SCIENCE AND SME MATHEMATICS EDUCATION

College of Natural Science

120 Seminar in Integrated Science for Elementary Schools
Spring. 1(1-1) Interdepartmental with Teacher Education. Administered by Science and Mathematics Education. P: BS 110 or BS 111 or CEM 141 or PHY 231 or PSL 250 or GLG 201 or GEO 203 R: Open only to students in the Integrated Science Teaching major, the Special Education major, the Child Development major, the Elementary Teacher Education program, the 5th-year teacher certification program, or with approval of the college. Exploration of major connecting themes in life sciences, earth science, and physical science as evidenced in the K-8 science curriculum and college science courses.

301 Science for Elementary Schools
Fall, Spring. 3(2-2) RB: Completion of an ISB and ISP laboratory or ISP and ISB laboratory course. Completion of the majority of complementary studies coursework in science and math. R: Open only to students in the Elementary Teacher Education Program. SA: NSC 301 Topics in earth science, life science, and physical science explored through discussion, demonstrations, readings, presentations, and field trips.

320 Integrated Science for Elementary Schools
Spring. 3(2-2) Interdepartmental with Teacher Education. Administered by Science and Mathematics Education. P: SME 120 and (BS 110 or LBS 144 or LBS 148 or BS 111 or LBS 145 or LBS 149 or PSL 250 or ZOL 355) and (PHY 231 or PHY 231B or CEM 141 or LBS 171) and (GLG 201 or GEO 203 or AST 207) R: Open only to students in the Integrated Science Elementary Teaching major. Not open to students with credit in SME 301. Analysis of the concepts integrating science across life sciences, earth sciences, and physical sciences. Applications to the K-8 science curriculum.

401 Science Laboratories for Secondary Schools (W)
Fall. 4(2-8) P: Completion of Tier I writing requirement. R: Open only to seniors in the Bachelor of Arts degree in Chemistry, or Biological Science-Interdepartmental major or Earth Science-Interdepartmental major or General Science-Interdepartmental major or Physical Science-Interdepartmental major or their associated LBS majors. SA: NSC 401 Laboratory equipment, supplies, demonstrations, exercises, and safety. Care of live organisms. Disposal of biological and chemical wastes.

420 Integrated Science Research
Fall, Spring. 3(2-2) Interdepartmental with Teacher Education. Administered by Science and Mathematics Education. R: Open to seniors in the General Science Secondary Teaching Major and open to seniors in the Integrated Science Elementary Teaching Major. Research design and data analysis of individual research projects relevant to the K-12 science curriculum, integrating topics in life, earth, and physical science.

430 History of Mathematics
Spring. 3(3-0) P: MTH 133 and MTH 301 Development of mathematical thought from ancient times to the present, selected from Egyptian, Babylonian, Mayan, Greek, Indian, and Arab contributions to mathematics and to the context of today's school mathematics curriculum.

490 Special Problems
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of college. Faculty directed individualized study of an interdisciplinary problem.

600 Special Problems for K-8 Teachers
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Elementary teacher certification, 3 years teaching experience. R: Approval of college. SA: NSC 600 Supervised study of problems or issues in biological sciences, physical sciences, earth sciences or mathematical sciences.

630 Bridges to Science
Summer. 2(2-1) R: Open to masters students in the Master of Arts for Teachers in General Science. Approval of college. SA: NSC 630 Scientific principles and concepts in integrative life, earth, and physical science.

800 Problems in Science or Mathematics for Teachers
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 15 credits in all enrollments for this course. R: Secondary certification in biological sciences, physical sciences or chemistry; secondary certification in Mathematics or Mathematics Education. R: Approval of college. SA: NSC 800 Supervised study of problems or issues in biological sciences, or physical sciences, or mathematical sciences.

820 College Student Cognition in Science
Spring. 3(3-0) RB: At least 3 undergraduate courses in science. Introduction to research methodologies and findings relevant to college student cognition in science disciplines. Material from education, psychology, cognitive sciences, and the science disciplines will be used to reveal college student cognitive processes as they relate to science fields.

828 Physical Science I
Summer. 3(2-1) RB: Elementary teacher certification, 1 year teaching experience. R: Open to graduate students in the Master of Arts for Teachers in General Science. Approval of college. SA: SME 651 The nature of matter and energy including energy transfer, density, and conservation of mass. Properties of elements, mixtures, and compounds.

829 Physical Science II
Summer. 3(2-1) RB: Elementary teacher certification, 1 year teaching experience. R: Open to graduate students in the Master of Arts for Teachers in General Science. Approval of college. SA: SME 652 Electricity and magnetism, force and motion, heat and temperature, sound, and light.

832 Earth Science I
Summer. 3(2-1) RB: Elementary teacher certification, 1 year teaching experience. R: Open to graduate students in the Master of Arts for Teachers in General Science. Approval of college. SA: SME 654 The solar system, including the sun, planets, earth, and its moon. Weather and the water cycle.

833 Earth Science II
Summer. 3 credits. RB: Elementary teacher certification, 1 year teaching experience. R: Open to graduate students in the Master of Arts for Teachers in General Science. Approval of college. SA: SME 654 Rocks, minerals, and fossils and the physical and geological processes that form them.

838 Life Science I
Summer. 3(2-1) RB: Elementary teacher certification, 1 year teaching experience. R: Open to graduate students in the Master of Arts for Teachers in General Science. Approval of college. SA: SME 655 Structure, function, genetics, and classification of organisms, including protists, plants, animals, and decomposers.

