Saddle River School District

preK-5
iSTEAM

Created/BOE Adopted August 2024

Pre K-5 iSTEAM Overview

The Saddle River School District is committed to providing all pre K-5 students with an outstanding education focused on building essential foundation skills, deepening students' understanding of important concepts in academic subjects, encouraging all students to be inquisitive lifelong learners. We believe that each student can fulfill their greatest potential by giving all students access to the highest quality curriculum and instruction.

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New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology, computing and design. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science, technology and design serves to prepare students to ethically produce and critically consume technology.

Mission and Rationale

All students receive computer science and design thinking instruction from pre-Kindergarten through grade 5. The study of these disciplines focuses on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares Wandell students for college and careers.

Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

All students have equitable access to a rigorous computer science and design thinking education.

Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

- Develop and apply computational and design thinking to address real-world problems and design creative solutions;
- Engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;
- Navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and
- Participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

preK-5 iSTEAM Course Description

In grades preK-1, students participate in class one time per week in the Innovation Station or the Computer Lab

In grades K and 1, our iSTEAM instructor "pushes into" class once a week to infuse technology into the classroom.

In grades 2-5, students participate in classes two times per week

Career Readiness Life Skills Practices

- Act as a responsible and contributing community members and employee.
- Attend to financial well-being.
- Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership and effective management
- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity increase collaboration and communicate effectively.
- Work productively in teams while using cultural/global competence.

Computer Science & Design Practices

1. Fostering an Inclusive Computing and Design Culture
2. Collaborating Around Computing and Design
3. Recognizing and Defining Computational Problems
4. Developing and Using Abstractions
5. Creating Computational Artifacts
6. Testing and Refining Computational Artifacts
7. Communicating About Computing and Design

preK-5   iSTEAM Course Descriptions

Over the course of the year in iSTEAM classes, students learn the importance of information in the units of study on the following slides.

In each unit, students understand how to gain an understanding of the assigned topic and work together to achieve common goals. They will understand the assigned topic while participating in multiple activities. Each unit will address factual, scientific and historical information about all of the units of study in iSTEAM while encouraging students to create, design and develop their own findings. Students begin to recognize the importance of being active and participating in different forms of activities. Students gain an understanding of the units through experimentation and design.

● Make and create in order to communicate through creative works.

● Choose programs and projects to share with an audience and present to others.

● Respond in the world by exploring, appreciating and critiquing programs, projects and techniques.

● Connect with technology and design through finding relevance.

● Experience and participate in cultural, social, identity and global awareness.

● Responding to ideas and work with personal meaning and cognizance of the ability of technology to address universal themes.

● Creating new innovation work reflective of a variety of ethnic, environmentally responsible and cultural perspectives.

● Connect and evaluate how technology connects meaning through all disciplines and contexts of our global society.

● Use technology to draw attention to a specific topic or issue and to communicate big ideas.

Gr. K iSTEAM Units of Study/Course Descriptions

- [Technology Literacy](#) / [Computer Science](#) - ipads/tablet use and safety, introduction to graphic design, networking and word processing.
- [Digital Citizenship/Internet Safety](#)- Instruction to an online presence
- [Global Learning](#)- Climate Change: Recycling
- [Design & Engineering](#)- Transportation
  - PBL: Creative & Critical Thinking/Problem-solving
    - Using a design thinking strategies, students will determine a subject or skill related to an assigned topic that they are interested in for research and development.
    - Creativity, critical thinking, and problem solving will be essential components of the design process.
- [Coding and Robotics](#)- Coding with Lego Education, Introduction to Bee Bot

Gr. 1 iSTEAM Units of Study/Course Descriptions

- Technology Literacy / Computer Science -introduction to keyboarding and network understanding. Development of graphic design and word processing.
- Digital Citizenship/Internet Safety- creating a digital footprint
- Global Learning- Climate Change: Recycling
- Design & Engineering- Animal Needs, Houses
  - PBL: Creative & Critical Thinking/Problem-solving
    - Using a design thinking strategies, students will determine a subject or skill related to an assigned topic that they are interested in for research and development.
    - Creativity, critical thinking, and problem solving will be essential components of the design process.
- Coding and Robotics- Coding with Bee Bot

Gr. 2 iSTEAM Units of Study/Course Descriptions

- Technology Literacy / Computer Sciences- Refinement of word processing and digital presentation.

- Digital Citizenship/Internet Safety- what is digital citizenship and global community?

- Global Learning- Reducing the amount of consumable materials we use/leave behind

- Design & Engineering- Buoyancy and Buildings

  - PBL: Creative & Critical Thinking/Problem-solving
    - Using a design thinking strategies, students will determine a subject or skill related to an assigned topic that they are interested in for research and development.
    - Creativity, critical thinking, and problem solving will be essential components of the design process.

