

# Dayton Regional STEM School

## Grades 6-8

### Course Descriptions





### **Our Mission**

The Mission of the Dayton Regional STEM School is to prepare students with the skills necessary to compete in the global economy while nurturing in our young people the same enthusiasm for discovery, invention, and application that launched the vision for powered flight.

This Mission is inspired by the Dayton region's history, and is aimed at ensuring our community's future success.

### **Project Based Learning**

At DRSS, we focus on using Project Based Learning in our curriculum. This teaching practice involves students learning through projects that address real-world problems and challenges. Throughout their education at DRSS, students will routinely learn the content through the process of completing projects. We rely on our large group of local partners to assist in providing authentic problems to allow our students the opportunity to give back to the community.

### **Five Qualities**

In addition to our regular instruction, we teach, practice, model and assess the following “five important qualities” at the Dayton Regional STEM School:

**PERSISTENCE – INQUIRY – COMMUNICATION – CREATIVITY – COLLABORATION**

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## 6<sup>th</sup> Grade Courses – Year Long

### Language Arts 6

Language Arts 6 is an integrated course that incorporates all of the following standards: language development, reading informational texts, reading literature, speaking and listening, and writing. These components are practiced through a series of thematic units centered on realistic fiction/personal narrative, science-fiction, historical fiction, and fantasy novels. While exploring these different genres, students will be exposed to a variety of writing styles. Students will explore the writing process by creating meaningful writing pieces such as a personal narrative, an argumentative essay, an informational piece, and a fictional essay. Speaking and listening skills will be developed throughout each unit by practicing open class discussions, small group collaboration, and class presentations.

### Math 6

Connected Mathematics is the curriculum used for students in grade 6. This middle school mathematics curriculum is rich in connections among core ideas of mathematics, between subjects, among activities and interests of students, and between mathematics and its connections outside of the classroom. The units for 6<sup>th</sup> grade include Factors and Multiples; Understanding and Computing with Fractions, Decimals, and Percentages; Two-Dimensional Measurement and Geometry; Understanding Probability; and Statistics.

### Accelerated Math 6

Connect Mathematics is the curriculum used for students in grade 6. This middle school mathematics curriculum is rich in connects among core ideas of mathematics, between subjects, among activities and interests of students, and between mathematics and its connections outside of the classroom. The units for this course will go at a fast pace and are truncated versions of the units including Factors and Multiples; Understanding and Computing with Fractions, Decimals, and Percentages. It will also cover units in Two- Dimensional Measurement and Geometry; Analyzing Relationships among Variables; Designing Shapes under Constraints; Extending the Number System to Rational Numbers; and Knowledge of Similarity through the use of Geometric Shapes.

### Science 6

The middle school science curriculum at DRSS is called IQWST (Investigating and Questioning our World through Science and

Technology--pronounced I-quest). In 6<sup>th</sup> grade science, the sequence of physics, earth science, biology and chemistry instruction builds upon students' prior knowledge and experiences in the real world, and builds understanding from unit to unit both within and across the middle school years. Students learn complex scientific ideas by engaging in practices that include working with models, constructing scientific explanations, engaging in argumentation and debate, analyzing data gathered either from students' own investigations or captured within complex datasets, and presenting ideas to peers. Science content learned through this course will include the interaction of light and matter, the particle nature of matter, organisms and ecosystems, and the water and rock cycles.

### **Social Studies 6**

In sixth grade social studies, students will learn about the ancient river valley civilizations of Ancient Egypt, Ancient China, Mesopotamia, and the Indus Valley. Thematic units about different types of governments, economies, and religions are a few of the major topics discussed. Students will work collaboratively to discover what lessons these ancient civilizations have taught our modern societies, and how ancient civilizations still impact our world today. In social studies 6, students will research new information and help share that information with their peers. Units on mapmaking, timelines, and other basic geographical and historical skills will be learned throughout the year.

