



Workshop Offering

STEMbytes currently offers workshops on all the topics listed below. And this list is always open to grow. If you have a specific request or idea, please share with info@stembytes.org.

Engineering, Design, and Electronics

Intro to Arduino (Gr9+)

Build & Program Your First Microcontroller

Students learn about microcontrollers and their applications every day in the world around them. They build a working LED circuit and program an Arduino to control it.

Skills Introduced: Basic electronics, Introductory programming logic, Problem-solving, Team collaboration, Arduino

Arduino Sensors (Gr9+)

Make a System Respond to the World

Students learn about the various sensors used in industry and build an Arduino system that responds to its environment.

Skills Introduced: Arduino, sensors and automation, basic electronics, Introductory programming logic, team collaboration

Arduino Motors (Gr9+)

Students build a circuit that enables an Arduino to control motors and even build a car.

Skills Introduced: Arduino, DC motors, motor drivers, PWM, speed control, direction control, wiring

Build Your Own DC Motor (Gr4+)

Students build a simple DC motor. They learn how electrical current can interact with a magnetic field to make it spin.

Skills Introduced: Electricity & Magnetism, basic electronics

Energy Generation (Gr6+)

Students explore how different technologies convert natural or stored energy into usable electrical power. Through hands-on experiments, students investigate concepts such as solar, mechanical, thermal, and chemical energy conversion.

Skills Introduced: Electricity & Magnetism, basic electronics

PCB Design with KiCad (Gr9+)

Put a Complex Circuit into a Small Sheet

Students learn how engineers turn electronic circuits into physical printed circuit boards (PCBs). Using KiCad, students prepare a simple PCB layout for manufacturing.

Skills Introduced: KiCad, PCB design, circuit schematics, electronic components, footprints, routing, circuit layout

Intro to 3D Modeling (Gr6+)

Bring Your Ideas to Life

Students use easy CAD tools to create simple 3D shapes. They learn how digital designs become real objects with 3D printing, a skill that is necessary for modern prototyping and also for making handy accessories and tools.

Skills Introduced: Design, 3D modeling, 3D Printing

Intro to 3D Printing (Gr6+)

Your Ideas in the Palm of Your Hand

Students explore how digital designs are transformed into real physical objects through additive manufacturing. They learn the basic process behind 3D printing, from creating a digital model to preparing it for printing, while seeing a 3D printer in action.

Skills Introduced: 3D printing, additive manufacturing, CAD-to-print workflow, slicing, digital fabrication

3D Printer Maintenance (Gr6+)

Your Ideas in the Palm of Your Hand

Students learn how to maintain a 3D printer to keep it reliable, accurate, and ready for use. Through a demonstration, students learn how to inspect and clean key components, level the print bed, check for common problems, and perform basic preventative maintenance.

Skills Introduced: 3D printer maintenance, bed leveling, nozzle care, troubleshooting, preventative maintenance, mechanical inspection

Precision Labeling, Cable Management & Wire Harness Bundling (Gr4+)

Students learn how professional engineers and technicians organize, label, and bundle wires and cables to create clean, reliable, and maintainable systems. Through a hands-on activity, students practice routing wires, applying labels, bundling cables, and organizing a small wiring assembly.

Skills Introduced: Cable management, wire routing, precision labeling, wire harnessing, organization, documentation, attention to detail

Wire Stripping and Crimping (Gr6+)

Students learn the fundamentals of preparing and terminating electrical wires for reliable connections. Through a hands-on activity, students practice stripping insulation, selecting appropriate terminals, making crimp connections, and inspecting their work for mechanical and electrical quality.

Skills Introduced: Wire stripping, crimping, terminal selection, wire preparation, electrical connections, quality inspection

Sensor Systems and Ground Loops (Gr9+)

Students explore how sensors communicate electrical signals to measurement and control systems and how improper grounding can introduce unwanted noise and errors. Through hands-on experiments, students investigate ground loops, identify sources of electrical interference, and learn practical techniques for reliable sensor wiring and signal measurement.

Skills Introduced: Sensors, signal measurement, grounding, ground loops, electrical noise, troubleshooting, instrumentation

O-rings and Seals (Gr6+)

Students learn how O-rings and other seals are used to prevent fluids and gases from leaking between mechanical components. Through a hands-on activity, students explore how seal geometry, material, compression, and installation affect sealing performance and learn how engineers select the right seal for an application.

Skills Introduced: O-rings, seals, sealing surfaces, compression, material selection, leak prevention, mechanical design

Structural Optimization and Strength-to-Weight Geometry (Gr4+)

Students explore how engineers design structures that are strong, lightweight, and efficient. Through a hands-on design activity, students experiment with geometric shapes, material placement, and load paths to understand how structural geometry affects strength, stiffness, and weight.

Skills Introduced: Structural optimization, strength-to-weight ratio, load paths, geometric design, lightweight engineering

Structured Troubleshooting and Root Cause Analysis (Gr9+)

Students learn how to approach technical problems systematically rather than relying on trial and error. Through practical examples, they learn to identify symptoms, isolate potential causes, test hypotheses, and determine the underlying root cause of a problem.

