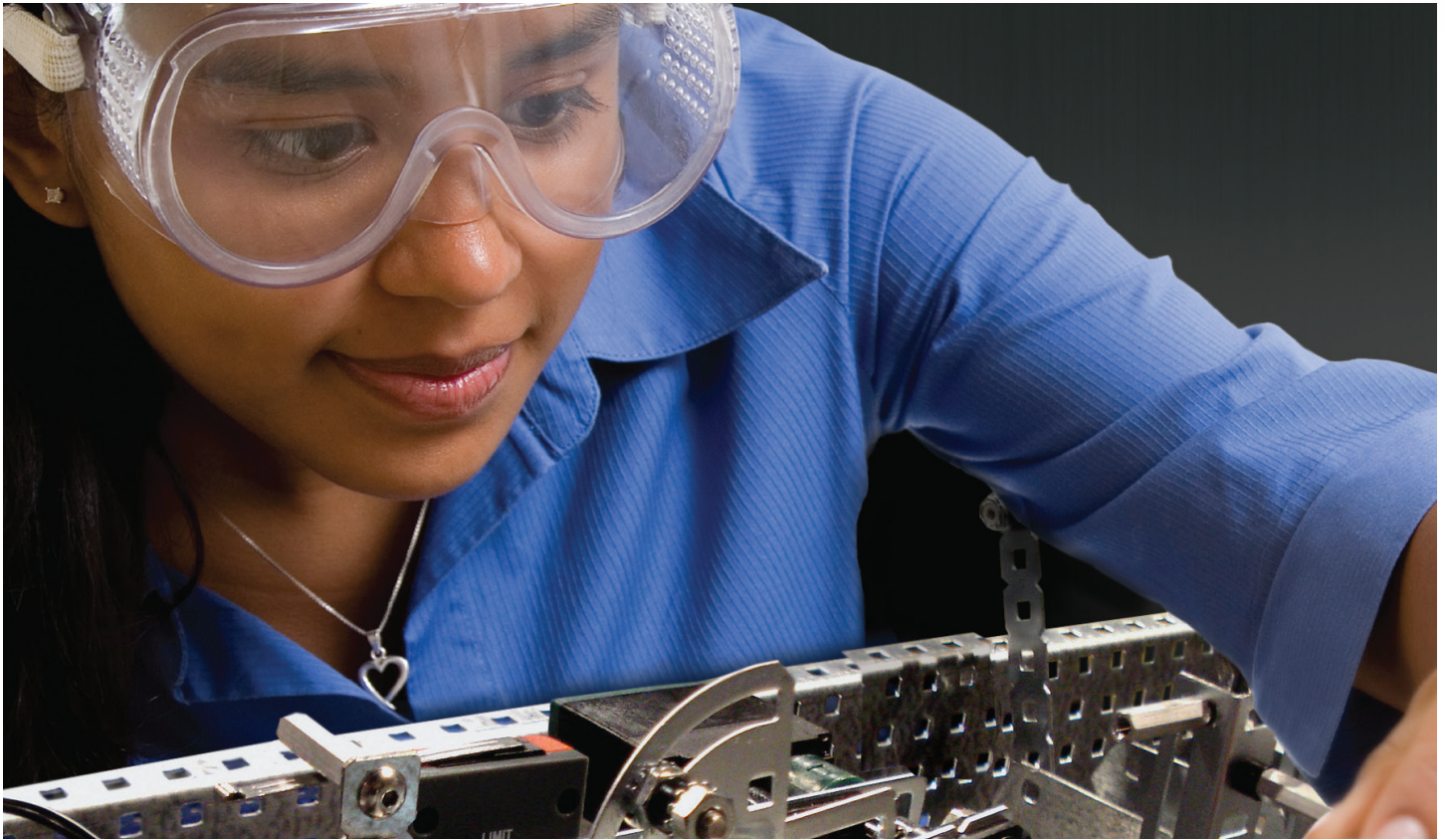


# Introduction to STEM Pathways

Middle & High School Pathways in Science, Technology, Engineering and Mathematics



An easy-to-implement solution for delivering early engagement and discovery of science, technology, engineering and mathematics topics for middle and high school students.

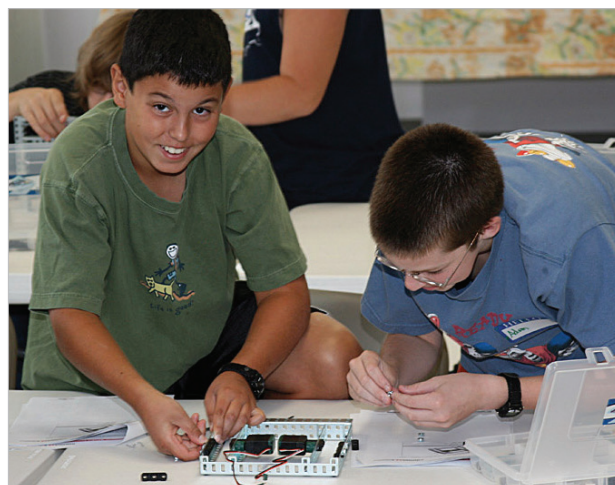
The standards-based curriculum emphasizes 21<sup>st</sup> Century skills including:

