### SCIENCE AND MATHEMATICS EDUCATION

#### College of Natural Science

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>120</td>
<td>Seminar in Integrated Science for Elementary Schools</td>
<td>Spring, 1(1-1) Interdepartmental with Teacher Education. P: (BS 110 or BS 111 or CEM 141 or PHY 231 or PSL 250 or MMG 205 or GLG 201 or GEO 203) R: Open only to students in the Integrated Science Teaching major, the Special Education major, the Elementary Teacher Education program, the 5th-year teacher certification program, or approval of college. Exploratory major connecting themes in life science, earth science, and physical science as evidenced in the K-8 science curriculum and college science courses.</td>
<td>3</td>
<td>3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department.</td>
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<tr>
<td>301</td>
<td>Science for Elementary Schools</td>
<td>Fall, Spring, 1(1-1) Interdepartmental with Teacher Education. (SME 120) and (BS 110 or LBS 144 or LBS 145 or LBS 149 H 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 teaching major. Topics in earth science, life science, and physical science explored through discussion, demonstrations, readings, presentations, and field trips.</td>
<td>3</td>
<td>3(3-0) A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of department.</td>
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<td>401</td>
<td>Science Laboratories for Secondary Schools (W)</td>
<td>Fall, 1(2-6) R: Open only to seniors in the BA degree in Chemistry, or the BS degree in Biological Science-Interdepartmental or Earth Science-Interdepartmental or General Science-Interdepartmental 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.</td>
<td>1</td>
<td>1(1-1) A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department.</td>
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<td>420</td>
<td>Integrated Science Research for Elementary Schools</td>
<td>Fall, 3(2-2) Interdepartmental with Teacher Education. P: (SME 320) and (STT 200 or STT 201) R: Open only to students in the Integrated Science 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.</td>
<td>3</td>
<td>3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department.</td>
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<td>490</td>
<td>Special Problems</td>
<td>Fall, Spring, 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.</td>
<td>1 to 4</td>
<td>3(3-0) 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.</td>
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<tr>
<td>500</td>
<td>Special Problems for K-8 Teachers</td>
<td>Fall, Spring, 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 630 Scientific principles and concepts in integrative life, earth, and physical science.</td>
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<td>600</td>
<td>Physical Science I</td>
<td>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.</td>
<td>3</td>
<td>3(3-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Approval of college. SA: NSC 652 Electricity and magnetism, force and motion, heat and temperature, sound, and light.</td>
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<td>651</td>
<td>Earth Science I</td>
<td>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.</td>
<td>3</td>
<td>3(3-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Approval of college. SA: NSC 654 Rocks, minerals, and fossils and the physical and geological processes that form them.</td>
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<td>652</td>
<td>Earth Science II</td>
<td>Summer, 2 credits. RB: Elementary teacher certification, 3 years teaching experience. R: Approval of college. SA: NSC 655 The nature of matter and energy including energy transfer, density, and conservation of mass. Properties of elements, mixtures, and compounds.</td>
<td>3</td>
<td>3(3-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Approval of college. SA: NSC 656 Structure, function, genetics, and classification of organisms, including protists, plants, animals, and decomposers.</td>
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<td>655</td>
<td>Life Science I</td>
<td>Summer, 2 credits. RB: Elementary teacher certification, 3 years teaching experience. R: Approval of college. SA: NSC 657 Interrelationships among and between organisms and their surroundings. Ecosystems, habitats, food chains, cycles, and pollution.</td>
<td>3</td>
<td>3(3-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Teacher Certification required. R: Approval of college. SA: NSC 800 Supervised study of problems in biological or physical science.</td>
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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. Spring. Given only at Summer. Given only at W.K. Kellogg Biological Station. 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. Summer. Given only at W.K. Kellogg Biological Station. 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.

860 Problem Solving Techniques in Physical Science
Summer. 3 credits. RB: (NSC 861 and NSC 862 and NSC 863) Secondary certification in chemistry or physics or earth science or physical science, 3 years teaching experience. R: Approval of college. SA: NSC 860
Measurement and analysis of chemical, physical, and geological phenomena.

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.

864 Interdisciplinary Seminar in Physical Science
Summer. 2 credits. RB: (NSC 860) R: Approval of college. SA: NSC 864
Interrelationships of the physical sciences. The role of society in regulation of science to technology transfer.

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

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 4 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.