Skills Introduced: Troubleshooting, root cause analysis, FMECA, problem-solving, critical thinking

Feedback Loops and PID Control (Gr9+)

Students learn how engineers use feedback to make systems automatically reach and maintain a desired target. Through a hands-on control activity, students explore the roles of proportional, integral, and derivative control and tune a simulated PID controller to improve a system's speed, accuracy, and stability.

Skills Introduced: PID control, feedback systems, proportional control, integral control, derivative control, controller tuning

Engineering Measurements (Gr9+)

Students learn how engineers and technicians accurately measure physical objects and dimensions using common measurement tools. Through hands-on activities, they practice taking measurements, selecting the appropriate tool, and understanding the importance of precision and accuracy in engineering and manufacturing.

Skills Introduced: Precision measurement, accuracy, measurement tools, engineering drawings, significant figures, dimensional analysis

Computer Skills & Programming

Intro to VBA (Gr6+)

Automate Your Microsoft Office Work

Students learn how to access Microsoft Visual Basic for Applications and use it to complete otherwise tedious tasks quickly. Students build a working LED circuit and program an Arduino to control it.

Skills Introduced: Introductory programming logic, Microsoft Visual Basic for Applications, Problem-solving, AI prompting

Batch Scripting (Gr6+)

Automate Your Computer Itself

Students learn how to use Windows batch scripts to automate repetitive tasks and interact with their computer through the command line. Through practical examples, they create simple scripts that perform tasks automatically and learn how programmers use automation to save time and reduce repetitive work.

Skills Introduced: Batch scripting, command-line interfaces, automation, file management, variables, basic programming logic

Intro to GitHub (Gr6+)

Collaborate on Your Programming Projects

Students learn how GitHub is used to store, organize, and share programming projects. Through a guided hands-on activity, students create a repository, upload their code, and learn the basics of collaborating on software projects.

Skills Introduced: GitHub, version control, repositories, code sharing, collaborative programming

Cheat Engine (Gr9+)

Students explore how computer programs store and manipulate data in memory using Cheat Engine in a controlled, offline environment. Through a guided hands-on activity, students search for changing values, observe how memory changes affect program behavior, and develop an understanding of how software interacts with computer memory.

Skills Introduced: Memory inspection, value searching, hexadecimal concepts, program behavior, debugging, reverse engineering

Network Packet Analysis and Packet Sniffing (Gr9+)

Students learn how data travels across a network by examining the individual packets exchanged between computers and devices. Through a guided, controlled activity, students use packet-analysis tools to capture and interpret network traffic, identify protocols, and understand how information is organized and transmitted.

Skills Introduced: Network packets, packet sniffing, Wireshark, network protocols, IP addresses, ports, network troubleshooting

Browser Developer Tools and Inspect Element (Gr6+)

Students learn how browser developer tools can be used to inspect and understand the HTML, CSS, and JavaScript that make up a webpage. Through a guided hands-on activity, students modify a webpage locally in their browser to experiment with layout, styling, and interactive elements while learning how frontend code controls what users see.

Skills Introduced: Browser developer tools, HTML, CSS, JavaScript, DOM inspection, frontend debugging, web development

Browser Extensions (Gr6+)

Students learn how browser extensions can add new features and functionality to web browsers. Through a hands-on activity, students explore how extensions interact with webpages and build a simple extension that modifies or enhances the browsing experience.

Skills Introduced: Browser extensions, HTML, CSS, JavaScript, browser APIs, DOM manipulation, web development

Web Scraping (Gr6+)

Students learn how programs can automatically collect structured information from webpages. Through a guided hands-on activity, students inspect webpage structure, extract selected data, and organize the results for analysis while learning about responsible and respectful use of online information. Students also learn the ethical implications of web scraping.

Skills Introduced: Web scraping, HTML, Python, data extraction, structured data, automation, web requests, ethics

A* (A-star) (Gr9+)

The Algorithm behind Google Maps

Students explore how computers find efficient routes between locations using the A* pathfinding algorithm. Through an intuitive, hands-on example, students learn how algorithms can evaluate possible paths, avoid obstacles, and efficiently navigate from a starting point to a destination.

Skills Introduced: Pathfinding algorithms, A* algorithm, graph search, heuristics, algorithmic thinking, optimization

Odometry (Gr9+)

Students learn how robots estimate their position and movement using measurements from wheels, encoders, and other sensors. Through a simulation, students program a robot to move and track its movement without relying on external positioning systems.

Skills Introduced: Odometry, wheel encoders, distance measurement, robot position, coordinate systems, robotics

Intro to AI (Gr9+)

How Neural Networks and ChatGPT work

Students get an overview of genetic learning algorithms, neural networks, large language models, and training bias. This workshop is less hands-on and more of a presentation that is meant to give students a slightly higher than basic understanding of what AI really is.

