

MSED Course Requirements

The following course requirements are designed to enable students to:

- acquire knowledge, via course work and apprenticeship experiences, of the research methods that are necessary for examining the processes of learning and teaching;
- develop broad perspectives on cognition and learning, including major theoretical and philosophical issues;
- understand how people learn mathematical or scientific concepts in part by becoming familiar with existing research on learning and teaching in mathematics and science; and
- gain insight into learner’s conceptions and perspectives through teaching experiences.

Component	Courses	Description
Research Apprenticeship	Faculty Interviews (MSE 801)	During their first year, students interview 8 faculty members from both campuses and write a 1-page summary of each interview. The summaries are submitted to the SDSU MSED Coordinator.
	Three Research Rotations: <ul style="list-style-type: none"> • MSE 802 (SDSU) <i>and</i> • MSED 295 (UCSD) 	Students have practical experience with 3 different research projects (at least one on each campus). Each rotation should involve approximately 30 hours of work.
	Research Project: <ul style="list-style-type: none"> • MSE 820 (SDSU) <i>or</i> • MSED 298(UCSD) 	Students design and conduct an empirical study under the supervision of a faculty member. Students typically collect data in the summer following their first year and analyze and report their findings during the beginning of their second year.
Cognitive Science	Two Courses at UCSD selected from: <ul style="list-style-type: none"> • Distributed Cognition (COGS 234 or 102A) • Seminar on Special Topics (COGS 260) • Cognitive Science Seminar (COGS 200) • Everyday Cognition (COGS 102B) • Cognitive Theory (one of COGS101 A, B, or C) • Cognitive Foundations of Mathematics (COGS 152) 	UCSD is recognized internationally as a leading center of cognitive science. In courses and seminars, students will explore questions such as the following: What is the nature of intelligent activity? What are possible computational and biological mechanisms underlying such activity? What is the role of the environment (cultural and social as well as physical) in supporting and enabling cognition?

<p style="text-align: center;">Theoretical Perspectives in Mathematics & Science Education</p>	<p>Seminar in Mathematics and Science Education (MSED 296 A, B, & C at UCSD)</p>	<p>International, as well as US, theories and research about how students learn mathematics and science from elementary school through college, what mathematics and science they are expected to learn, and ways of helping them learn (i.e., teaching them) are studied</p>
	<p>Learning Theories (MTHED 603 at SDSU)</p>	<p>The application of several major learning theories (e.g., behaviorism, structuralism, radical constructivism, information processing, and sociocultural perspectives) to research on the learning and teaching of mathematics and science.</p>
	<p>Science Education Seminar (N Sci 600 at SDSU or MSED 290 at UCSD) <i>required for science educators</i></p>	<p>Research on the learning and teaching of science at the K-14 level is explored. Issues include students' conceptions (of topics in biology, physics, and chemistry), the nature of science, and experimental curricular approaches.</p>
	<p>Two Seminars taught at SDSU, selected from the following, <i>required for mathematics educators</i>:</p> <ul style="list-style-type: none"> • Research on Teaching (MTHED 604) • Algebra in the 7-14 Curriculum (MTHED 605) • Geometry, Probability, Statistics in the 7-14 Curriculum (MTHED 606) • Research on Undergraduate Mathematics Education (MTHED 607) 	<p>In MTHED 605 and 606 students explore the research on students' conceptions of a variety of topics in important content areas (such as geometry and algebra) at the secondary and lower-division undergraduate levels. Innovative pedagogical approaches are also investigated. MTHED 604 addresses the research on teaching mathematics and teacher knowledge.</p>
<p style="text-align: center;">Research Methods</p>	<p>Quantitative Methods:</p> <ul style="list-style-type: none"> • PSYC 201 A & B (at UCSD) <i>or</i> • MA 282 A & B (at UCSD) <i>or</i> • PSY 670 A & B (at SDSU) 	<p>Statistical methods and the mathematical treatment of data are explored, with special reference to research in psychology.</p>
	<p>Qualitative Methods (MSE 810 at SDSU)</p>	<p>Qualitative methods are explored, such as clinical interviewing, verbal protocol analysis, grounded theory, design experiments, and interactional analysis.</p>

<p style="text-align: center;">Teaching Experience</p>	<p>One Teaching Practicum selected from:</p> <ul style="list-style-type: none"> • Teaching prospective teachers (MSE 805) • Supervised K-12 teaching (MSE 806 or MSED 295) • Specially designed practicum (MSE 807) • TA for undergraduate mathematics or science (“Content” 500 at UCSD) • MSED 295 (1-4 units) or EDS 129A/139: Gr 7-12 teaching (6 units) 	<p>Students work with a supervising faculty member to create an experience in which they will assist or teach prospective teachers, undergraduates, or K-12 students.</p>
<p style="text-align: center;">Tailored Experiences</p>	<p>Students work with their advisors to select a total of two courses, chosen from different categories, according to the needs and background of the student:</p> <ul style="list-style-type: none"> • Philosophy & History. Philosophy of Science (PHIL 145); Philosophy of Biology (PHIL 146); Philosophy of Physics (PHIL 147); Seminar on Science Studies (PHIL 209A); History of Science (HISC 106, 107, 108, 109, 160/260, 163/263, 164/264, 165/265). • Sociology. Sociology of Education (SocG 270); Social Organization of Education (SocC 126/EDS 126); Language, Culture, & Education (SocB 117/EDS 117). • Mathematics & Science. Graduate level courses in mathematics, chemistry, biology, or physics. • Teaching Experience. An option for students who have not yet had teaching experiences at both the K-12 and collegiate levels is to take a second teaching practicum. • Other. Other types of courses (at the graduate or upper division undergraduate level) can be approved by the advisors if they contribute to a coherent program. 	
<p style="text-align: center;">Independent Research</p>	<p>Research Seminar (MSE 830)</p>	<p>Students and faculty present research for discussion and critique.</p>
	<p>Dissertation Research: MSE 899 (SDSU) or MSED 299 (UCSD)</p>	<p>Independent study and research for the doctoral dissertation.</p>

Residency Requirements. Students must complete a 36-unit residency at UCSD, of which a maximum of 12 units can be upper division undergraduate courses (100 level). Lower division undergraduate courses do not count toward residency. Students must also complete an 18-unit residency at SDSU. The residency requirements cannot be replaced by coursework taken elsewhere.

Course Substitution Process. To substitute a course for a required course, a student must first prepare a written request for the course substitution. The request must include a rationale for the substitution and explain how the new course fits into the student’s MSED program. The student submits the request to both SDSU and UCSD advisors. If both advisors approve, the student forwards the approvals to both Debbie Escamilla (SDSU) and Kelly Kasperlain (UCSD), who will place the documentation of approval in the student’s file. Approval must be obtained *before* the beginning of the course.