The Department of Mathematics and Science Education has an education program that prepares students for teaching licensure at the secondary level (grades 6-12) while they receive a bachelor of science degree in biology, chemistry, physics, applied mathematics, computer sciences, an engineering discipline, or a related field.

A math or science teacher must know the subject matter as well as how to teach it. The Department of Mathematics and Science Education is a discipline-based teaching program. Students will learn how to effectively teach their chosen disciplines because the curriculum focuses on each student’s chosen discipline as opposed to general education.

The program draws primarily from constructivist epistemology as a means by which knowledge is developed and fully recognizes the individual perspectives from which learners approach school and life situations. Additionally, the knowledge base utilizes contemporary research on teaching and learning and is philosophically and substantively aligned with Illinois Content Standards and the professional subject-matter organizations. Graduates of the program will be leaders in instructional innovation in mathematics and science.

The overall organizational framework for the program borrows heavily from Shulman’s (1986) Knowledge Growth in Teaching with the ultimate focus on the Teacher as Transformer of Subject Matter. At an operational level, the program focuses on the development, revision, and elaboration of six primary domains of knowledge that both theory and research have indicated are essential for effective instruction. It is this combination of domains of knowledge that distinguishes the expert teacher from others possessing one or more of the following domains of knowledge: subject matter knowledge, pedagogical knowledge, knowledge of schools, knowledge of learners, curricular knowledge, and pedagogical content knowledge.

Within the Knowledge Growth in Teaching model, the Illinois Institute of Technology program is committed to providing students with experiences that help them develop a full range of knowledge and skills in the areas of subject matter, pedagogy, pedagogical content knowledge, schools, learners, and curriculum within a framework of moral and ethical societal norms, including a commitment to equity and diversity. From a constructivist perspective, individuals are continually structuring knowledge and revising their knowledge in response to differing contexts and new knowledge/perceptions. Consequently, it is important to note that the program does not view any of the domains of knowledge as completed outcomes upon graduation. Rather, the domains provide a basis for continued life-long professional development.

**Specific Program Outcomes**

Program graduates will demonstrate their knowledge of the stated domains of knowledge by:

- The development of integrated and in-depth subject matter knowledge in topical areas directly relevant to teaching content specialty (Subject Matter Knowledge).
- The successful development of instructional materials/plans consistent with research on teaching/learning and supports emotional development (Pedagogical Knowledge).
- Successfully working within the school and community in a manner that fosters community and state instructional goals (Knowledge of Schools).
- The development and implementation of instructional materials and plans that are consistent with current cognitive and social theories on student learning and personal development for all students regardless of their race, ethnicity, gender, sexual orientation, language, religion, socioeconomic status, and regional/geographic origins (Knowledge of Learners).
- Appropriate selection of instructional/curriculum materials relative to local, state, and national curriculum goals and reforms, and exhibited ability to analyze and revise materials so that they are consistent with appropriate curriculum goals (Curricular Knowledge).
- Successful development and implementation of instruction that represents current subject matter to students in a form that promotes in-depth understanding and ability to apply knowledge to new and unique situations (Pedagogical Content Knowledge).

**Licensure Programs**

- Mathematics and Science Education: Secondary Science or Mathematics Teaching Licensure
Course Descriptions

MSED 200
Analysis of Classrooms
This is an introductory course providing students background in learning theory, motivation theory, classroom management, aspects of effective teaching, critical classroom variables, and the school as a system. This course includes a two-hour weekly seminar along with a practicum experience of five hours per week in an area school.
Lecture: 2 Lab: 0 Credits: 3
Satisfies: Communications (C)

MSED 250
Middle and Secondary Curriculum/Foundations
This course focuses on history/sociology of education, rationales, and goals of current reform efforts, curriculum design, development, and curriculum analysis. This course is designed to develop the participant’s understanding of mathematics and science curricula in middle and secondary schools. Studies will include the roles of goals, standards, and learning theories in the development and selection of instructional materials, assessments, and technology. The course includes consideration of issues of equity and student diversity on middle and secondary school curricula. The course will involve readings, reflections, curriculum development, and evaluation projects.
Lecture: 3 Lab: 0 Credits: 3
Satisfies: Communications (C)