Skills Introduced: Artificial intelligence, machine learning, data, model training, bias

Regular Expressions (Regex) (Gr6+)

Students learn how regular expressions can be used to search, match, and manipulate text based on patterns. Through practical examples, they build increasingly complex patterns and discover how Regex can automate tasks such as finding specific information, validating input, and cleaning data.

Skills Introduced: Regular expressions, pattern matching, text processing, data validation, string manipulation, automation

Effective Debugging (Gr6+)

Students learn how to systematically find and fix problems in their code instead of simply guessing at solutions. Through hands-on examples, they practice reading error messages, isolating problems, testing possible causes, and using a structured approach to get their programs working.

Skills Introduced: Debugging, troubleshooting, error analysis, problem-solving, logical thinking, code testing

Excel Power Query (Gr6+)

Organize your Data

Students learn how to import, organize, clean, and transform data using Excel Power Query. Through practical examples, they discover how to turn messy or repetitive data-processing tasks into a repeatable workflow that can be refreshed whenever new data is added.

Skills Introduced: Power Query, data cleaning, data transformation, data import, data organization, workflow automation

Secrets of File Explorer (Gr4+)

Students discover powerful features and lesser-known capabilities of Windows File Explorer that can make organizing and navigating files faster and more efficient. Through hands-on activities, students learn advanced search techniques, useful keyboard shortcuts, file management tools, and ways to work with folders and files more effectively.

Skills Introduced: Windows File Explorer, file organization, advanced search, keyboard shortcuts, file management, productivity

Word Document Formatting (Gr4+)

Make your Reports Look Professional

Students learn how to create clean, professional, and well-organized documents using Microsoft Word. Through a hands-on activity, students practice formatting text, applying styles, organizing content, working with tables and figures, and using layout tools to produce polished documents.

Skills Introduced: Microsoft Word, text formatting, styles, document layout, tables, images, professional formatting

Intro to Markdown (Gr6+)

Students learn how Markdown can be used to quickly create clean, structured, and readable documents using simple text-based formatting. Through a hands-on activity, students practice creating headings, lists, links, tables, code blocks, and other common elements used in documentation and online platforms.

Skills Introduced: Markdown, text formatting, documentation, headings, lists, links, tables, code formatting

Intro to LaTeX (Gr6+)

Students learn how LaTeX can be used to create professional documents with precise formatting, especially for technical and mathematical work. Through a guided hands-on activity, students create a document containing equations, figures, references, and structured sections while learning how to control formatting through code.

Skills Introduced: LaTeX, technical writing, mathematical equations, document structure, references, typesetting

Mouse-Free Keyboard Navigation (Gr3+)

Students learn how to navigate their computer and common applications efficiently using keyboard shortcuts instead of relying on a mouse. Through practical exercises, they discover shortcuts for switching between applications, navigating documents, editing text, and performing everyday tasks more quickly.

Skills Introduced: Keyboard shortcuts, efficient navigation, productivity techniques, text editing, computer literacy, workflow optimization

Google Like a Pro (Gr4+)

Students learn how to search the internet more effectively by using search operators, precise keywords, filters, and other techniques to find relevant information quickly. Through practical challenges, they learn how to refine searches, cut through irrelevant results, and locate reliable information.

Skills Introduced: Search operators, query formulation, information retrieval, search refinement, source evaluation, online research

The Binary Number System and Boolean Logic (Gr3+)

The Fabric of the Computer Universe

Students diversify their knowledge of number systems, from binary to hexadecimal and beyond. They learn the advantages of different number systems. They also are exposed to Boolean logic and practice Boolean logic in a practical activity.

Skills Introduced: Number systems, computer logic, Boolean logic

Barcodes (Gr3+)

Students learn how barcodes encode information using patterns of lines, widths, and spacing. Through a hands-on activity, students analyze a barcode, identify its underlying structure, and manually recreate it to understand how machines can translate simple visual patterns into data.

Skills Introduced: Barcodes, data encoding, pattern recognition, binary concepts, measurement, precision

Math Skills

TI-nspire (Gr9+)

Unlocking the Secret Powers of Your Calculator

Students learn how to go beyond basic calculations and take advantage of the powerful tools built into the TI-Nspire. Through practical examples, they explore graphing, equations, data analysis, spreadsheets, and other features that can help them solve problems more efficiently and visualize mathematical concepts.

Skills Introduced: TI-Nspire functions, graphing, data analysis, spreadsheets, mathematical modeling, calculator programming

AI Tools

Computer Vision with YOLOv8 (Gr9+)

Students explore how computers can be taught to recognize and locate objects in images and video. Using YOLOv8, students see how modern computer vision systems process visual information and discover how AI is used in applications such as robotics, security, and autonomous systems.

Skills Introduced: Computer vision, object detection, artificial intelligence, machine learning, image processing

Miscellaneous

Resume Building (Gr9+)

Students are taught how to make a really powerful resume.

Skills Introduced: Resume building