- ✔ Teamwork
- ✔ Leadership
- ✔ Creative problem-solving skills

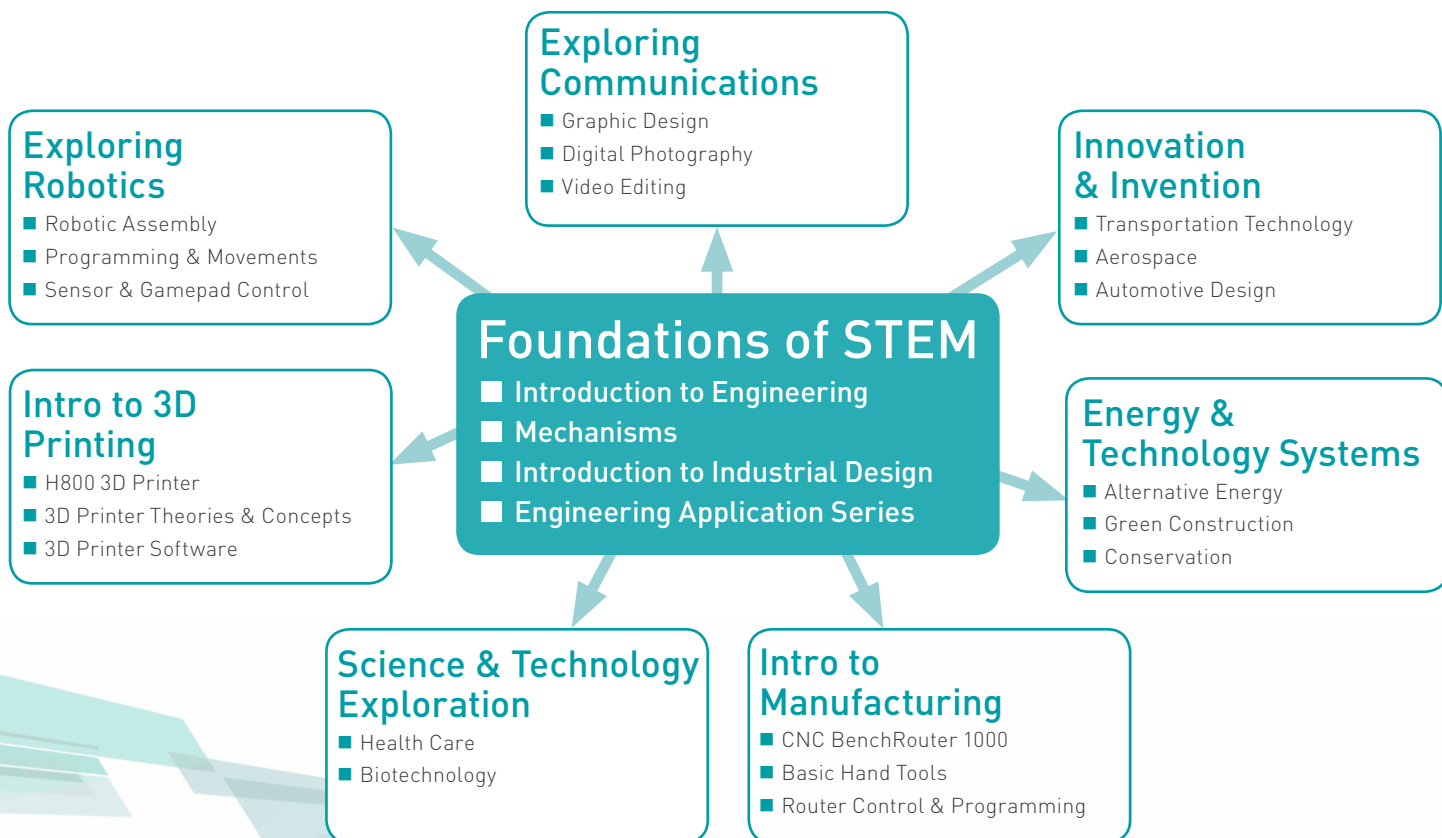
# INTRODUCTION TO STEM PATHWAYS

Intelitek's Introduction to STEM Pathways provides an easy-to-implement solution for delivering early engagement and discovery of science, technology, engineering and mathematics topics for middle and high school students.

Using multiple instructional strategies including activity-based learning and immersive e-learning, students explore technology, examine science and math concepts and investigate careers in STEM. The standards-based curriculum emphasizes 21st Century skills including teamwork, leadership and creative problem-solving skills. Relevant topics like robotics, energy systems and transportation help students see the connection between STEM and the world around them.



