MATHEMATICS AND SCIENCE DUAL, MINOR

REQUIREMENTS

This minor is intended for Elementary Education majors wishing to enhance their content preparation in mathematics and science and is particularly suitable for Elementary Education majors who intend to teach mathematics and science in the middle school.

A minimum cumulative grade point average of 2.75 is required, based on all minor coursework taken on the UW–Madison campus.

MATHEMATICS COMPONENT

The mathematics sequence emphasizes problem solving, mathematical reasoning and justification, communicating, and building on students' mathematical ideas in areas such as algebraic thinking, calculus, and probability and statistics. The capstone course, MATH 138 Mathematics for Teaching: Conjecture, Generalization, and Proof, is for students to build connections across core ideas in upper-level elementary and middle school mathematics and to understand how these evolve from and into elementary and higher level mathematics. This sequence is also intended to prepare students to take the Praxis examination for middle school mathematics, thereby permitting certification and licensure in most other states that require more in-depth content preparation.

Complete the following courses. Students completing this minor will take MATH 135 instead of MATH 132 in the Elementary Education sequence.

Code	Title	Credits
MATH 135	Algebraic Reasoning for Teaching Math [1]	3
MATH 136	Pre-calculus and Calculus for Middle School Teachers [2]	6
MATH 138	Mathematics for Teaching: Conjecture, Generalization, and Proof [3]	3

1

Offered each spring semester.

2

This is a 6-credit course based on the large lecture of MATH 213 Calculus and Introduction to Differential Equations with a special discussion section for students completing this minor. Offered each fall semester. The following students will be exempt from this course requirement: students having taken MATH 213, MATH 217, MATH 221, MATH 222, MATH 234, MATH 275, MATH 276, or MATH 375 (or an exact transfer equivalent of any of these) with a grade of B or better; students having passed the AP Calculus AB test with a score of 5; and students having passed the AP Calculus BC test with a score of 4 or better.

3

This 3-credit capstone course is similar to MATH 132 Problem Solving in Algebra, Probability and Statistics.

SCIENCE COMPONENT

The aim of the **science component** of this minor is for students to understand science as an intellectual activity. The goals of science and the diverse means by which scientific knowledge is generated and validated should be at the core of the science portion of this minor. Upon its completion, students should have had opportunities to understand some of the most powerful organizing ideas in the various scientific disciplines as well as how those ideas have been and are generated. Such an understanding should provide students with the fundamental tools and outlook necessary to teach the variety of science content typically taught in middle schools.

The committee that developed this science component has indicated that the primary purpose for the minor should be consistent with the goals of a liberal or general education, thus viewing the minor as an extension of the current liberal studies requirement. In addition to the 9 credits of science required for the liberal studies requirement, students completing this minor must also take 9 credits in science for the math–science dual minor. With these **18 credits** it is possible to provide a minimal level of breadth and depth of science coursework. This minor is also expected to provide Elementary Education program students with a background in the sciences that are most commonly taught at the middle school level.

Complete the following requirements:

- At least 18 credits from the courses listed below. Additional courses can be considered; please consult with an advisor in the School of Education Student Services office, 139 Education Building.
- One course in each of three of the four science areas of biology, chemistry, physics, and earth and space science from the approved list, below. Integrated Liberal Studies 153 does not count in any of the areas, but can count toward the 18 credit total.
- At least 6 credits of coursework from the courses listed below that are **not** marked with an asterisk (*). Courses with the asterisk are considered to be introductory level courses.

The following courses are approved for inclusion in the science component of the math/science minor.

Code	Title	Credits
ILS 153	Ways of Knowing in the Sciences *	4

Biology course options

Code	Title	Credits
Biochemistry		
All courses numbered 500 and above		
Biocore		
All courses		
Biology		
BIOLOGY/ ZOOLOGY 101	Animal Biology *	3
BIOLOGY/ ZOOLOGY 102	Animal Biology Laboratory *	2
BIOLOGY/BOTANY/ ZOOLOGY 151	Introductory Biology *	5
BIOLOGY/BOTANY/ ZOOLOGY 152	Introductory Biology	5
Botany		
BOTANY 100	Survey of Botany *	3

