

THE STEM ACADEMY

A National Non-Profit Status K-12 Education Program
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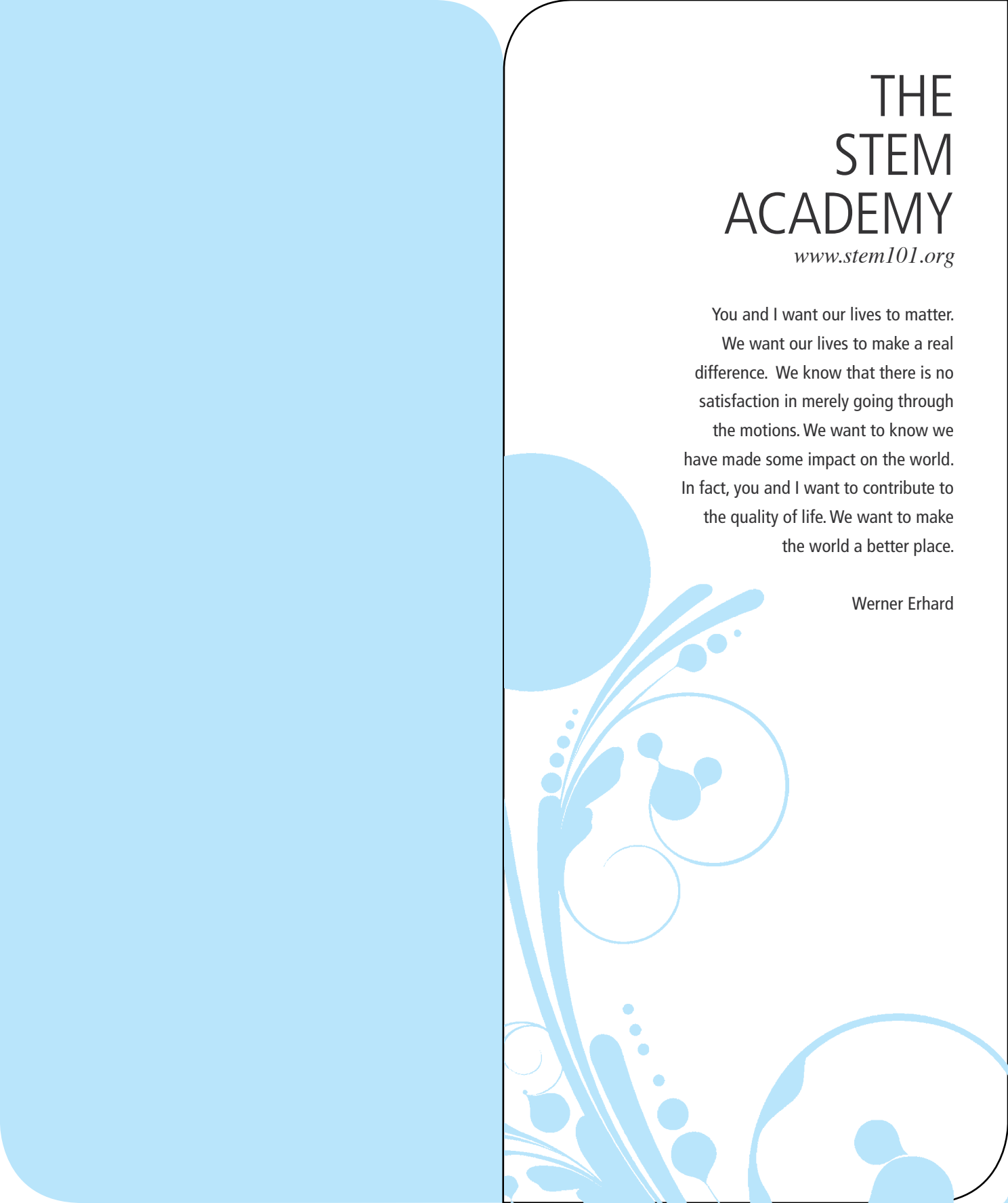
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You and I want our lives to matter.