MSED 300
Instructional Methods/Strategies I
Discussion/laboratory oriented course that focuses on instructional planning, implementation considerations of various teaching methods, and development of instructional activities. Students are also provided with opportunities to practice instructional skills in peer teaching lessons.
Prerequisite(s): (MSED 200 and MSED 250) or (MSED 500 and MSED 554) or (MSED 500 and MSED 555)
Lecture: 3 Lab: 0 Credits: 3
Satisfies: Communications (C)

MSED 320
Inquiry and Problem Solving in Mathematics and Science
This course provides students with opportunities for reflection on aspects of inquiry and problem solving and nature of science and mathematics. It provides background for student development of instructional materials focusing on inquiry/problem solving, nature of science/mathematics, and how to modify and differentiate instructional materials to include the participation of all students. Must have received a passing score on the ISBE Basic Skills Exam.
Prerequisite(s): (MSED 200 and MSED 250) or (MSED 500 and MSED 554) or (MSED 500 and MSED 555)
Lecture: 3 Lab: 0 Credits: 3
Satisfies: Communications (C)

MSED 350
Advanced Methods for Inclusive Instruction and Practicum
This course will help students develop an understanding of the roles community resources and informal settings can play in math/science achievement and the ability to create instructional materials that capitalize on the use of these resources to better design instructional materials and experiences to meet the diverse needs of their students. Students spend approximately five hours per week in an informal education venue (e.g., museum, aquarium, zoo) along with a weekly two-hour, on-campus course per week. Students will reflect on how their students can learn in informal settings, teaching to public student audiences and designing curricular materials. Assessments will include the development of a curriculum unit that includes formal and informal lessons.
Prerequisite(s): (MSED 200 and MSED 250 and MSED 300) or (MSED 300 and MSED 500 and MSED 554) or (MSED 300 and MSED 500 and MSED 555)
Lecture: 2 Lab: 0 Credits: 3
Satisfies: Communications (C)

MSED 400
Instructional Methods/Strategies II
Follow-up course to Instructional Methods/Strategies I with a strong focus in various advanced instructional models such as inductive, deductive, problem solving, and inquiry role development as well as cooperative learning and assessment. The course will emphasize the development, implementation, and assessment of differentiated instructional materials and plans that are consistent with current cognitive and social theories on student learning and personal development for all aspects of intellectual, social, and emotional development of all students regardless of cultural, social, and ethnic background. Students will have several opportunities to practice instructional models in peer teaching lessons.
Prerequisite(s): MSED 300
Lecture: 3 Lab: 0 Credits: 3
Satisfies: Communications (C)

MSED 450
Professional Internship
Capstone experience in which students assume continuous teaching responsibilities in at least three classes in an area school. Students will spend a full semester in the area school under the supervision of a classroom teacher and university supervisor. Students must have received a passing score on the ISBE Content Exam and faculty approval.
Prerequisite(s): MSED 300 and (MSED 320 or MSED 538) and (MSED 350 or MSED 540) and MSED 400
Lecture: 0 Lab: 40 Credits: 6
Satisfies: Communications (C)
MSED 480
Adolescent Psychology
This course is designed to develop the participants’ understanding of adolescent psychology. The main foci throughout the course are the unique aspects of adolescents and how those aspects influence behavior, learning, and social interactions, especially with regard to middle schools. Studies will include educational psychology theories and models, motivation and learning, developmental changes during adolescence, cognitive abilities, human ecology, diversity, and cultures. Additionally, participants will examine historical and philosophical perspectives of adolescent psychology and synthesize how these perspectives have influenced teaching, learning, and cultures in middle schools. The course will involve weekly readings and reflections, classroom experiences, short assignments, tests/quizzes, research projects, and formal class presentations. Mandatory for students seeking middle school optional endorsements.
Lecture: 3  Lab: 0  Credits: 3

MSED 497
Special Projects
Special projects.
Credit: Variable