BOTANY/ PL PATH 123	Plants, Parasites, and People *	3
BOTANY/ BIOLOGY 130	General Botany *	5
BOTANY/BIOLOGY/ ZOOLOGY 151	Introductory Biology *	5
BOTANY/BIOLOGY/ ZOOLOGY 152	Introductory Biology	5
BOTANY/ENVIR ST/ ZOOLOGY 260	Introductory Ecology *	3
All courses numbered 300 and above		
Entomology		
ENTOM/ ENVIR ST 201	Insects and Human Culture-a Survey Course in Entomology *	3
All courses numbered 300 and above		
Forest and Wildlife Ecology		
All courses numbered 300 and above		
Genetics		
All courses numbered 400 and above		
Microbiology		
MICROBIO 101	General Microbiology *	3
MICROBIO 102	General Microbiology Laboratory *	2
All courses numbered 300 and above		
Plant Pathology		
PL PATH/ BOTANY 123	Plants, Parasites, and People *	3
All courses numbered 300 and above		
Zoology		
ZOOLOGY/ BIOLOGY 101	Animal Biology *	3
ZOOLOGY/ BIOLOGY 102	Animal Biology Laboratory *	2
ZOOLOGY/BIOLOGY/ BOTANY 151	Introductory Biology *	5
ZOOLOGY/BIOLOGY/ BOTANY 152	Introductory Biology	5
ZOOLOGY/BOTANY/ ENVIR ST 260	Introductory Ecology *	3
ZOOLOGY/ ENTOM 302	Introduction to Entomology	4
ZOOLOGY/ ENVIR ST 315	Limnology-Conservation of Aquatic Resources	2
ZOOLOGY 316	Laboratory for Limnology-Conservation of Aquatic Resources	2-3
Courses numbered 350 and above		

Chemistry course options

Code	Title	Credits
Biochemistry		
All courses numbered 500 and above		
Chemistry		
CHEM 103	General Chemistry I *	4
CHEM 104	General Chemistry II	5
CHEM 108	Chemistry in Our World *	5
CHEM 109	Advanced General Chemistry *	5
CHEM 115	Chemical Principles I *	5
CHEM 116	Chemical Principles II	5
All courses numbered 300 and above		

Physics course options

Code	Title	Credits
PHYSICS 103	General Physics *	4
PHYSICS 104	General Physics	4
PHYSICS 107	The Ideas of Modern Physics *	3
All courses numbered 200 and above		

Earth and Space Science course options

Code	Title	Credits
Astronomy		
ASTRON 103	The Evolving Universe: Stars, Galaxies, and Cosmology *	3
ASTRON 104	Our Exploration of the Solar System *	3
ASTRON 150	Topics in Astronomy	2
ASTRON 200	The Physical Universe *	3
ASTRON 236	The History of Matter in the Universe *	3
All courses numbered 200 and above		
Atmospheric and Oceanic Studies		
ATM OCN 100	Weather and Climate *	3
ATM OCN 101	Weather and Climate *	4
ATM OCN/ENVIR ST/ GEOSCI 102	Climate and Climate Change *	3
ATM OCN/ GEOSCI 105	Survey of Oceanography *	3-4
ATM OCN/ ENVIR ST 171	Global Change: Atmospheric Issues and Problems *	2-3
All courses numbered 200 and above		
Geography		
GEOG/ENVIR ST 120	Introduction to the Earth System *	3
GEOG/ENVIR ST 127	Physical Systems of the Environment *	5
All courses numbered 300 and above and designated as Physical Science		
Geoscience		
GEOSCI 100	Introductory Geology: How the Earth Works *	3
GEOSCI/ATM OCN/ ENVIR ST 102	Climate and Climate Change *	3
GEOSCI/ ATM OCN 105	Survey of Oceanography *	3-4
GEOSCI 110	Evolution and Extinction *	4
GEOSCI 202	Introduction to Geologic Structures	4
GEOSCI 204	Geologic Evolution of the Earth	4
GEOSCI 304	Geobiology	3
GEOSCI/GEOG 320	Geomorphology	3
GEOSCI/G L E 370	Elementary Petrology	3
GEOSCI/GEOG 420	Glacial and Pleistocene Geology	3
GEOSCI 430	Sedimentology and Stratigraphy	3
GEOSCI/G L E 455	Structural Geology	4

GEOSCI 456	Geologic Field Methods	2

All courses numbered 556 and above