We want our lives to make a real difference. We know that there is no satisfaction in merely going through the motions. We want to know we have made some impact on the world. In fact, you and I want to contribute to the quality of life. We want to make the world a better place.

Werner Erhard



WHO WE ARE

Section 1:

The STEM Academy is a national non-profit status organization dedicated to improving STEM literacy for all students. We represent a recognized national next-generation high impact academic model. The practices, strategies and programming represented have been qualified as representing best practices by the National Academy Foundation (Academy of Engineering), National Action Council for Minorities in Engineering and Alaska Native Science and Engineering Program.



MISSION

Improve STEM literacy for all students through the establishment of a National STEM Professional Learning Environment dedicated to the continuous improvement process based upon researchable student outcome data

EMPHASIS

- Promote STEM literacy for all students with an emphasis on under-represented minority and lower-income students
- Prepare all students to be competent, capable citizens in a technology-dependent society by Establishing Engineering Habits of the Mind
- Create rigorous, comprehensive and innovative K-12 programs designed for all learners with a strategic focus on gender, racial and socioeconomic concerns
- Foster a comprehensive web of student assessments by launching summative and formative evaluation tools with the capacity and integrity for measuring full STEM literacy and competencies

RESULTS

- Exploration of innovative STEM education practices
- Improved collaboration of STEM contributors
- Comprehensive preK-16 STEM education opportunities and participation advancement
- Advancing a full generation of learners to fill critical voids in national STEM Career Field projections
- STEM literate citizenry with open ended problem solving capacity

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The STEM Academy prepares all students for post-secondary engineering education, internships and career opportunities. Are your students prepared?



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OVERVIEW

The practices, strategies, and programming utilized within The STEM Academy K-12 curriculum were developed to improve rural and low-income student growth, close achievement gaps, decrease dropout rates, increase high school graduation rates and improve teacher and principal effectiveness. The evidence is substantiated by student outcome data captured by The STEM Academy LMS as compared to historical student performance data.

The curriculum is rigorous, innovative and comprehensive and was collaboratively developed by K-12 teachers, school administrators, university educators, industry partners, engineering and biomedical professionals. K-12 curriculum is standard enough to assure high-quality content exchange and flexible enough to allow for school districts and states to modify to meet their particular needs. Curriculum culminates with students applying real-world application of their STEM education with hands-on activities and maps to the following national standards: Common Core, International Technology Engineering Education Association - ITEEA; Accreditation Board for Engineering and Technology - ABET; National Research Council (Science) – NRC; National Council of Teachers of Mathematics - NCTM.

The STEM Academy offers on-site instructor, administration and career counselor training designed to bolster performance and increase student enrollment. Our curriculum development team which consists of education professionals from the fields of science, technology, engineering, mathematics and administration will consult your school on successful implementation strategies to cultivate a cohesive STEM learning environment for students. Teachers and students use the same tools utilized by industry professionals in engineering, architecture, robotics, electronic, material science and bio-technology fields with an emphasis on sustainability.

The mission is to prepare all students to be competent, capable citizens in a technology-dependent society through comprehensive student assessments including traditional tests, project based learning presentations and portfolios. This STEM centric program develops engineering pipeline by featuring a main line education approach focused on standards-based foundations, gender awareness, socio-economic concerns and general learner needs. The STEM Academy courses feature a blended learning approach featuring video tutorials, text books and challenging hands-on exercises to Establish Engineering Habits of the Mind.