- Coding and Robotics- Coding with Dash and Dot

Gr. 3 iSTEAM Units of Study/Course Descriptions

- Technology Literacy / Computer Science- Mastery of word processing and digital presentation
- Digital Citizenship/Internet Safety- maintaining a safe and responsible social media presence, being responsible online, awareness of unsafe practices and habit
- Global Learning- Climate Change: Reducing carbon footprint
- Design & Engineering- Structures and Towers
  - PBL: Creative & Critical Thinking/Problem-solving
    - Using a design thinking strategies, students will determine a subject or skill related to an assigned topic that they are interested in for research and development.
    - Creativity, critical thinking, and problem solving will be essential components of the design process.
- Coding and Robotics- Code.org and Dash and Dot Robotics

Gr. 4 iSTEAM Units of Study/Course Descriptions

- [Technology Literacy](#) / [Computer Science](#)- Spreadsheets and Data Analysis
- [Digital Citizenship/Internet Safety](#)-creating a safe and responsible digital footprint
- [Design & Engineering](#)- Bridges and Aeronautics
  - PBL: Creative & Critical Thinking/Problem-solving
    - Using a design thinking strategies, students will determine a subject or skill related to an assigned topic that they are interested in for research and development.
    - Creativity, critical thinking, and problem solving will be essential components of the design process.
- [Global Learning](#)- Climate Change: Reusing/repurposing/sustainability
- [Coding and Robotics](#)- Game Design, Electricity, Sam Labs and Little Bits

Gr. 5 iSTEAM Units of Study/Course Descriptions

- [Technology Literacy](#) / [Computer Science](#)- Digital Collaboration with Google Slides and WeVideo
- [Digital Citizenship/Internet Safety](#)- Create a safe/responsible digital footprint
- [Design & Engineering](#)-The Physics of Coasters and Game Making
  - PBL: Creative & Critical Thinking/Problem-solving
    - Using a design thinking framework, students will determine a subject or skill that they are interested in for research and development.
    - Creativity, critical thinking, and problem solving will be essential components of the design process.
- [Global Learning](#)- Climate Change: Reusing/repurposing/sustainability
- [Coding and Robotics](#)- Robotic Functions and Sensors- Little Bits and Sam Labs

K-5 iSTEAM Course Proficiencies

The following slides list standards and the proficiencies that describe what students are expected to know and be able to do as a result of successfully completing this course by grade 5.

The proficiencies are the basis of the assessment of student achievement.

Technological Literacy/Research Skills

Technology Literacy K-2
• 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).
• 9.4.2.TL.2: Create a document using a word processing application.
• 9.4.2.TL.3: Enter information into a spreadsheet and sort the information.
• 9.4.2.TL.4: Navigate a virtual space to build context and describe the visual content.
• 9.4.2.TL.5: Describe the difference between real and virtual experiences.
• 9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g.,SL.2.5.).
• 9.4.2.TL.7: Describe the benefits of collaborating with others to complete digital tasks or
develop digital artifacts (e.g., W.2.6., 8.2.2.ED.2).

Technology Literacy 3-5
• 9.4.5.TL.1: Compare the common uses of at least two different digital tools and identify the advantages and disadvantages of using each.
• 9.4.5.TL.2: Sort and filter data in a spreadsheet to analyze findings.
• 9.4.5.TL.3: Format a document using a word processing application to enhance text, change page formatting, and include appropriate images, graphics, or symbols.
• 9.4.5.TL.4: Compare and contrast artifacts produced individually to those developed collaboratively (e.g., 1.5.5.CR3a).
• 9.4.5.TL.5: Collaborate digitally to produce an artifact (e.g., 1.2.5CR1d).

8.1 Computer Science Grades K-2
Computing Systems
- Individuals use computing devices to perform a variety of tasks accurately and quickly. Computing devices interpret and follow the instructions they are given literally.
  8.1.2.CS.1: Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.
- A computing system is composed of software and hardware.
  8.1.2.CS.2: Explain the functions of common software and hardware components of computing systems.
- Describing a problem is the first step toward finding a solution when computing systems do not work as expected.
  8.1.2.CS.3: Describe basic hardware and software problems using accurate terminology.

Networks and Internet
- Computer networks can be used to connect individuals to other individuals, places, information, and ideas. The Internet enables individuals to connect with others worldwide. •
  8.1.2.NI.1: Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network. •
  8.1.2.NI.2: Describe how the Internet enables individuals to connect with others worldwide.
- Connecting devices to a network or the Internet provides great benefits, but care must be taken to use authentication measures, such as strong passwords, to protect devices and information from unauthorized access. •
  8.1.2.NI.3: Create a password that secures access to a device. Explain why it is important to create unique passwords that are not shared with others. •
  8.1.2.NI.4: Explain why access to devices need to be secured.