839 Life Science II
Summer. 3(2-1) RB: Elementary teacher certification, 1 year teaching experience. R: Open to graduate students in the Master of Arts for Teachers in General Science. Approval of college. SA: SME 656 Interrelationships among and between organisms and their surroundings. Ecosystems, habitats, food chains, cycles, and pollution.

840 Critical Content of School Mathematics: Numbers and Operations
Spring of odd years. 3(3-0) R: Open to graduate students. Mathematical foundations of numbers, number systems, and related algorithms. Historical development. Development in school curriculum. Research on teaching and learning.

841 Critical Content of School Mathematics: Algebra
Fall of odd years. 3(3-0) RB: MTH 310 and MTH 320 R: Open to graduate students. Mathematical foundations of algebra. Historical development. Development in school curriculum. Research on teaching and learning.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Credits</th>
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<tr>
<td>842</td>
<td>Critical Content of School Mathematics: Geometry</td>
<td>Spring of even years.</td>
<td>3(3-0)</td>
<td>RB: MTH 330 or MTH 432</td>
<td>R: Open to graduate students. Mathematical foundations of geometry. Instructional materials. Historical development. Development of geometry in school curriculum. Research on teaching and learning.</td>
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<td>861</td>
<td>Chemistry for Teachers</td>
<td>Summer.</td>
<td>3(2-1)</td>
<td>RB: Secondary certification in chemistry or physics or earth science or physical science, 1 year of teaching.</td>
<td>R: Open to graduate students in the Physical Science-Interdepartmental major. Approval of college. SA: NSC 861 Intensive lecture and laboratory study of basic chemistry from a modern viewpoint.</td>
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<td>862</td>
<td>Physics for Teachers</td>
<td>Summer.</td>
<td>3(2-1)</td>
<td>RB: Secondary certification in chemistry or physics or earth science or physical science, 1 year of teaching.</td>
<td>SA: NSC 862 Intensive lecture and laboratory study of basic physics from a modern viewpoint.</td>
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<td>863</td>
<td>Earth Science for Teachers</td>
<td>Summer.</td>
<td>3(2-1)</td>
<td>RB: Secondary certification in chemistry or physics or earth science or physical science, 1 year of teaching.</td>
<td>R: Open to graduate students in the Physical Science-Interdepartmental major. Approval of college. SA: NSC 863 Intensive lecture and laboratory study of basic earth sciences from a modern viewpoint.</td>
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| 865         | Technology for Teachers | Summer. | 2(2-1) | RB: Secondary certification in chemistry or physics or earth science or physical science, 1 year of teaching. | R: Open to graduate students in the Physical Science-Interdepartmental major. Approval of college.

Utilization and application of new technologies in secondary science classrooms. |
| 866         | Integrated Science for Secondary Teachers | Summer. | 3(2-1) | RB: Secondary certification in chemistry or physics or earth science or physical science, 1 year of teaching. | R: Open to graduate students in the Physical Science-Interdepartmental major. Approval of college.

Development of class activities that integrate across the sciences: physics, chemistry, earth science, and biology. |
| 870         | Teaching College Science | Spring. | 2 credits. | RB: One year of graduate study in a biological or physical science. | R: Approval of college. SA: NSC 870 Philosophies of education. Ethnic, gender, and cultural issues. Designing a laboratory course. Problems of class size. Instructional technologies. Assessment and evaluation. |
| 871         | Biochemistry and Cell Biology for Teachers | Summer of odd years. | 7(4-6) | RB: Undergraduate degree in the biological sciences | R: Open to lifelong graduate students. Approval of department; application required. Review of basic principles in biochemistry and cell biology, and their application to current topics. |
| 874         | Field Ecology for Teachers | Summer of even years. | 7(4-6) | RB: Undergraduate degree in the biological sciences | R: Open to lifelong graduate students. Approval of department; application required. Review of basic principles of ecology and their application in a field setting. |
| 879         | Teaching College Mathematics | Fall. | 3(3-0) | A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Counseling, Educational Psychology and Special Education and Mathematics and Teacher Education. Administered by Science and Mathematics Education. RB: Past or concurrent mathematics teaching experience. Curriculum materials, case studies, approaches to teaching and student learning of particular mathematics topics. |
| 889         | Research for Inservice Teachers | Fall, Spring, Summer. | 1 to 8 credits. | A student may earn a maximum of 10 credits in all enrollments for this course. | R: Open only to inservice K-12 teachers with baccalaureate degrees. R: Approval of college. SA: NSC 889 Research in faculty laboratories. Oral and written presentations. |
| 899         | Master's Thesis Research | Fall, Spring, Summer. | 1 to 8 credits. | A student may earn a maximum of 36 credits in all enrollments for this course. | R: Open only to master's students in the College of Natural Science. Approval of college. SA: NSC 899 Master's thesis research. |
| 901         | Frontiers in Biological Science | Fall, Spring. | 1 to 4 credits. | A student may earn a maximum of 36 credits in all enrollments for this course. | R: Secondary certification in chemistry or physics or earth science or physical science or biology, 3 years teaching experience. R: Approval of college. SA: NSC 901 Weekend workshops with research faculty exploring background and latest findings in their area of research. |
| 902         | Frontiers in Physical Science | Fall, Spring. | 1 to 4 credits. | A student may earn a maximum of 40 credits in all enrollments for this course. | R: Open only to students with secondary teacher certification in chemistry or physics or earth science or physical science or biology and 3 years of teaching experience. R: Approval of college. SA: NSC 902 Weekend workshops with research faculty exploring background and latest findings in their area of research. |
| 903         | Topics in Mathematics Education Research | Fall of odd years. | 3(3-0) | RB: MTH 802A or MTH 802B | SA: MTH 903 Research in mathematics education and its effect on policy, curriculum, and the teaching and learning of mathematics. |