**Start with the requisite Foundations of STEM course, then mix and match courses to build a flexible program for STEM exploration!**



## The complete and flexible classroom solution

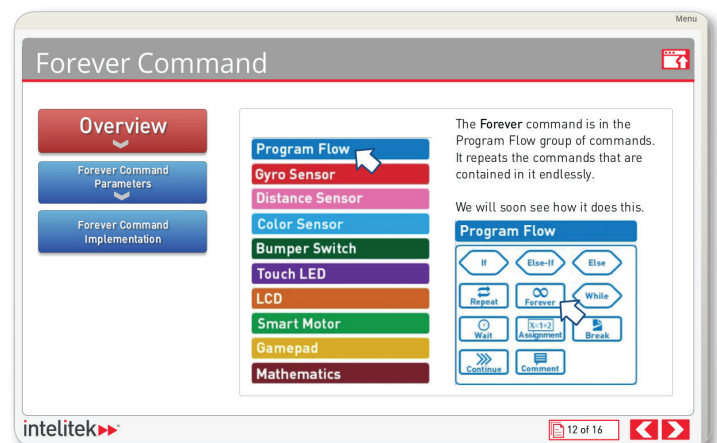
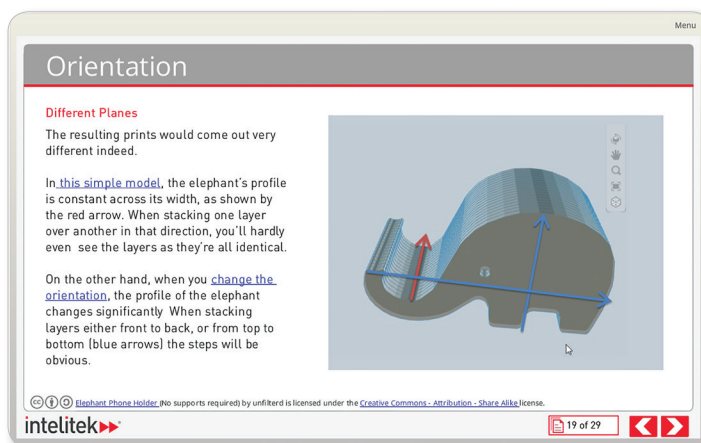
Introduction to STEM Pathways makes implementation easy. Each course provides everything you need, out of the box and ready to use. You can choose flexible packages based on your class size and you can customize the program by adding topics in any configuration to the requisite Foundations course. The curriculum works with any instructional method whether instructor-led, self-directed or collaborative.

## Freeing teachers to focus on teaching

The LearnMate® learning management system is included with the requisite Foundations course. LearnMate® enables consistent course delivery year-over-year across classrooms, schools and districts. With such an easy-to-use tool to handle time-consuming administrative tasks, teachers are free to focus on individual students. Easy setup of courses and students saves time, while robust reporting and real-time feedback on student progress empowers teachers with valuable information to maximize their effectiveness.

## Your total STEM outfitters

Intelitek provides you with a complete one-stop-shop solution for your program. We provide everything you need for a complete solution, from simple ordering to installation to support after the sale, all from the same source. We also provide professional development and training as a resource to ensure you achieve the best possible results for your students. Best of all, our solutions are cost-effective and flexible enough to work with any budget.



## Advantages

- Consistent program delivery across organizations and semesters.
- Easy-to-use classroom setup, management and grading enables teachers to focus on student outcomes.
- Integrated learning activities with all the components you need, ready to use out of the box.
- Flexible, customizable packages for varying class sizes and length.
- Curriculum designed for any instructional strategy or teaching model.
- Interactive e-learning format engages digital-native students
- Robust assessment and real-time student progress to identify learning gaps and validate your program.
- Training and support from one company.

## Features

- Curriculum aligned to various educational standards.
- 15-45 hours of content per course, perfect for a 3-9 week class.
- Interactive e-learning content with video, engaging simulations and scenarios.
- Integrated software launches directly from browser.
- Hardware packages for 2, 10, 20 and 30 students.



# FOUNDATIONS OF STEM

The Foundations of STEM course pack is the cornerstone of the Introduction to STEM Pathways program, which introduces STEM concepts to students through problem-based learning and hands-on activities. This package includes the following courses: Introduction to Engineering, Mechanisms, Introduction to Industrial Design and our Engineering Application Series, which consists of over 30 downloadable projects to add to your classroom.



Foundations includes the LearnMate® classroom management system which delivers curriculum, tracks student progress, enables assessments and facilitates classroom management.

## Content Topics

**Duration: 45-60 hours**

### Introduction to Engineering

Introduction to Engineering provides students an excellent overview of the field of engineering. Students explore the history of engineering, career choices and the engineering design process.

- Introduction to Engineering
- Engineering in Society
- Careers in Engineering
- Engineering Approaches to Product Design
- Engineering Education Planning
- Exploring Engineering (Project)

### Mechanisms

In the Mechanisms course, students examine various components of mechanisms including gears, pulleys, levers and more.

- Simple Machines - Inclined Planes, Wedges, and Screws
- Simple Machines - Levers
- Simple Machines - Wheels, Axles, and Pulleys
- Gears
- Forces
- Work
- Friction
- Building a Mechanisms

### Introduction to Industrial Design

In the Introduction to Industrial Design course, students explore the history and role of industrial designers. What is Industrial Design?

- Technical Drawing
- History of Product Design & How Products are Made
- Reverse Engineering, Patents, and the Engineer's Notebook
- Human Factors Engineering
- Rapid Prototyping

### Engineering Application Series

The Engineering Application Series (EAS) is a collection of over 30 downloadable projects that you can add to your classroom.