Impacts of Computing
- Computing technology has positively and negatively changed the way individuals live and work (e.g., entertainment, communication, productivity tools).
  8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology.

Data & Analysis
- Individuals collect, use, and display data about individuals and the world around them.
  8.1.2.DA.1: Collect and present data, including climate change data, in various visual formats.
- Computers store data that can be retrieved later. Data can be copied, stored in multiple locations, and retrieved.
  8.1.2.DA.2: Store, copy, search, retrieve, modify, and delete data using a computing device.
- Data can be used to make predictions about the world.
  8.1.2.DA.3:
- Identify and describe patterns in data visualizations.
  8.1.2.DA.4: Make predictions based on data using charts or graphs.

8.1 Computer Science Grades 3-5
Computing Systems
- Computing devices may be connected to other devices to form a system as a way to extend their capabilities.
  8.1.5.CS.1: Model how computing devices connect to other components to form a system.
- Software and hardware work together as a system to accomplish tasks (e.g., sending, receiving, processing, and storing units of information). 8.1.5.CS.2: Model how computer software and hardware work together as a system to accomplish tasks.
- Shared features allow for common troubleshooting strategies that can be effective for many systems.
  8.1.5.CS.3: Identify potential solutions for simple hardware and software problems using common troubleshooting strategies.

Networks and Internet
- Information needs a physical or wireless path to travel to be sent and received.
  8.1.5.NI.1: Develop models that successfully transmit and receive information using both wired and wireless methods.
- Distinguishing between public and private information is important for safe and secure online interactions. Information can be protected using various security measures (i.e., physical and digital).
  8.1.5.NI.2: Describe physical and digital security measures for protecting sensitive personal information.

Impacts of Computing
- The development and modification of computing technology is driven by individual's needs and wants and can affect individuals differently.
  • 8.1.5.IC.1: Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.
  • 8.1.5.IC.2: Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.

Data and Analysis
- Data can be organized, displayed, and presented to highlight relationships.
  8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.
- The type of data being stored affects the storage requirements.
  8.1.5.DA.2: Compare the amount of storage space required for different types of data.

- Individuals can select, organize, and transform data into different visual representations and communicate insights gained from the data.
  • 8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.
  • 8.1.5.DA.4: Organize and present climate change data visually to highlight relationships or support a claim.

- Many factors influence the accuracy of inferences and predictions.
  8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

Digital Citizenship

Digital Citizenship K-2
• 9.4.2.DC.1: Explain differences between ownership and sharing of information.
• 9.4.2.DC.2: Explain the importance of respecting the digital content of others.
• 9.4.2.DC.3: Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).
• 9.4.2.DC.4: Compare information that should be kept private to information that might be made public.
• 9.4.2.DC.5: Explain what a digital footprint is and how it is created.
• 9.4.2.DC.6: Identify respectful and responsible ways to communicate in digital environments.
• 9.4.2.DC.7: Describe actions peers can take to positively impact climate change (e.g.,6.3.2.CivicsPD.1).

Digital Citizenship 3-5
• 9.4.5.DC.1: Explain the need for and use of copyrights.
• 9.4.5.DC.2: Provide attribution according to intellectual property rights guidelines using public domain or creative commons media.
• 9.4.5.DC.3: Distinguish between digital images that can be reused freely and those that have copyright restrictions.
• 9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology (e.g. 8.1.5.NI.2).
• 9.4.5.DC.5: Identify the characteristics of a positive and negative online identity and the lasting implications of online activity.
• 9.4.5.DC.6: Compare and contrast how digital tools have changed social interactions (e.g., 8.1.5.IC.1).
• 9.4.5.DC.7: Explain how posting and commenting in social spaces can have positive or negative consequences.
• 9.4.5.DC.8: Propose ways local and global communities can engage digitally to participate in and promote climate action

Design & Engineering

Engineering Design K-2

8.2.2.ED.1: Communicate the function of a product or device.

• 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.

• 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process

• 8.2.2.ED.4: Identify constraints and their role in the engineering design process.

Engineering Design 3-5

• 8.2.5.ED.1: Explain the functions of a system and its subsystems.

• 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.

• 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.

• 8.2.5.ED.4: Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).

• 8.2.5.ED.5: Describe how specifications and limitations impact the engineering design process.

• 8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and tradeoffs identified in the design process.

Global and Design Thinking - Grades K-2

Interaction of Technology and Humans

• 8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.

• 8.2.2.ITH.2: Explain the purpose of a product and its value.