### **STEM Foundations 6**

STEM Foundations 6 will provide middle school students with problem solving skills using the design process. As part of an introduction to the IT pathway, students will gain foundational knowledge of current HTML5 web design standards. They will apply this knowledge to plan, design and develop their Dayton Regional STEM School portfolio using valid, well-formed, scalable and semantically correct HTML5. During the creation process, students will identify and apply the elements of design: balance, rule of thirds, emphasis, padding, color, and line. As part of an introduction to the Engineering Pathway we will utilize the Engineering Design Process through various projects (i.e. Arduino, instrument creation, etc.). Through the above pathways, students will also learn and implement 21st Century Skills (ISTE Standards), such as effective communication, collaboration, Growth Mindset, project management, time management and so forth.

## 6<sup>th</sup> Grade Courses – Quarterly Rotation

### Computer Coding & Technology

The intent of the Computer Coding & Technology course is to extend computer coding skills. These skills are learned using Ozobot and Alice3 software. Students explore and learn the process of problem solving by following a design phase inclusive of flowcharts, coding, debugging, peer feedback, and reflection. Individual and small group learning provide students with a collaborative coding experience that replicates industry practices. Mastery learning is supported with self-paced inquiry-based learning starting with commands and progressing through deciphering coding errors. Levels of mastery are shown as students work through the design phase in each project based learning project.

### Math Enrichment

This course is meant to present real- world situations to students dealing with statistics and probability. The students learn and explore by problem solving their way through investigations in small groups and project based learning. The first half of the course is about the process of statistical investigations, constructing and analyzing distributions of data, and comparing data distributions by using what they know about measures of center and spread. This ends with a Data About Us Project that the students present to their peers. Another focus of this course is to develop students' abilities to understand and reason about probability. Students will gain an understanding of experimental and theoretical probabilities and the relationship between them. The students work in small groups to create a carnival game using a set of guidelines and rubrics. This is presented to peers, parents, administration, and community members during an Exhibition.

### Principles of Engineering Design

The central purpose of the Principles of Engineering Design course is to apply engineering, science, math, and technology to solve open-ended problems. Students explore and learn the process of defining and solving a problem through design challenges, projects, and project based learning. While working in small groups, students delve into the engineering design process researching the strength of structures and materials, identifying criteria and constraints in a design challenge, maintaining a budget, and building, testing and refining designs. These solutions are presented to peers, parents, administration and community members during an Exhibition. Another focus of the course is to provide

students with a basic understanding of the different fields of engineering and the educational plan for obtaining a position in these engineering fields. Students will investigate these fields through research, presentations, visiting experts, and a field trip.

### **Sustainability**

This course is designed to help students learn about practical ways in which to improve our use of natural resources and their impact on the environment. During this course students' eyes are opened to the consumerist approach to how we use the things that we buy. Students learn about our school's Zero Waste initiative and become active members in solving the school's problems with how we view "Waste". Students are engaged in a Trash and Recycling audit at their homes to determine how and what they already recycle and throw away. After students learn what their provider can recycle, as a class we take a fieldtrip to MCSWD to see where all the trash, and many of our recycling goes, since many residents and businesses do not recycle appropriately. Students also learn about the benefits and side effects of plastics and single-use disposable items that we have become so comfortable using in our society. At the end of this course, the students are provided with lessons teaching them about energy saving measures that they can take home to reduce their families' heating and electrical bills. Students are also provided with energy saving materials to install in their homes, which are provided by the Ohio Energy Project with support of DP&L and Vectren in our area.

## 7<sup>th</sup> Grade Courses – Year Long

### Language Arts 7

In this course, students will explore reading and writing through a workshop style classroom. Students will be exposed to various styles and genres of writing, and will take individual writing pieces through the complete writing process. Theme based novels and informational texts will be used in small group settings for students to learn and practice communication, cooperation, and collaboration. Literature circles will be used to study the genres of fantasy/dystopian, narrative nonfiction, and survival fiction. Reading and writing assignments will be supported by mini-lessons and class discussion to enhance student learning and comprehension. Projects and activities in the class are designed to push students to be stronger and more confident public speakers, collaborators, and communicators in preparation for their future endeavors.

