



Course Syllabus

Toyota EM² Institute

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Malesus STEM (Science, Technology, Engineering, Math) Innovation Center's Mission Statement:

The Malesus STEM Innovation Center mission is to reimagine learning within the context of the 21st Century to meet emerging industry workforce needs.

Toyota EM² Innovation Institute:

E – Engineering-broader concepts within the context of manufacturing

M – Manufacturing-foundational concepts of production

M – Mechatronics – the area of manufacturing that focuses specifically on automation and robotics

The EM² course will introduce students to engineering concepts in the context of manufacturing and the processes and equipment needed to produce products. Students will design and model a variety of projects using equipment such as a mechanical arm, laser cut clock, student designed 3D printer project, and simulation trainers.

Additional Required Course – 7th Grade Mathematics:

Students will explore the following mathematical concepts and skills:

- A. **Ratios and Proportional Relationships** - Students extend their understanding of ratios from 6th grade and develop understanding of proportionality to solve single- and multi-step problems. Students use this understanding to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by

relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line. They distinguish proportional relationships from other relationships.

- B. **The Number System** - Students develop a unified understanding of numbers, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percent as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. These properties are further explored with respect to negative numbers. This exploration is carried out in real-world problems with various contexts so that the student can gain a deeper understanding and appreciation for the use of mathematics in daily life.
- C. **Expressions and Equations** - By applying the properties of operations as strategies, students explore working with expressions, equations, and inequalities. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve multi-step real-world problems. They use variables to represent quantities and construct simple equations and inequalities to solve problems by reasoning about the quantities.
- D. **Geometry** - Students continue their work with area from 6th grade, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity, they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
- E. **Statistics and Probability** - Students continue their work from 6th grade to build a solid foundation for statistics and probability needed for high school. Students understand that statistics can be used to gain information about a population through sampling. They work with drawing inferences about a population based on a sample and use measures of center and of variability to draw informal comparative inferences about two populations. Students investigate the chance processes and develop, use, and evaluate probability models. Students summarize numerical data sets with respect to their context using quantitative measures and describe any overall patterns or deviations from the overall pattern.

Additional Required Course: 7th Grade Science

The theme for seventh grade science is how matter and reactions are the basis for life science, particularly the molecules that make up life (LS1) DNA/proteins, and their hierarchy to organ systems and heredity; and biogeochemical cycles (LS2) carbon and oxygen cycling through photosynthesis and aerobic cellular respiration. Earth and space science standards are addressed from a perspective based on matter and reactions (atmospheric composition, combustion, and climate change). Tennessee's state mathematics standards are integrated into the science standards, specifically connecting proportional reasoning with whole number multiplication and division. Special attention is given to science literacy through the use of science and engineering practices.

Student Expectations:

1. Be Respectful
2. Be Responsible
3. Be Ready
4. Be Safe

Course Materials:

1. 1 ½ inch binder
2. Pencils (Mechanical are acceptable)
3. 1 pack of notebook paper
4. 2 black dry erase markers
5. 1 pack of dividers
6. 2 plastic folders
7. 2 highlighters
8. 2 composition books

Grading Policy:

A = 90 – 100

B = 80 – 89

C = 70 – 79

D = 60 – 69

F = Below 59