

# 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:M: 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:M: 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:M: 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 for Elementary Schools

Fall. 3(2-2) Interdepartmental with Teacher Education. Administered by Science and Mathematics Education. P:M: SME 320 and (STT 200 or STT 201) R: Open only to students in the Integrated Science Elementary Teaching major.

Research design and data analysis of individual research projects relevant to the K-8 science curriculum, integrating topics in life, earth, and physical science.

#### 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 in biological, physical, or earth sciences.

#### 630 Bridges to Science

Summer. 1 credit. A student may earn a maximum of 3 credits in all enrollments for this course. RB: (NSC 301) SA: NSC 630

Scientific principles and concepts in integrative life, earth, and physical science.

#### 651 Physical Science I

Summer. 2 credits. RB: Elementary teacher certification, 3 years teaching experience. R: Approval of college. SA: NSC 651

The nature of matter and energy including energy transfer, density, and conservation of mass. Properties of elements, mixtures, and compounds.

#### 652 Physical Science II

Summer. 2 credits. RB: Elementary teacher certification, 3 years teaching experience. R: Approval of college. SA: NSC 652

Electricity and magnetism, force and motion, heat and temperature, sound, and light.

#### 653 Earth Science I

Summer. 2 credits. RB: Elementary teacher certification, 3 years teaching experience. R: Approval of college. SA: NSC 653

The solar system, including the sun, planets, earth, and its moon. Weather and the water cycle.

#### 654 Earth Science II

Summer. 2 credits. RB: Elementary teacher certification, 3 years teaching experience. R: Approval of college. SA: NSC 654

Rocks, minerals, and fossils and the physical and geological processes that form them.

#### 655 Life Science I

Summer. 2 credits. RB: Elementary teacher certification, 3 years teaching experience. R: Approval of college. SA: NSC 655

Structure, function, genetics, and classification of organisms, including protists, plants, animals, and decomposers.

#### 656 Life Science II

Summer. 2 credits. RB: Elementary teacher certification, 3 years teaching experience. R: Approval of college. SA: NSC 656

Interrelationships among and between organisms and their surroundings. Ecosystems, habitats, food chains, cycles, and pollution.

#### 800 Problems in Biological or Physical Science for Teachers

Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 8 credits in all enrollments for this course. RB: Teacher Certification required. R: Approval of college. SA: NSC 800

Supervised study of problems in biological or physical science.

#### 850 Cell and Molecular Biology

Summer. 2 credits. RB: Secondary certification in biology, 3 years teaching experience. R: Approval of college. SA: NSC 850

Molecular basis of structure and function of cells. Protein structure and function, cell physiology, metabolic energy and transmission of genetic information.

#### 851 Cell and Molecular Biology Laboratory

Summer. 3 credits. RB: Secondary certification in biology, 3 years teaching experience. R: Approval of college. SA: NSC 851

Generation of laboratory exercises appropriate for secondary students.

#### 852 Interdisciplinary Seminar in Biological Science

Fall, Spring, Summer. 1 credit. RB: Secondary certification in biology, 3 years teaching experience. R: Approval of college. SA: NSC 852

Interrelationships of biological science and technology. Role of society in regulation of research and technological innovations.

#### 855 Environmental and Behavioral Biology

Summer. 3 credits. RB: Secondary certification in biology, 3 years teaching experience. R: Approval of college. SA: NSC 855

Biotic and abiotic features of lakes, streams, forest ecosystems, and microbial ecosystems.

#### 856 Environmental and Behavioral Biology Laboratory

Summer. 3 credits. RB: Secondary certification in biology, 3 years teaching experience. R: Approval of college. SA: NSC 856

Laboratory and field examinations of lake, stream and forest ecosystems.

#### 861 Chemistry for Teachers

Summer. 2 credits. RB: Secondary certification in chemistry or physics or earth science or physical science, 3 years teaching experience. R: Approval of college. SA: NSC 861

Intensive lecture and laboratory study of basic chemistry from a modern viewpoint.

#### 862 Physics for Teachers

Summer. 2 credits. RB: Secondary certification in chemistry or physics or earth science or physical science, 3 years teaching experience. R: Approval of college. SA: NSC 862

Intensive lecture and laboratory study of basic physics from a modern viewpoint.

- 863 Earth Science for Teachers**  
 Summer. 2 credits. RB: Secondary certification in chemistry or physics or earth science or physical science, 3 years teaching experience. R: 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.
- 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. 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.
- 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:M: SME 926  
 Continuation of SME 926.
- 954 Design and Methods in Mathematics Education Research**  
 Fall of odd years. 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.
- 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 24 credits in all enrollments for this course. RB: SME 926 and SME 927 and SME 954  
 Doctoral dissertation research.