### Math 7

Connected Mathematics is the curriculum used for students in grade 7. This middle school mathematics curriculum is rich in connections among core ideas of mathematics, between subjects, among activities and interests of students, and between mathematics and its connections outside of the classroom. The units for 7<sup>th</sup> grade include mathematical concepts of algebraic variables, expressions, patterns, scale factor, scale models, ratios, proportions, rational numbers, linear relationships, volume, surface area, probability and measures of data distributions.

### Accelerated Math 7 (Pre-Algebra)

This course focuses on higher mathematical thinking and problem solving, with an emphasis on algebra. The units include concepts of algebraic variables, expressions, patterns, scale factor, scale models, ratios, proportions, rational numbers, linear relationships, and geometry. Students are expected to be proficient in basic arithmetic skills, to work at an accelerated pace and open to work on self-guided independent projects.

### Science 7

The middle school science curriculum at DRSS is called IQWST (Investigating and Questioning our World through Science and Technology--pronounced I-quest). In 7th grade science, the sequence of chemistry, physics, and earth science instruction builds upon students' prior knowledge and experiences in the real world, and builds

understanding from unit to unit both within and across the middle school years. Students learn complex scientific ideas by engaging in practices that include working with models, constructing scientific explanations, engaging in argumentation and debate, analyzing data gathered either from students' own investigations or captured within complex datasets, and presenting ideas to peers. Science content learned through this course includes chemical reactions, energy transformations, and weather and seasons.

### **STEM Foundations 7**

STEM Foundations 7 will expand upon STEM Foundations 6. Students will delve deeper into the IT pathway by honing their HTML5 web design skills and incorporating current CSS best practices in order to practice planning, designing, and developing their Dayton Regional STEM School portfolio. Students will also continue to use valid, well-formed, scalable and semantically correct HTML5/CSS. During the creation process, students will identify and apply the elements of design: balance, rule of thirds, emphasis, padding, color, and line. Through the IT pathway students will continue to build upon 21st Century Skills (ISTE Standards), such as effective communication, collaboration, Growth Mindset, project management, time management and so forth.

### **World History 7**

This course will look at world history from the period of the Ancient Greek and Roman Empire to trade and exploration in the 1500's. The course will be broken into thematic units: Ancient Greece/Rome, Middle Ages, Renaissance, reformation of the church, and trade and exploration. In these units we will look at the impacts of major Greek/Roman/Renaissance achievements by making connections to our lives today, the impact of trade and exploration to the world around us, and the rise/ fall of the empires. Students will be engaged in hands on learning through a blend of independent work and group-based research and discussion.

### **Wellness & Fitness 7**

This course is designed to motivate students to build healthy lifestyles for today and the future. The curriculum is designed to increase student knowledge & skills in a variety of adolescent health topics. Examination of health behaviors, goal setting, decision making, nutrition, medicines & disease prevention are included.

*The following courses have their content split and integrated into the classes listed above, and are not taught as their own individual course.*

**Web Design**

*In this course students will create a website with tag text elements, special characters, lines, graphics, hypertext links, and graphical tables.*

**Pre-Engineering**

*Students in this pre-engineering course will acquire the knowledge and skills in problem solving, teamwork and innovation. Students explore STEM careers as they participate in a project-based learning process, designed to challenge and engage the natural curiosity and imagination of middle school students. Teams may design and test their ideas using modeling, automation, robotics, mechanical and computer control systems.*

## **8<sup>th</sup> Grade Courses – Year Long**

### **Algebra 1/Honors Algebra 1** - (high school credit – 1 credit)

Students closely examine a variety of functions in this course, and study methods for solving problems involving those functions. These functions include linear, quadratic, and exponential. Students study connections between the graphical, numerical (table), and symbolic (equation) representations of each of these functions. Students apply representations to real life situations to solve problems about the situations. They use data to create models to solve problems and predict outcomes. Students often work in cooperative groups to participate in inquiry learning. Students are given carefully created problems and work together to explore the underlying mathematics.