- Airplane Launcher
- Balloon Racer
- Bathroom Redesign
- Movable Bridge
- Conveyor System - Automated
- Geothermal Heating/Cooling System
- Guitar Tuning Device
- Intelligent Green House
- Pneumatics Trainer
- Robotics Game/Event
- Smart House
- Solar Water Heater
- Sun Tracking Solar Panel Array
- Vending Machine
- Wind Turbine

## Components

### Catalog # STEM-FOUN-CORE

#### Courses Included:

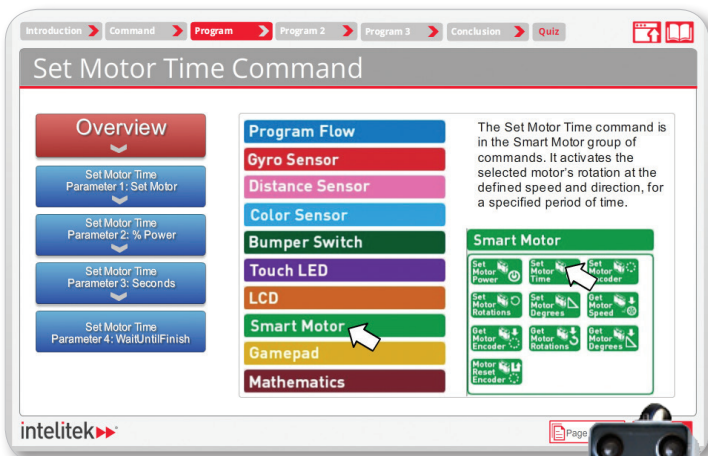
- LearnMate Learning Management System (LMS E-learning Content):
- Introduction to Engineering (Virtual)
- Mechanisms (Virtual)
- Introduction to Industrial Design (Lab)
- Engineering Application Series (EAS) Projects

#### Courses Material:

- Introduction to Industrial Design Course Materials Package
  - Protractors
  - 12" metal rulers
  - Lab, challenge sheets and more
- Mechanisms Materials Package
  - VEX Mechanism Hardware Kit With 108 Components
  - 500g & 250g Spring Scales and Weights
  - Classroom Resources
  - Classroom Challenge Sheets
- Engineering Application Series (EAS) Project Materials Package
  - Simple machines modeling packages
  - Brass fasteners
  - Other miscellaneous materials

# EXPLORING ROBOTICS

Intelitek's Exploring Robotics provides an easy-to-implement solution for delivering early engagement and discovery of science, technology, engineering and mathematics topics for middle school students. Students will explore robotics with the VEX® IQ Robotics platform while developing 21st Century skills like teamwork, creativity and problem-solving.



## Content Topics

**Duration: 30-45 hours**

### Introduction

- Using LearnMate
- What are Robots?
- Driving the Model
- Natural vs programming languages
- Introduction to easyC

### Basic Robot Movements

- Set Motor Speed
- Set Motor Time
- Set Motor Rotation
- Turning the Model
- Conclusion and Challenge

### Repeating Actions – Loops

- Forever Loop
- Repeat Loop
- Variables
- While Loop
- Conclusion and Challenge

### Reacting to Events – Conditional Branching

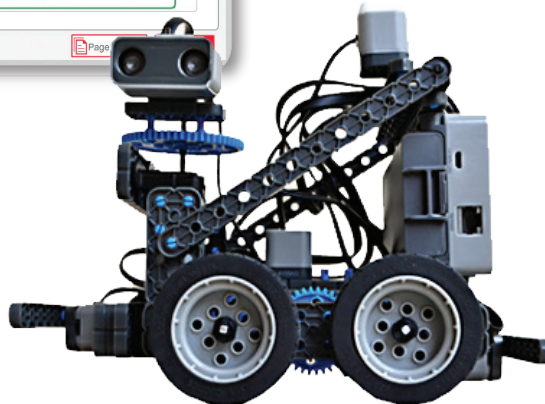
- Branching with Variables
- Touch Sensor – Output to LCD
- Touch Sensor – Controlling Motion (Part 1)
- Touch Sensor – Controlling Motion (Part 2)
- Conclusion and Challenge

## Components

### Catalog # STEM-EXPL-ROBXX

#### Materials Included:

- Each program package enables students to work in teams of two with a dedicated VEX IQ robotic kit.
- Software licenses are included for each student and one teacher. When ordering specify your software license terms: annual subscription or perpetual license. Perpetual license is permanent, requiring no renewal. Annual license is for 365 days.
- 2-Student package 2 VEX IQ kits, 3 seats easyC, e-learning course STEM-EXPL-ROB02
- 10-Student package 6 VEX IQ kits, 11 seats easyC, e-learning course STEM-EXPL-ROB10
- 20-Student package 11 VEX IQ kits, 21 seats easyC, e-learning course STEM-EXPL-ROB20
- 30-Student package 16 VEX IQ kits, 31 seats easyC, e-learning course STEM-EXPL-ROB30
- Programming Add-On Kit (2 motors, 7 sensors included)



### Touch LED

- How Does it Work?
- Touch LED as a Touch Sensor
- Touch LED for Visual Feedback
- Touch LED for Indicating Distance
- Conclusion and Challenge

### Ultrasonic Distance Sensor

- How Does it Work?
- Sensor Output to LCD – LED
- Rotating the Sensor to Detect an Object
- Moving the Model to Detect an Object
- Conclusion and Challenge

### Color Sensor

- How Does it work?
- Sensor Output to LCD – LED
- Detecting Earth Properties
- Searching for a Mineral
- Conclusion and Challenge

### Gamepad

- Arcade Control
- Single Motor Control
- Sending Variables
- Conditional Branching Using the Joystick
- Conclusion and Challenge

### Compass – Using Gyro

- How Does it work?
- Sensor Output to LCD – LED
- Returning Home
- Final Program (Part 1)
- Final Program (Part 2)

# INTRO TO 3D PRINTING

## Intro to 3D Printing Curriculum

The Intro to 3D Printing Curriculum is a flexible, hands-on course that serves as a complete introduction to 3D printers. The course is designed to introduce students to the theories and concepts of 3D printing, while also teaching them everything they need to know to begin printing 3D parts on their own.

