley.edu/admissions/).

Admission Requirements

The minimum graduate admission requirements are:

1. A bachelor's degree or recognized equivalent from an accredited institution;

2. A satisfactory scholastic average, usually a minimum grade-point average (GPA) of 3.0 (B) on a 4.0 scale; and

3. Enough undergraduate training to do graduate work in your chosen field.

For a list of requirements to complete your graduate application, please see the Graduate Division's Admissions Requirements page (https://grad.berkeley.edu/admissions/steps-to-apply/requirements/). It is also important to check with the program or department of interest, as they may have additional requirements specific to their program of study and degree. Department contact information can be found here (http://guide.berkeley.edu/graduate/degree-programs/).

Where to apply?

Visit the Berkeley Graduate Division application page (http://grad.berkeley.edu/admissions/apply/).

Admission to the Program

Requirements

1. A bachelor's degree or its recognized equivalent from an accredited institution;

2. Superior scholastic record, normally well above a 3.0 GPA;

3. Indication of appropriate research goals, described in the statement of purpose; and

4. For international applicants whose academic work has been in a language other than English, the Test of English as a Foreign Language (TOEFL).

Selection Criteria

SESAME accepts three to six Ph.D. students each year from more than 50 applications. Applicants are judged on a number of factors; good scores and a high GPA are necessary but not sufficient. Particularly valued are potential as a researcher and educator, a strong background in a STEM discipline, and an agenda that fits well with the work of specific faculty in this small, interdisciplinary program. Applicants should clearly indicate in their statement of purpose which faculty member(s) they are interested in doing research with and why.

Experience teaching, developing instructional materials, or doing educational or psychological research in these areas will also be favorably considered. Knowledge of psychology, cognitive science, education, or statistics is helpful but not required. See SESAME Admissions (https://gse.berkeley.edu/admissions/sesame/) for more information. SESAME accepts applications for only the Fall semester.

Statement of Purpose and Personal History

The statement of purpose and personal history are two separate essays.

The statement of purpose should succinctly explain your reasons for applying to SESAME, briefly review our relevant academic preparation and work experience, and describe your future academic or professional goals once the degree is acquired. The focus should be on your preparation, experience, and aims rather than a discussion of the trends or importance of education in general. The most successful statements are one to two pages in length and focus on the strengths and experiences of the applicant, providing the reviewers with evidence and justification for admitting those applicants who are qualified and well-suited for SESAME.

The personal history should include any relevant information not already included in the statement of purpose. Additional suggestions may be found in the Graduate Division's Personal Statement Guide. There is no minimum length for the personal history.

These two essays are used in part to evaluate the candidate's writing skills. Pursuant to UC Berkeley Policy, the two statements must be written by the candidate.

Three Letters of Recommendation

Ph.D. applicants should provide at least three and no more than five letters that speak directly to their ability and potential to perform academic work at the doctoral level.

SESAME is programmatically separate from the GSE so GSE-wide course requirements do not apply. Note, however, that the Graduate Division's requirement of EDUC 375 still applies.

A. Two SESAME Core Courses Taken in Year 1

SCMATHE 210	Practicum in Science and Math Education Research and Development	4 Units in Fall and 2 Units in Spring
SCMATHE 292	Research Seminar and Colloquium (Fall and Spring)	1

B. Two Foundations Courses Beginning in Year 1

EDUC 203	Cultivating Cognitive Development: From Sensorimotor Intelligence to Embodied STEM Concepts (Spring)	3
EDUC 254	Introduction to Cultural Historical Activity Theory (Spring)	3