Honors Algebra I students will cover many of the same topics but will look more deeply at many of these topics and move into additional topics to prepare for future advanced mathematics courses.

### **Math 8**

This course uses the Connected Math series as the primary curriculum. Connected Math provides a wonderful opportunity for teachers, students, and parents to challenge their previous knowledge of math and to make new, rich connections between different strands of math, different content areas, and the real world. Students are expected to work in cooperative groups, in which discussion and discovery are encouraged and celebrated! Major mathematical concepts in the 8th grade curriculum include mathematical modeling, linear and exponential relationships, coordinate geometry, and basic algebraic manipulation.

### **Language Arts 8**

The core concept of Language Arts 8 is exploring social justice for all Americans. We will explore poetry, fictional and nonfictional literature to help develop an understanding of how others' experiences influence their writing, what they believe, and how America can progress forward based on our findings. Some of the ways we will explore these concepts are through literary circles, small and big group discussion and Socratic seminars in which they will also practice their speaking and learning skills. The students will present these findings through writing workshops in which students practice brainstorming, revision, grammar and usage skills, publishing, and presentation. Students then translate these learned writing methods to projects shared between classes such as U.S. History, Science, and more. The students will use their prior knowledge and

findings to create their future projects that display and present their findings in a meaningful way.

### **Science 8**

The middle school science curriculum at DRSS is called IQWST (Investigating and Questioning our World through Science and Technology--pronounced I-quest). In 8th grade science, the sequence of physics, earth science, biology and chemistry instruction builds upon students' prior knowledge and experiences in the real world, and builds understanding from unit to unit both within and across the middle school years. Students learn complex scientific ideas by engaging in practices that include working with models, constructing scientific explanations, engaging in argumentation and debate, analyzing data gathered either from students' own investigations or captured within complex datasets, and presenting ideas to peers. Science content learned through this course will include genetics and heredity, plate tectonics, and forces and motion.

### **STEM Foundations 8**

STEM Foundations 8 will empower students to become collaborators, innovators, inventors, and explorers of coding as the language of tomorrow. Instruction topics include HTML5, CSS, JavaScript, and Python taught through exciting hands-on projects such as building web pages for clients, exploring digital citizenship, and enhancing digital portfolios. This course is the 3rd course in the STEM Foundations series and will continue to build on the curriculum introduced during STEM Foundations 6 and 7. In addition to technical skill development, a concentration on 21st century skills including accountability, critique, self-reflection, and basic design sensibilities will be woven into this course. In the final stages of this course, students will formally present their portfolio to professionals and school partners.

### **US History 8**

Students will participate in an investigative and informational American History course that will primarily focus on American History beginning in the 1600s through the early days of the 20th century. Students will learn our country's history through various perspectives of those living it, specifically how Native Americans, European Americans, and African Americans viewed different events. Students will be challenged to question what they know about US History and develop their own

interpretations of “what really happened” as they dive deeply into our country’s story through various perspectives using primary sources. Students will also partake in a series of project-based learning activities that focus on: the Development of Colonies, Revolutionary America, westward migration, A Nation Divided, and the Immigrant’s America.

### **Wellness and Fitness 8**

This course will examine multiple aspects of health including physical, mental, and social health. Throughout the course, students will work to develop skills to achieve and maintain wellness. Topics to be addressed include decision-making, communication, nutrition, substance abuse, reproductive health, and disease prevention. In addition, students will regularly participate in physical activity to enhance their fitness levels. During this course, students will demonstrate an improvement in their cardiovascular endurance and muscular endurance.

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