

Science Education

www.science-ed.uni.edu

Science Education is an interdepartment and intercollegiate entity within the College of Humanities, Arts, and Sciences. There is no science education department as such. Some science teaching majors are offered under the jurisdiction and general supervision of the Dean of the College of Humanities, Arts and Sciences. The responsibility for programs and courses in Science Education is delegated to the Science Education faculty under its director. Members of the Science Education faculty hold their primary appointments in the various science departments in the College of Humanities, Arts and Sciences and in the Department of Teaching in the College of Education.

The following programs are offered in science education:

Undergraduate Majors (B.A.)

- Comprehensive Secondary Science-Teaching (p. 1)
- Middle Level Science-Teaching (Dual) (p. 2)

Minor

- Basic Science (K-8)-Teaching (p. 4)

Graduate Major (M.A.)

- Science Education (p. 4)

Bachelor of Arts Degree Programs Comprehensive Secondary Science- Teaching

The Comprehensive Secondary Science Teaching major requires a minimum of 120 total hours to graduate. This total includes UNIFI/General Education requirements, the Professional Experiences requirements, Educator Essentials requirements, and the following specified major requirements, to complete the minimum of 120 hours.

This major is intended for students who wish to teach at the secondary level in all areas of science (biology, chemistry and biochemistry, earth science, and physics). The program will lead to Iowa Department of Education endorsement in Basic Science (5-12), All Science (5-12), and 3 out of the 4 endorsements Biology (5-12), Chemistry (5-12), Earth Science (5-12), and Physics (5-12).

Required Core

Biology:		
BIOL 2051	General Biology: Organismal Diversity	4
BIOL 2052	General Biology: Cell Structure and Function	4
BIOL 3100	Evolution, Ecology and the Nature of Science	3
Chemistry and Biochemistry:		
CHEM 1110	General Chemistry I *	4
CHEM 1120	General Chemistry II *	4
CHEM 2040	Applied Organic and Biochemistry	3-4

or CHEM 2210	Organic Chemistry I	
Earth Science:		
EARTHSCI 1100	Astronomy	3
EARTHSCI 1200	Elements of Weather	3
EARTHSCI 1300	Introduction to Geology	4
Physics:		
PHYSICS 1511	General Physics I **	4
PHYSICS 1512	General Physics II **	4
PHYSICS 4080/5080	Resources for Teaching Physics	2

Additional Science Content: 12-15

Choose 3 of the 4 required science content areas below, which enables you to complete the requirements for the individual science subject endorsements you choose. If you choose to complete the requirements for all 4 science content areas, work with your advisor. The course or courses you don't complete can be replaced with science content courses in science areas that you choose to add.

Biology (4 hours):		
BIOL 3140	Genetics	
Chemistry and Biochemistry (3 hours):		
any 2000-level or above course		
Earth Science (6 hours):		
EARTHSCI 1110	Astronomy Laboratory	
EARTHSCI 1210	Elements of Weather Laboratory	
EARTHSCI 1320	Earth History	
Physics (5 hours):		
any 2000-level or above course		
Total Hours		54-58

* Students with excellent preparation in chemistry may substitute CHEM 1130 plus 3 hours of additional credit hours in chemistry electives for CHEM 1110 and CHEM 1120.

**Students with excellent preparation in physics and calculus may substitute PHYSICS 1701 and PHYSICS 1702 for PHYSICS 1511 and PHYSICS 1512.

Professional Experiences

Required:		
EDUC 2385	Teaching Methods I: Secondary Science * **	3
EDUC 2485	Teaching Internship I: Secondary Science	3
EDUC 3585/5585	Teaching Methods II: Secondary Science *	3
EDUC 3685/5685	Teaching Internship II: Secondary Science	3

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EDUC 4138	Secondary School Teaching	12
Total Hours		24

- * A grade of C (2.00) or higher is required for all Methods courses.
 **Comprehensive Secondary Science Teaching majors can count EDUC 2385 Teaching Methods I: Secondary Science for category 5 of Educator Essentials.

For completion of this major the grade point average in each of the four science disciplines must be a minimum of 2.00, with a 2.50 GPA in the major as a whole.

Elective courses must be ones that count toward the major in the discipline or be approved for this use by the department offering the course.

Notes:

1. Students with sufficient high school preparation may be allowed to omit some introductory courses and substitute other courses from the same department.
2. The mathematics prerequisite for one or more of the above courses is a working knowledge of algebra and trigonometry or MATH 1140.