## Afinia H800

The Afinia H800 is a brand new, fully-enclosed printer which has a build volume up to 5 times larger than the H480 (10" x 8" x 8"). The H800 weighs approximately 55 pounds and has a footprint of 19.1" x 20.5" x 19.5", which makes it an ideal printer for larger projects. Includes 2 year extended warranty

## 3D Printer Software

The Afinia 3D Printer software has an easy-to-use interface which allows beginner users to perform all the tasks necessary to begin printing their own 3D parts within minutes.

## Content Topics

**Duration: 15-20 hours**

### Introduction

- Revolutions in Technology
- What is 3D Printing?
- 3D Printing for Industry
- Methods of 3D Printing
- Anatomy of a 3D Printer
- How does FDM work
- Mesh Geometry & Resolution
- 3D Positioning System
- Sharing Revolutions
- 3D Printing Marketplaces

### Software

- Intro to 3D Printing Software Afinia Software
- Opening STL Files
- Adjusting the View
- Transforming the Model
- Duplicating the Model
- Saving Your Work

### Orientation

- Layer Thickness
- Orientation
- Scale

### Support

- Overhanging Structures
- Identifying Support Needs
- Support Preview
- Specifying Support
- Support Angles
- Supporting Overhangs
- Avoidance Strategies

### Fill

- Interior Fill
- Choosing Infill
- Shell Thickness Fill as Support
- Fill Printing in Afinia
- Surface Print

## Components

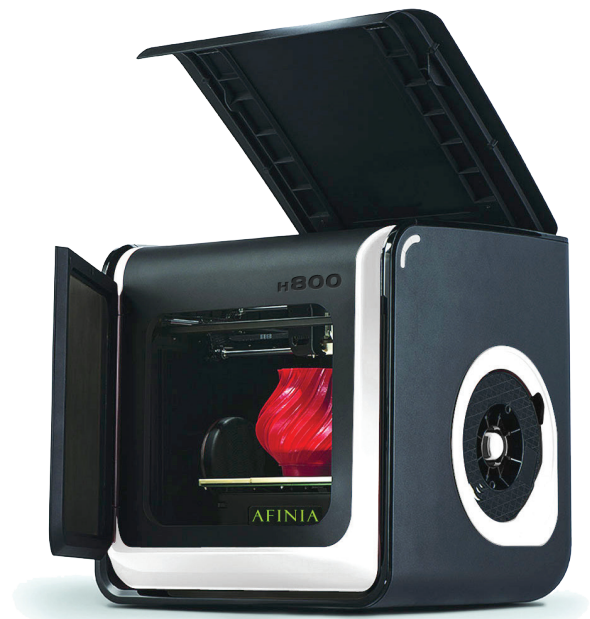
**Catalog # STEM-INTR-3DP**

### Materials Included:

- Afinia H800 3D printer

### Accessories:

- BuildTak build platform, Air Filters (2), Cell/Perf boards (3) and a replacement nozzle.
- Filament: Eight 500 gram spools of filament in PLA (Blue, Green, Gray and Natural) and ABS (White, Black, Red and Yellow)



### Modeling Approaches

- Creating 3D Content
- 3D Modeling
- 3D Sculpting
- 3D Scanning
- Parametric Design

### Projects

- Wanted for Hire: 3D Print Technician
- Search and Print
- Design and Print

# INNOVATION AND INVENTION

Innovation and Invention explores the relevant topic of transportation technologies. Students learn about careers in various transportation industries and connect with technology through hands-on activities like building gliders, rockets and CO<sub>2</sub> dragsters.



## Content Topics

**Duration: 45-60 hours**

### Introduction to Transportation

In Introduction to Transportation, students discover how land, air, marine, and space transportation help move people and materials. They explore the history and advancement of various transportation systems. Throughout the course, students also examine careers in the transportation and related fields.

### Aerospace

Aerospace explores the research and development of aircraft, aerospace history, industries and careers. Hands-on activities enable students to put into practice the research and design principles they learn throughout the course.

## Components

### Catalog # STEM-ININ-LABXX

#### Materials Included:

##### ■ E-learning Content:

- Introduction to Transportation Technology (Lab)
- Aviation (Lab)
- Aerospace (Lab)
- R&D Automotive (Lab)

##### ■ Transportation Technology Curriculum (TTC) Course Materials Package

Includes the following for 2, 10, 20, or 30 Students:

- Flight Simulator X Standard software
- Flight sim yoke
- Pneumatic rocket launching assembly
- Estes sample rocket kit
- Hobby knife
- Cutting mat
- 12" Metal ruler
- VFR terminal chart, aviation Chicago
- Pipe cleaners (100-pack)
- Foam board 11x14 (2-pack)
- Wire cutters
- Nose cone materials assembly
- Roomarang
- 2 X 3/32" x 24" basswood sheet (15-pack)
- Colored pencils (36-pack)
- Brass fasteners (100-pack)
- and more!

