

# SCIENCE AND MATHEMATICS EDUCATION

## SME

### 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 approval of 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 ISB laboratory or ISP and ISP 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(2-6) 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. Field Trips required.

#### 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. RB: 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. RB: 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 science, 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 653

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.

## Science and Mathematics Education—SME

- 842 Critical Content of School Mathematics: Geometry**  
Spring of even years. 3(3-0) RB: MTH 330 or MTH 432 R: Open to graduate students. Mathematical foundations of geometry. Instructional materials. Historical development. Development of geometry in school curriculum. Research on teaching and learning.
- 861 Chemistry for 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. SA: NSC 861  
Intensive lecture and laboratory study of basic chemistry from a modern viewpoint.
- 862 Physics for Teachers**  
Summer. 3(2-1) RB: Secondary certification in chemistry or physics or earth science or physical science, 1 year of teaching. SA: NSC 862  
Intensive lecture and laboratory study of basic physics from a modern viewpoint.
- 863 Earth Science for 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. SA: NSC 863  
Intensive lecture and laboratory study of basic earth sciences from a modern viewpoint.
- 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 of even years. 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. RB: 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.
- 890 Independent Study**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open to masters students.  
Individualized study for master's level students.
- 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. RB: 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. RB: 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.
- 926 Proseminar in Mathematics Education I**  
Fall. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education and Mathematics and Teacher Education. Administered by Science and Mathematics Education.  
Research on the learning and teaching of mathematics. Teaching, teacher and student learning, curriculum, and educational policy. Historical, philosophical, empirical, and theoretical perspectives.
- 927 Proseminar in Mathematics Education II**  
Spring. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education and Mathematics and Teacher Education. Administered by Science and Mathematics Education. P: SME 926  
Continuation of SME 926.
- 954 Design and Methods in Mathematics Education Research**  
Fall. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education and Mathematics and Teacher Education. Administered by Science and Mathematics Education. RB: SME 926 and SME 927  
History, current trends, and issues pertaining to research design and methods in mathematics education research. Mathematics education research in the areas of policy, teaching, teacher learning, and student learning with particular attention to how features of research designs influence research findings.
- 990 Independent Study**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open to doctoral students.  
Individualized study for doctoral level students.
- 997 Special Topics in Mathematics Education**  
Fall, Spring, Summer. 3 to 6 credits. A student may earn a maximum of 18 credits in all enrollments for this course. RB: SME 903 or TE 950 or CEP 913 SA: MTH 997  
Advanced topics in mathematics education.
- 999 Doctoral Dissertation Research**  
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 120 credits in all enrollments for this course. RB: SME 926 and SME 927 and SME 954  
Doctoral dissertation research.