Educator Essentials

Required: *

Select one of the following in each category:

Category 1: The Learner		3
EDPSYCH 1500	Reflections on Learning	
EDPSYCH 2068	Development and Learning in Sociocultural Contexts	
EDPSYCH 2100	Creativity and Higher Order Thinking in the Classroom	
SOCFOUND 2243	Rethinking the Learning Society: Education and Its Future(s)	
Category 2: Social Contexts of Learning		3
SOCFOUND 2119	Social & Cultural Foundations of Education	
SOCFOUND 2134	A Modern History of Education in the United States	
SOCFOUND 2334	Education Policy and Politics of Education	
TESOL 2015	Language Today	
Category 3: Education for All		3
KINES 4152	Adapted Physical Education	
SOCFOUND 3334	Education, Power, and Change	
SOCFOUND 3434	Social Movements and Education	
SPIE 3140	Interdisciplinary and Intersectional Study of Education for All	
SPIE 3150	Meeting the Needs of Diverse Learners in Classrooms	
TESOL 3710	Content Area Strategies for English Language Learners	

Category 4: The Classroom Environment 3

EDPSYCH 3200	Deeper Motivation and the Highly Engaged Classroom
EDPSYCH 3300	Level Up: Gamified Learning Environments
ELEMECML 4151	Early Childhood Curriculum Development and Organization
RTNL 3360	Playful Learning and Project-Based Experiences: Techniques for Ed and Recreational Environments
SOCFOUND 3219	Critical Perspectives on Technology and Education

Category 5: Effective Pedagogy 3

ARTED 4600	Expressive Learning Assessment
LRNTECH 3600	Technology, Pedagogy, and Learning in the Digital Age
MEASRES 3510	Assessment for Learning
TEACHING 3500	Effective Teaching through Differentiation, Technology and Assessment

Category 6: The Professional Educator 3

ELEMECML 3149	Child, Family, School and Community Relationships
SOCFOUND 3519	Teacher Leadership & Educational Change
TEACHING 3177	Collaborative Partnerships for Educators

Total Hours 18

* A grade of C (2.00) or higher is required in each Educator Essentials course.

Middle Level Science-Teaching (Dual)

The Middle Level Science Teaching (Dual) major requires a minimum of 120 total hours to graduate. This total includes UNIFI/General Education requirements, the Professional Experiences requirements, Educator Essentials requirements, and the following specified major requirements, to complete the minimum of 120 hours.

Students who complete this major must also complete the Middle Level Education Dual Major – Teaching (see Department of Curriculum and Instruction). This major is for students who wish to teach at the middle school level. Students will complete subject area concentrations in science and up to three other subject area concentrations including Language Arts, Mathematics, and/or Social Studies. This major fulfills the following endorsements: Basic Science (5-12), Middle School Science (5-8) and one other Middle School subject (5-8) including Language Arts, Mathematics, or Social Studies.

The Middle-Level Science Teaching (Dual) major is waived from the 10-hour upper level requirement.

Biology:

BIOL 2051	General Biology: Organismal Diversity	4
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BIOL 2052	General Biology: Cell Structure and Function	4
Chemistry and Biochemistry:		
CHEM 1110	General Chemistry I	4
CHEM 1120	General Chemistry II *	4
Earth Science:		
EARTHSCI 1200	Elements of Weather	3
EARTHSCI 1210	Elements of Weather Laboratory	1
EARTHSCI 1300	Introduction to Geology	4
Physics:		
PHYSICS 1511	General Physics I	4
PHYSICS 1512	General Physics II	4
Total Hours		32

* Students with excellent preparation in chemistry may substitute CHEM 1130 plus 3 hours of additional credit hours in chemistry electives for CHEM 1110 and CHEM 1120.

For completion of this major the grade point average in each of the four science disciplines must be a minimum of 2.00, with a 2.50 GPA in the major as a whole.

Notes:

The mathematics prerequisite for one or more of the above courses is a working knowledge of algebra and trigonometry or MATH 1130 or MATH 1140 .

Professional Experiences

Required:

EDUC 2385	Teaching Methods I: Secondary Science *,**	3
EDUC 2485	Teaching Internship I: Secondary Science	3
EDUC 3585/5585	Teaching Methods II: Secondary Science *	3
EDUC 3685/5685	Teaching Internship II: Secondary Science	3
EDUC 4137	Middle School/Junior High Teaching	12
Total Hours		24

* A grade of C (2.00) or higher is required for all Methods courses.

**Middle Level Science Teaching (Dual) majors can count EDUC 2385 Teaching Methods I: Secondary Science for category 5 of Educator Essentials.