### Aviation

In this course, students learn aviation principles and study the different forms of navigation. Students use a flight simulator to test flight physics and gain hands-on experience with flight control and navigation. Students also explore flight by examining aircraft components, reading a terminal area chart and creating their own flight scenario.

### Research & Design Automotive

In the Research & Design Automotive course, students explore and apply the principles of design. Student examine fundamentals of automobile design, such as aerodynamics and energy efficiency. In hands-on activities, students explore the process used in industry to produce a marketable product and apply the design process to craft their own paper car. They also study the marketing process and design an advertisement for the paper car.



# ENERGY SYSTEMS

In this engaging course, students explore various technological systems in the relevant context of sustainable and alternative energy. Students discover how alternative resources such as solar, wind, nuclear and hydropower are used to produce energy. Students learn about hybrid vehicles and fuel sources such as hydrogen, electricity and ethanol. Students learn how construction and design methods are used to create energy-efficient buildings and how existing homes can be retrofitted to increase their energy-efficiency. Students investigate ways to protect the resources we harvest.

Using the supplied experiment kits, students generate electricity from renewable sources, design a solar energy system based on electricity needs and extract hydrogen from water by electrolysis.



## Components

### Catalog # STEM-ENSYS-LABXX

#### Materials Included:

- E-learning Content:
  - Introduction to Green Technology (Lab)
  - Resource Conservation (Lab)
  - Green Transportation (Lab)
  - Alternative Energy (Lab)
  - Green Construction (Lab)
- GTC Renewable Energy Experiments (Lab)
- Green Technology Curriculum (GTC) Course Materials Package 2, 10, 20, or 30 students:
  - Dynamo kinetic flashlight
  - H-Racer V2 & hydrogen station kit
  - World's simplest motor
  - Sunpower house
  - Renewable energy monitor
  - Rapitest soil test kit
  - Conservation of Natural Resources (5 CDs)
  - and more!

## Content Topics

**Duration: 45-75 hours**

### Introduction to Green Technology

Introduction to Green Technology considers why research in sustainable and alternative energies is so important today. The threats to human and environmental health posed by fossil fuel consumption are explored.

### Resource Conservation

Resource Conservation investigates natural resources and how they are used in industry, agriculture and everyday life. It addresses our degree of dependence on the environment, and ways to protect resources. Students acquire an understanding of how technology and science play important roles in conserving, preserving, recycling and monitoring the health of the environment; assisting in the proper disposal of waste; and how to wisely use natural resources for the benefit of all.

### Alternative Energy

Alternative Energy explores scientific advances that are making alternative energy more affordable and efficient. Students discover how alternative resources such as solar, wind, nuclear and hydropower are used to produce energy. Relevant activities demonstrate how turbines generate electricity from renewable energy sources, such as moving air and water. Science and math objectives are addressed as students participate in activities such as calculating their own home's electricity needs and designing a solar energy system based on those needs.

### Green Transportation

In the Green Transportation course, students learn about hybrid vehicles and vehicles powered by green fuel sources including hydrogen, electricity, and ethanol. Students conduct activities such as an electrolysis experiment that separates hydrogen from water. They also learn steps they can take now to reduce fuel consumption.

### Green Construction

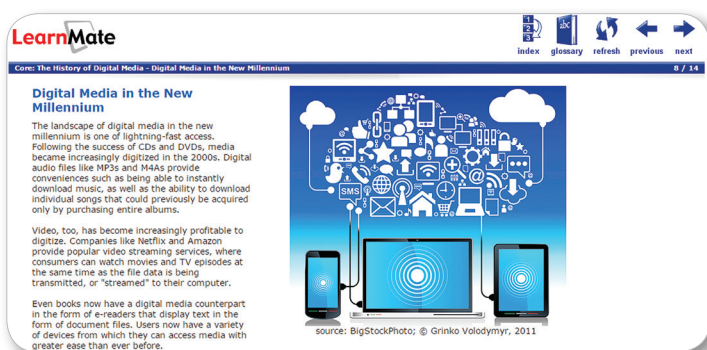
This course explores methods of construction and design used to create self-sustaining, energy-efficient structures. Students explore design strategies and technologies used for retrofitting a home to meet green concerns, as well as ways to design and construct a green home from the ground up. Students are introduced to passive solar heating and cooling systems, water temperature management, and various technologies that can harvest electricity for direct use. Additionally, students will investigate Energy Star, ecological building, and numerous careers in the green construction field.



# EXPLORING COMMUNICATIONS

In the Exploring Communications Technology course, students explore the history of various types of media and their impact on society. Students learn to edit digital video using the tools and techniques used by professional video editors. They investigate digital photography basics, such as digital camera features and operation, file formats and image quality. Photo editing and manipulation techniques are also examined.

Hands-on activities include building pinhole cameras, editing digital photos and video segments, designing graphics and applying graphics to a t-shirt.