C. Three Methodology Courses (1 Quant, 1 Qual + 1 More) Taken at Any Time

EDUC 222C	Design-Based Research Forum	3
EDUC 241C	Narrative across Learning Contexts	3
EDUC 241D	Perspectives on Classroom Discourse	3
EDUC 243	Advanced Qualitative Methods	3
EDUC 244	Data Mining and Analytics	3
EDUC 250A	Qualitative Research in Language/Literacy Education	3
EDUC 250C	Discourse Analysis	3
EDUC 252B	Ethnographic Methods in the Study of Language and Literacy in Traditional and Digital Environment	3
EDUC 259	(co)Participant Observation Research in the Field	4
EDUC 271B	Introduction to Qualitative Research Methods	3
EDUC 274A	Measurement in Education and the Social Sciences I	4
EDUC 274B	Measurement in Education and the Social Sciences II	4
EDUC 274D	Multidimensional Measurement	4
EDUC 275B & EDUC 275L	Data Analysis in Educational Research II and Educational Data Analysis Laboratory II	5
EDUC 275G	Hierarchical and Longitudinal Modeling	5
EDUC 276A	Introduction to Program Evaluation	3
EDUC 280C	Research Apprenticeship and Qualitative Methodology Seminar I	3
EDUC 293A & EDUC 293L	Data Analysis in Education Research and Educational Data Analysis Laboratory	5

SCMATHE 220C	Instructional Design in Science and Mathematics Education	3

D. One Learning in the Discipline Course Taken at Any Time

Below are examples of courses that represent this area but this list is not exhaustive. Students are encouraged to look at courses offered each term, to consult with their advisor, and to explore graduate coursework on campus more broadly.

EDUC 222C	Design-Based Research Forum (Fall)	3
EDUC 224A	Mathematical Thinking and Problem Solving (Fall)	3
EDUC 282	Introduction to Disciplined Inquiry (Fall)	3
SCMATHE 220C	Instructional Design in Science and Mathematics Education (Spring, odd years. May satisfy the E requirement below.)	3

E. Required: One Curriculum and Technology Design Course Taken at Any Time

Below are examples of courses that represent this area but this list is not exhaustive. You are encouraged to look at courses offered each term, to consult with your advisor, and to explore graduate coursework on campus more broadly - e.g., the School of Information (http://guide.berkeley.edu/graduate/schools-departments-graduate-groups/information/).

EDUC 222	Politics and Pedagogies at the Intersections of Data, Technologies, and Inequalities	3
EDUC 224C	Gender, Mathematics and Science	3
EDUC 224A	Mathematical Thinking and Problem Solving	3
EDUC 170	K12 Computer and Data Science Education: Design, Research, and Evaluation	3
EDUC 244	Data Mining and Analytics	3

F. Two STEM Disciplinary Courses in the Student's Field of Emphasis

Reflecting the range of STEM disciplinary fields and your interests, these two courses should be selected in consultation with your faculty advisor and with an eye toward your professional development.

G. Participation in a Research Group (At Least Four Semesters)

Many faculty in the GSE have one or multiple research groups that run yearlong. SESAME students typically enroll in a research group led by their advisor. However, you are encouraged to participate in multiple research groups if it will further enhance your growth. Below is a list of Learning Sciences and Human Development research groups to consider.

EDUC 209	Academic Writing Support Group	2
EDUC 223B	Special Problems in Mathematics, Science and Technology Education (Embodied Design Research Lab)	2-6
EDUC 223B	Special Problems in Mathematics, Science and Technology Education (Embodied Underground)	2-6
EDUC 223B	Special Problems in Mathematics, Science and Technology Education (Technology Enhanced Learning in Science)	2-6
EDUC 223B	Special Problems in Mathematics, Science and Technology Education (Leveraging Learning Technologies)	2-6

EDUC 223B	Special Problems in Mathematics, Science and Technology Education (Functions in Research)	2-6
EDUC 223B	Special Problems in Mathematics, Science and Technology Education (Teaching for Robust Understanding)	2-6
EDUC 223B	Special Problems in Mathematics, Science and Technology Education (Designing for Joy and Justice in Education)	2-6
EDUC 223B	Special Problems in Mathematics, Science and Technology Education (Computational Representations in Education (CoRE))	2-6
EDUC 298C	Group Studies, Seminars, or Group Research-- DCEMST	1-4
EDUC 290A	Special Topics Seminars: Policy, Organization, Measurement, and Evaluation	1-4

The Learning Sciences Certificate in Instructional Design, Learning Technologies, and Education Research prepares students for careers involving education design and research. This program is designed to meet the needs of both doctoral and professional master's students in Berkeley's science, technology, engineering, and mathematics (STEM) departments and in its professional schools.