Educator Essentials

Required: *

Select one of the following in each category:

Category 1: The Learner 3		
EDPSYCH 1500	Reflections on Learning	
EDPSYCH 2068	Development and Learning in Sociocultural Contexts	

EDPSYCH 2100	Creativity and Higher Order Thinking in the Classroom	
SOCFOUND 2243	Rethinking the Learning Society: Education and Its Future(s)	
Category 2: Social Contexts of Learning		3
SOCFOUND 2119	Social & Cultural Foundations of Education	
SOCFOUND 2134	A Modern History of Education in the United States	
SOCFOUND 2334	Education Policy and Politics of Education	
TESOL 2015	Language Today	
Category 3: Education for All		3
KINES 4152	Adapted Physical Education	
SOCFOUND 3334	Education, Power, and Change	
SOCFOUND 3434	Social Movements and Education	
SPIE 3140	Interdisciplinary and Intersectional Study of Education for All	
SPIE 3150	Meeting the Needs of Diverse Learners in Classrooms	
TESOL 3710	Content Area Strategies for English Language Learners	
Category 4: The Classroom Environment		3
EDPSYCH 3200	Deeper Motivation and the Highly Engaged Classroom	
EDPSYCH 3300	Level Up: Gamified Learning Environments	
ELEMECML 4151	Early Childhood Curriculum Development and Organization	
RTNL 3360	Playful Learning and Project-Based Experiences: Techniques for Ed and Recreational Environments	
SOCFOUND 3219	Critical Perspectives on Technology and Education	
Category 5: Effective Pedagogy		3
ARTED 4600	Expressive Learning Assessment	
LRNTECH 3600	Technology, Pedagogy, and Learning in the Digital Age	
MEASRES 3510	Assessment for Learning	
TEACHING 3500	Effective Teaching through Differentiation, Technology and Assessment	
Category 6: The Professional Educator		3
ELEMECML 3149	Child, Family, School and Community Relationships	
SOCFOUND 3519	Teacher Leadership & Educational Change	
TEACHING 3177	Collaborative Partnerships for Educators	
Total Hours		18

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* A grade of C (2.00) or higher is required in each Educator Essentials course.

Minor

Basic Science Minor (K-8)-Teaching

The Basic Science Minor (K-8)-Teaching is offered to Elementary Education majors, and leads to the State of Iowa endorsement #150 in Basic Science (K-8).

Required

Professional Experiences:		
EDUC 3500/5500	Teaching Methods II: (Topic) (Methods of Teaching Elementary Science)*	3
Science and Science Education:		
SCI ED 1100	Inquiry into Earth and Space Science	3
SCI ED 1200	Inquiry into Life Science	3
SCI ED 1300	Inquiry into Physical Science	3
SCI ED 2310	Investigating Physical Science Phenomena	2
Biology:		3
Select one of the following:		
BIOL 1012	Life: The Natural World	
BIOL 1014	Life: Continuity and Change	
Earth Science:		3-4
Select one of the following:		
EARTHSCI 1100	Astronomy	
EARTHSCI 1200	Elements of Weather	
EARTHSCI 1300	Introduction to Geology	
Chemistry and Biochemistry:		4
Select one of the following:		
CHEM 1010	Principles of Chemistry	
CHEM 1020	Chemical Technology	
Physics:		3
PHYSICS 1000	Physics in Everyday Life	
Total Hours		27-28

* EDUC 3500/5500 has a prerequisite of EDUC 2300; EDUC 2400; and junior standing, and a corequisite of EDUC 3600/5600. Students will take these courses as part of the Elementary Education major.

Master of Arts Degree Program

Major in Science Education

Students interested in this program must submit a completed Application for Admission to Graduate Study and should refer to their MyUNIverse Student Center To-Do list or contact the Science Education Graduate Coordinator. Graduate information and application for graduate admission can be found at <https://admissions.uni.edu/application>.

The Graduate Record Examination (General Test) **is not** required for admission to the program.

This major requires as a prerequisite a bachelor's degree (teaching degree preferred) with a major or minor/emphasis in Science or in a specific science discipline. Teacher licensure is a prerequisite for completing the program approval process for this major.

Only graduate courses (course numbers 5000 or above) will apply to a graduate degree, even if the undergraduate course number (4999 or less) is listed. No exceptions will be made.

This major is available on the **thesis** and **non-thesis** options. A **minimum of 30 semester hours**, including 6 hours of SCI ED 6299 for thesis research and writing, is required for the **thesis** option; a **minimum of 30 semester hours**, including completion and in some cases public presentation of a creative component, is required for the **non-thesis** option. **A minimum of 17 hours of 6000-level course work is required for the thesis option. A minimum of 14 hours of 6000-level course work is required for the non-thesis option.**

Required

Measurement and Research:		
SCI ED 6500	Research Methods in Science Education	4
Science and Science Education:		
SCI ED 6600	Developing Science Curricula	2
SCI ED 6700	The History, Philosophy, and Nature of Science	3
SCI ED 6800	Teaching-Learning Models in Science Education	2
SCI ED 6900	Trends and Issues in Science Education	3
Thesis or non-thesis option research and electives		16
Total hours thesis or non-thesis option		30

Thesis Option

Research:		
SCI ED 6299	Research	6
Science content courses		6
Electives from education or science education		4
Total Hours		16

Non-Thesis Option

Research:		
SCI ED 6299	Research	3
Science content courses		8
Electives from education or science education		5
Total Hours		16

Inquiries for additional information concerning this major, including assignment of an advisor and advisory committee, should be made to the Science Education Graduate Program Coordinator.