## Content Topics

**Duration: 45–60 hours**

### Introduction to Communications

Introduction to Communications gives students an overview of communication, media creation, and the impact of media on society. Communication's history and purposes are the foundation of the course, focusing on how and why messages are sent to various types of audiences. Students focus specifically on design concepts and theories involved in graphic communications. The course addresses a spectrum of communication and media concepts including camera operation, the evolution of digital photography, the digital media revolution, and the relationship of audiences to a history of mediums, including telegraphy, radio and film.

### Digital Photo Editing

The Digital Photo Editing course focuses on procedures for editing and manipulating digital photographs. The course uses graphic design software to explore basic editing techniques and tools. More complicated processes are introduced later in the course as students familiarize themselves with photo manipulation. By course completion, students will have experience with image editing techniques such as cropping, resizing, dodge and burn, adding and subtracting color and painting.

## Components

### Catalog # STEM-COMM-LABXX

#### Materials Included:

- E-learning Content:
  - Introduction to Communications (Lab)
  - Digital Video Editing (Lab)
  - Digital Photo Editing (Lab)
  - Graphic Design (Lab)
- Exploring Communications Course Materials Package 2, 10, 20, or 30 students:
  - Pinnacle Studio HD Ultimate V15
  - Speakers, computer stereo
  - Computer microphone
  - DVD-R spindle 25-pack
  - Printer/scanner/copier
  - USB printer cable
  - Cotton t-shirt (25-pack)
  - Heat transfer press, t-shirt
  - T-shirt transfer paper-inkjet
  - and more!

### Graphic Design

In the Graphic Design course, students explore color use and theory, typography, page layout, image resolution and more. They work with these concepts using in image editing software. They also design and create their own images, both on paper and digitally, for familiar print mediums such as flyers, posters, and billboards.

Relevant projects include creating and printing a design on a T-shirt and designing advertisements for a school sports team, club or organization.

### Digital Video Editing

In the Digital Video Editing course, students study many of the tools and practices commonly used by professional video editors. This includes creating and editing video clips, inserting titles and still images, crafting transitions, using music and voice-overs and more. Students apply each new skill to producing a complete video.

# INTRODUCTION To MANUFACTURING

In the Introduction to Manufacturing course, students will learn to safely use CNC Routers through a project-based curriculum. First students are introduced to the fundamental skills in identification, application and usage of hand tools that engineers, maintenance technicians and other skilled professionals use every day. Hand tools play a key role in the installation, modification and maintenance of most machines and students will discover that using the proper tool for each application is essential to the quality of any job.

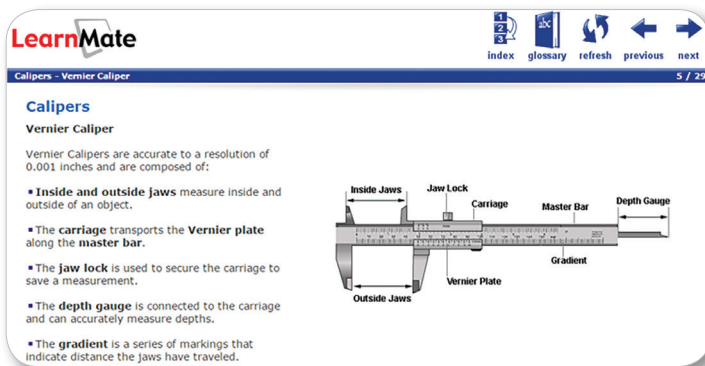
After completion of the hand tools course, students will begin with the express CNC Router curriculum which is a direct, project-driven course that enables students to bring objects they create to life quickly and motivates them to complete other projects. Students will learn terminology related to CNC machines, how to set up the router using Mach3™ control software, and will complete five projects using Vectric VCarve Pro software.

## Components

### Catalog # STEM-INTR-MANF

#### Materials Included:

- Introduction to CNC Router curriculum
- Introduction to Hand Tools curriculum
- Introduction to Hand Tools Materials
- Intelitek BenchRouter 1000
  - Cutting area: 24 in (60 cm) x 16 in (40 cm)
  - Mach 3 control software
  - 800W liquid spindle PC controlled
  - 1in (25.4 mm) thick MDF table
  - X-Y cutting at 200 ipm / (5080 mm/min)
  - Starter Cutting Tools Kit
  - Shop vacuum and dust foot
  - 2 Spare pieces of 24 in x 16 in x1 in MDF
  - 110v or 220v power
  - V-Carve Pro (30 Seats)
  - (Requires .edu E-Mail Address)
  - Manufactured in the USA



## Content Topics

Duration: 20-30 hours

### Introduction to Basic Hand Tools

In this course students complete various skill drills to learn how to safely and accurately work with different hand tools such as vises, chisels, pliers, files, screwdrivers and more.

### Introduction to CNC Routers with VCarve Pro

The Intro to CNC routers course begins with a basic overview of the hardware and software that's used to complete the 5 project-based lessons that follow.

### Project 1: Making a 3D Sign

In the first project, students will learn to draw a part and import clipart while creating their own 3D sign.

### Project 2: Making a Gear Clock

This project shows students how to pattern a drawing and set tool paths while creating a decorative clock housing.

### Project 3: Makers Lab Sign

The third project teaches students how to import vector graphics and join objects while creating a maker's lab sign.