• 8.2.2.ITH.3: Identify how technology impacts or improves life.

• 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks.

• 8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.

Nature of Technology

• 8.2.2.NT.1: Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together.

• 8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

Effects of Technology on the Natural World

• 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology.

• 8.2.2.ETW.2: Identify the natural resources needed to create a product.

• 8.2.2.ETW.3: Describe or model the system used for recycling technology.

• 8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.

Ethics and Culture

8.2.2.EC.1: Identify and compare technology used in different schools, communities, regions, and parts of the world.

Interaction of Technology and Humans

• 8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system. impact of the solution.

• 8.2.5.ITH.2: Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have.

• 8.2.5.ITH.3: Analyze the effectiveness of a new product or system and identify the positive and/or negative consequences resulting from its use.

• 8.2.5.ITH.4: Describe a technology/tool that has made the way people live easier or has led to a new business or career.

Nature of Technology

• 8.2.5.NT.1: Troubleshoot a product that has stopped working and brainstorm ideas to correct the problem.

• 8.2.5.NT.2: Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries, and societies.

• 8.2.5.NT.3: Redesign an existing product for a different purpose in a collaborative team.

• 8.2.5.NT.4: Identify how improvement in the understanding of materials science impacts technologies.

Effects of Technology on the Natural World

• 8.2.5.ETW.1: Describe how resources such as material, energy, information, time, tools, people, and capital are used in products or systems.

• 8.2.5.ETW.2: Describe ways that various technologies are used to reduce improper use of resources.

• 8.2.5.ETW.3: Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.

• 8.2.5.ETW.4: Explain the impact that resources, such as energy and materials used to develop technology, have on the environment.

• 8.2.5.ETW.5: Identify the impact of a specific technology on the environment and determine what can be done to it.

Ethics and Culture

8.2.5.EC.1: Analyze how technology has contributed to or reduced inequities in local and global communities and determine its short- and long-term effects.

Coding and Robotics

Algorithms and Programming by Grade 2
•8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.
8.1.2.AP.2: Model the way programs store and manipulate data by using numbers or other symbols to represent information.
•8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks. Computers follow precise sequences of steps that automate tasks.
•8.1.2.AP.4: Break down a task into a sequence of steps. Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.
• 8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes.
• 8.1.2.AP.6: Debug errors in an algorithm or program that includes sequences and simple loops.

Algorithms and Programming by Grade 5
• 8.1.5.AP.1: Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
• 8.1.5.AP.2: Create programs that use clearly named variables to store and modify data.
• 8.1.5.AP.3: Create programs that include sequences, events, loops, and conditionals.
• 8.1.5.AP.4: Break down problems into smaller, manageable sub-problems to facilitate program development.
 • 8.1.5.AP.5: Modify, remix, or incorporate pieces of existing programs into one's own work to add additional features or create a new program.
• 8.1.5.AP.6: Develop programs using an iterative process, implement the program design, and test the program to ensure it works as intended.

K-5 iSTEAM Assessments

K- 2

Online Assessment Data Stored in
Starfall
ABCYA
Typing Club
Google Classroom/Apps for Education
Code.org
Brainpop Jr.
Kahoot
EDpuzzle
Seesaw

3-5

Online Assessment Data Stored in
Typing Club
Google Classroom/Apps for Education
Code.org
WeVideo
Brainpop
Google Forms
Kahoot
Quizlet
Seesaw

Summative: -Teacher observations -Student responses - placement of fingers during typing activities -Student completion of... typing club lessons and lessons in programs listed above.

Formative: -Use of Google Apps -Google Docs assignments - Google Slides projects -Google Sheets projects (data and data analysis, graphing, equations, trends, patterns and statistics) -looking at their Google Drive -Completion of coding games -Teacher observations of students' being good digital citizens -Website design -Showing internet safety - Creating a Google Form and presenting the findings - Design a global community (ie. farm for fidgits) -success on engineering.com -Video communication samples from WeVideo -Safe Online Discussions on Google Classroom -Appropriate responses on Google Classroom from teacher and student messages - Appropriate communication samples from discussion boards -Connecting wireless device

K-5 iSTEAM Instructional Resources

K-2
Starfall.com
ABCYA.com
Typing Club
Google Apps for Education
Code.org
Brainpop Jr.
SeeSaw

3-5
Typing Club
Google Apps for Education
Code.org
WeVideo
Brainpop
Kahoot
Quizlet
Sam Studios

Click <u>here</u> for NJDOE Complete Curriculum for 2020 New Jersey Student Learning Standards – Computer Science and Design Thinking

Clink <u>here</u> for NJDOE Complete Curriculum for 2020 New Jersey Student Learning Standards – Career Readiness, Life Literacies, and Key Skills