Students who complete the certificate will be prepared to:

- Design courses for undergraduates and graduate students
- Use learning sciences research in design, implementation, and assessment of educational programs
- Use and refine learning technologies, including online courses, learning management systems, interactive models and simulations, and educational games
- Succeed in K-12 settings; undergraduate, graduate, and research institutions; out-of-school settings; non-profits, education startups, and industries that develop technical training and novel approaches to learning
- Meet the needs of students with varied cultural, educational, and personal experiences, including emergent bilinguals, underrepresented minorities, and students new to technology.

For further information, visit sesame.berkeley.edu/learning-sciences-certificate-program (https://sesame.berkeley.edu/learning-sciences-certificate-program/) or contact Lloyd Goldwasser (goldwasser@berkeley.edu).

Science and Mathematics Education

Expand all course descriptions [+]Collapse all course descriptions [-]

SCMATHE 210 Practicum in Science and Math Education Research and Development 1 - 4 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Practical experience on an educational research or development project on campus or elsewhere for 8-12 hours per week. Class meetings augment research experience with discussions of readings and interaction with guest speakers.
Practicum in Science and Math Education Research and Development: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of fieldwork per week

Additional Details

Subject/Course Level: Science and Mathematics Education/Graduate

Grading: Letter grade.

Practicum in Science and Math Education Research and Development: Read Less [-]

SCMATHE 220C Instructional Design in Science and Mathematics Education 3 Units

Terms offered: Spring 2023, Spring 2021, Spring 2019
Survey of literature on design of instruction in science and mathematics, including development of computer-based instruction. Includes consideration of evaluation methods and development of instruction modules for topics in science and mathematics.
Instructional Design in Science and Mathematics Education: Read More [+]
Rules & Requirements

Prerequisites: 220B or consent of the instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Science and Mathematics Education/Graduate

Grading: Letter grade.

Instructional Design in Science and Mathematics Education: Read Less [-]

SCMATHE 292 Research Seminar and Colloquium 1 Unit

Terms offered: Fall 2024, Spring 2024, Fall 2023
Discussion of current education research carried on by students, faculty, and guest speakers. A written analysis of several presentations required.
Research Seminar and Colloquium: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of colloquium per week

Additional Details

Subject/Course Level: Science and Mathematics Education/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Research Seminar and Colloquium: Read Less [-]

SCMATHE 294 Formulation of Educational Research 1 - 3 Units

Terms offered: Fall 2024, Fall 2023, Spring 2023
Development of thesis proposal under supervision of faculty member.
Formulation of Educational Research: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Science and Mathematics Education/Graduate

Grading: Letter grade.

Formulation of Educational Research: Read Less [-]

SCMATHE 295 Research 1 - 12 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Independent research activities under supervision of a faculty member.
Research: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Science and Mathematics Education/Graduate

Grading: Letter grade.

Research: Read Less [-]

SCMATHE 299 Individual Reading and Study 1 - 5 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Individual reading and study under the supervision of a faculty member.
Individual Reading and Study: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Science and Mathematics Education/Graduate

Grading: Letter grade.

Individual Reading and Study: Read Less [-]

SCMATHE 602 Individual Study for Qualifying Examination 1 - 8 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Individual study, under the supervision of a faculty member, designed to prepare the student for Ph.D qualifying examination.
Individual Study for Qualifying Examination: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor

Credit Restrictions: Course does not satisfy unit or residence requirements.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Science and Mathematics Education/Graduate examination preparation

Grading: Offered for satisfactory/unsatisfactory grade only.

Individual Study for Qualifying Examination: Read Less [-]