### Project 4: Creating a 3D Robot

The fourth project has students importing .STL models and configuring slice settings while making a 3D robot.

### Project 5: Dinosaur Puzzle

The final project combines all of the knowledge gained from the first 4 projects into a complex 3D dinosaur puzzle.

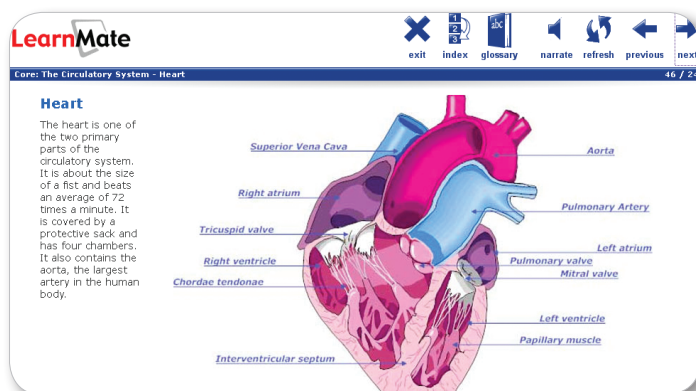
# SCIENCE AND TECHNOLOGY EXPLORATION

Science and Technology Exploration consists of various exploratory STEM topics you can mix and match to round out the opportunities you can offer students. By adding individual topics to fit your program, you can deliver an introductory overview of various pathways including health care, biotechnology.

## Health Care

**Duration: 15-20 hours**

Health Care is an exploratory course that introduces students to the principles and practices of health care, giving an overview of career opportunities available in the field. Ethical and legal issues are also discussed, encouraging critical thinking skills and introspection. Students explore several health professions and practice some of the skills necessary for those professions.



## Components

**Catalog # STEM-HCARE-LABXX**

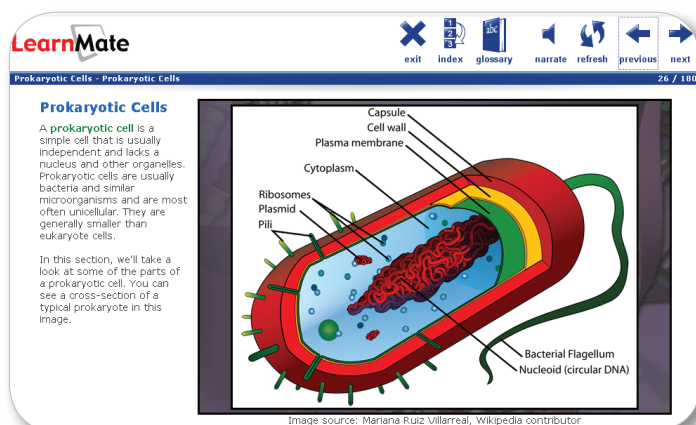
**Materials Included:**

- E-learning Content: Health Care (Lab)
- Health Care Course Materials Package - 2, 10, 20, or 30 Students
  - Eye chart, Snellen
  - Thermometer, oral digital
  - Athletic tape, 1 roll
  - Scissors, bandage
  - Health CD V2
  - Blood pressure / pulse meter
  - Tooth anatomy worksheets
  - Toothbrush, disposable, pre-pasted
  - and more!

## Biotechnology

**Duration: 15-20 hours**

Biotechnology explores how the use and manipulation of cells and genetic materials affects our lives on a daily basis, the industry it has created and the range of careers available in the field. The course also examines several fields that use biotechnology, including medical, agricultural, industrial and forensic science. Bioethics and legal issues are also discussed, encouraging critical thinking skills and introspection.



## Components

**Catalog # STEM-BTECH-LABXX**

**Materials Included:**

- E-learning Content: Biotechnology (Lab)
- Biotechnology Course Materials Package - 2, 10, 20, or 30 Students
  - DNA fingerprinting simu-gel
  - Strawberry DNA extraction kit (32-pack)
  - Genetics CD V2
  - Biotech DNA assembly
  - DNA model kit (12-pack)
  - and more!

# YOUR TOTAL STEM OUTFITTERS

Intelitek provides you with everything you need for a complete STEM program. Built on the power of the LearnMate e-learning platform, Intelitek's blended-learning programs deliver comprehensive, standards based instruction via hands-on activities and compelling online curriculum.

Each program we implement is a partnership fully backed by our sustained support and professional development. Everything we provide is for the purpose of an improved educational outcome for all those invested in education, from students and parents to teachers and administrators.



## More benefits:

- Consistent program delivery across organizations and semesters.
- Easy-to-use classroom setup, management and grading enables teachers to focus on.
- Integrated learning activities with all the components you need, ready to use out of the box.
- Flexible, customizable packages for varying class sizes and length.
- Curriculum designed for any instructional strategy or teaching model.
- Interactive e-learning format engages digital-native students.
- Robust assessment and real-time student progress to identify learning gaps and validate your program.
- Training and support from one company.

## ABOUT INTELITEK

Intelitek transforms education across the globe through comprehensive and innovative technology learning solutions that empower instructors and inspire students. We understand the changing needs of your career and technology classrooms, and design flexible solutions that meet those needs within the framework of any budget. Our sustainable support and professional development ensure the continued success of your programs. By helping to deliver the skills needed for in-demand careers, we are producing results for students, teachers, nations and economies.



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