

Michigan Merit Curriculum

Science Course/Credit Requirements

A Career and College Ready Agenda

With the passage of the Michigan Merit Curriculum legislation in 2006, no longer is it acceptable to graduate high school with credit based on seat time. Instead, all Michigan students are required to demonstrate proficiency with the required academic standards in order to receive a diploma. [Section 1278\(1\)\(b\)](#) of the legislation states that the graduation requirements for science are “at least 3 credits in science that are aligned with subject area content expectations developed by the department and approved by the state board”. In 2015, the Michigan State Board of Education adopted the [Michigan Science Standards](#). These standards constitute the minimum content for the three required science credits. More information is available in the FAQ posted at the [Michigan Merit Curriculum website](#).

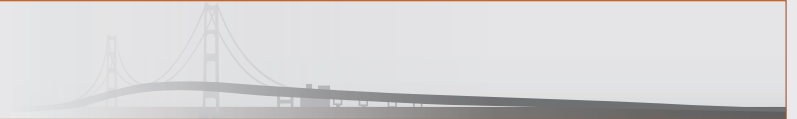
According to the [MiSTEM Advisory Council](#) “since 2010, STEM employment opportunities have continued to grow and have outpaced overall occupational growth in the state. STEM job opportunities are expected to grow by 11.8% through 2020 compared with 8.5% for

all occupations.” With an increased focus on [flexible learning options and competency-based recognition](#) of student learning, districts must consider options to traditional course-taking pathways so that students are better prepared for career and college.

Credit Vs. Courses

The State of Michigan doesn’t require end-of-course exams; the only state-required high-school assessment is the M-STEP and the SAT which are administered at the end of a student’s junior year. This allows for various pathways to help students successfully demonstrate proficiency in meeting the content defined by the [Michigan Science Standards](#) for high school. Districts have flexibility in designing credit-earning options that meet the needs of their student population and takes full advantage of the individual expertise of their staff. Texts and other curriculum materials may serve as course models; other models might be available through your ISD/RESA or [Math/Science Center](#).





Course Design Considerations

All courses should be instructed and assessed in a 3-dimensional manner, in accordance with the vision put forth in the Michigan Science Standards. Courses should be carefully designed so that students have opportunities to develop a deep understanding of the fundamental science and engineering concepts that cross disciplinary boundaries. These **cross-cutting concepts** provide students with organizational frameworks for developing a coherent understanding of these important ideas and therefore should also serve as an organizational framework for developing science courses.

Cross-Cutting Concepts

- 1 Patterns
- 2 Cause and Effect
- 3 Scale, Proportion, and Quantity
- 4 Systems and System Models
- 5 Energy and Matter
- 6 Structure and Function
- 7 Stability and Change

Career & College Ready Instruction

Arranging the content represented by the standards into courses is just one step in implementing the new standards. The National Research Council has outlined **8 practices for K-12 science classrooms** that describe ways students should be engaged in the classroom as a reflection of the practices of actual scientists and engineers. When students “do” science the learning of the content becomes more meaningful.

Practices for K-12 Science Classrooms

- 1 Asking questions (for science) and defining problems (for engineering)
- 2 Developing and using models
- 3 Planning and carrying out investigations
- 4 Analyzing and interpreting data
- 5 Using mathematics and computational thinking
- 6 Constructing explanations (for science) and designing solutions (for engineering)
- 7 Engaging in argument from evidence
- 8 Obtaining, evaluating, and communicating information

