Teaching and Learning, M.S.

Science Education

The Master of Science in teaching and learning with a science education subprogram requires a minimum of 38 s.h. of graduate credit. The program is designed for teachers and supervisors (K-college) and professionals in related fields, such as medical education, college teaching, museum program management, and outreach programs. It is intended to provide experience in understanding teaching and learning and the research processes required to advance the field.

Students complete course work in four areas: science education, education, research, and science. Their individual programs of study are approved by the science education faculty.

The M.S. in teaching and learning with a science education subprogram requires the following course work.

### Required Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>All of these:</td>
<td></td>
<td></td>
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<tr>
<td>EDTL:6757</td>
<td>Learning in the Science Classroom (no substitute for this course)</td>
<td>3</td>
</tr>
<tr>
<td>EDTL:6759</td>
<td>Advanced Pedagogy (no substitute for this course)</td>
<td>3</td>
</tr>
<tr>
<td>EDTL:7755</td>
<td>Independent Study in Science Education Research (taken two times for 3 s.h. each)</td>
<td>6</td>
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Two science content courses chosen in consultation with advisor

A minimum of 12 s.h. chosen from these:

- EDTL:6758 Writing in the Science Classroom
- PSQF:4143 Introduction to Statistical Methods
- PSQF:6200 Educational Psychology
- PSQF:6220 Quantitative Educational Research Methodologies
- PSQF:6275 Constructivism and Design of Instruction
- RCE:7338 Essentials of Qualitative Inquiry

One additional qualitative or quantitative research methods course chosen in consultation with advisor

May include one of these:

- EDTL:7004 Schooling in the United States
- EDTL:7033 Seminar on Teacher Education

### Thesis

Students must complete a thesis, for which they earn 2-4 s.h. of credit.

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>EDTL:6393</td>
<td>Master's Thesis</td>
<td>2-4</td>
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</table>

### Final Examination

A final oral examination is administered on campus in which candidates defend their thesis. This examination includes a critical inquiry into the purposes, methods, and results of the thesis research investigation.

The final examination is conducted by a committee of no fewer than three members of the graduate faculty. In some cases, the committee must include a member from outside science education; consult the department.

### Admission

Applicants must meet the admission requirements of the Graduate College. They should hold an undergraduate major in a science area (or combination of science areas), in science education, or in elementary education with a science emphasis. The department recommends that applicants have teaching licensure/certification unless they are preparing for careers in allied health, museums, or community colleges.

STEM Education

The Master of Science in teaching and learning with a STEM education subprogram requires 36 s.h. of graduate credit. The program focuses on science, technology, engineering, and mathematics (STEM) education. The program includes course work toward the K-12 STEM specialist endorsement. Degree requirements fit the schedule of a practicing teacher by including online, hybrid, night, weekend, and summer course work, with periodic on-campus meetings.

The M.S. in teaching and learning with a STEM education subprogram requires the following course work.

### Required Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</table>
| STEM Pedagogy Courses
- All of these:                                    |       |
| EDTL:6563 | STEM Through Mathematical Modeling                                   | 3     |
| EDTL:6761 | STEM Research and Leadership Seminar                                 | 3     |
| EDTL:6762 | STEM Experiential Learning                                          | 3     |
| EDTL:6764 | STEM Extracurricular Experience and Capstone                         | 6     |

College of Education Course

This course:

- EDTL:5095 Issues in U.S. Schools

### Science/Mathematics Courses

Two of these:

- EDTL:4565 Mathematics in Management and Social Sciences
- EDTL:6766 Physical Science Topics in STEM Education
- EDTL:6767 Systems Thinking in Biology and Integrated STEM Education

This course:
EDTL:6765  STEM Independent Research (taken two times for 3 s.h. each)  6  STEM specialist endorsement from the Board of Educational Examiners (BOEE).

**Additional Course Work**

At least two of these (chosen in consultation with an advisor):

- EDTL:5085  Generation Innovation: Technology Integration in 21st-Century K-12 Schools  3
- EDTL:5090  Diversity and Identity in K-12 Schools  3
- EDTL:5535  Current Issues in Mathematics Education  3
- EDTL:6534  Foundations of Mathematics Education  3
- EDTL:6570  Foundation of School Mathematics Curriculum  3
- PSQF:4143  Introduction to Statistical Methods  3
- PSQF:6200  Educational Psychology  3

**K-12 STEM Specialist Endorsement**

The University of Iowa does not offer a state-approved program for the K-12 STEM Specialist endorsement. In addition to the master's degree, teachers must have met the requirements for a standard Iowa teaching license with endorsement in mathematics, science, engineering, industrial technology, or agriculture. They must demonstrate completion of 12 s.h. of science and 12 s.h. of math content course work (including computer science), which may include content course work completed as part of this subprogram as well as other college-level courses. In addition, they must have completed 3 s.h. of engineering or technological design course work not included in this subprogram; ENGR:1100 Introduction to Engineering Problem Solving and ENGR:1300 Introduction to Engineering Computing may be options for the requirement. Once the courses are completed, teachers may apply to the Board of Educational Examiners for transcript analysis and to add the endorsement.

**Admission**

Applicants must meet the admission requirements of the Graduate College. These include:

- a bachelor's degree from a regionally accredited American college or university or an equivalent degree from another country as determined by the Office of Graduate Admissions with an undergraduate major in a given science or math area (or combination of science areas), science education, math education, or in elementary education with a science or math emphasis;
- a minimum g.p.a. of 3.00 or the foreign equivalent as determined by the Office of Graduate Admissions; and
- international applicants whose first language is not English must score at least 81 (internet-based) with a minimum score of 600 on the Test of English as a Foreign Language (TOEFL) or a minimum International English Language Testing System (IELTS) score of 7.0 (with no subscore lower than 6.0).

Teaching licensure/certification is recommended for the M.S. degree and required if the candidate seeks the K-12