GETTING STARTED

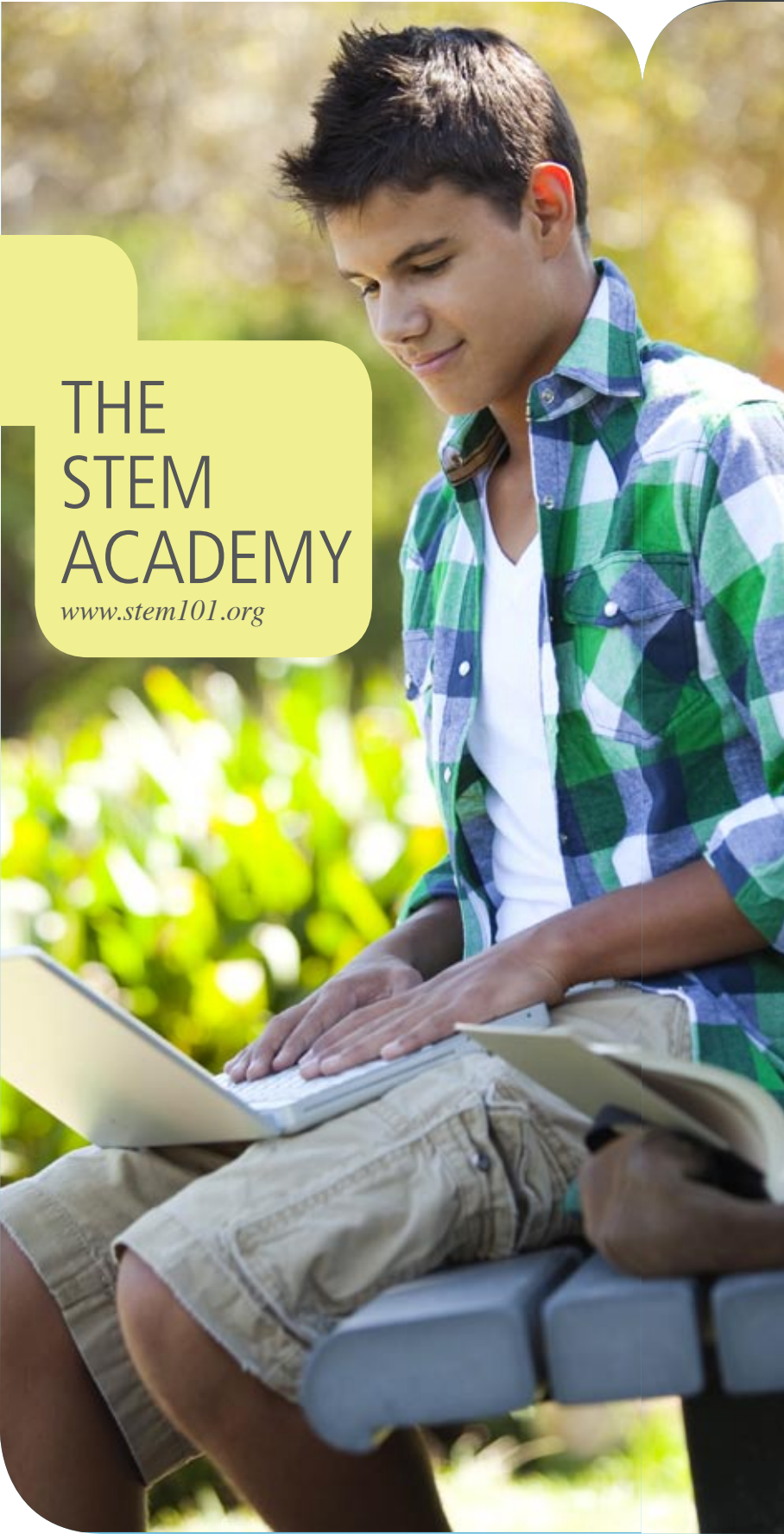
Section 2:

IDENTIFY STAKEHOLDERS

Identify STEM stakeholders. Participants typically would include School or District Level Administration contact, Curriculum Coordinator or Director, CTE Director, Lead Instructors and Career Counselor if applicable.

Request a meeting with a member of The STEM Academy Academic Leadership Team.





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REQUEST CURRICULUM EVALUATION ACCESS

High School (9-12)

Foundations of Technology
Introduction to Engineering
3D Solid Modeling
Design for Manufacturing
Principles of Engineering
Architecture featuring Green Methods
Engineering Technology
General Fabrication Methods
Sustainable Methods
Material Science
Foundations in Biotechnology
Engineering Projects in Community Service

Middle School (6-8)

Discovering STEM (6)
Designing with STEM (7)
Investigating STEM Skills (8)

NETWORK WITH NATIONAL STEM 101 LEARNING COMMUNITY

Request to visit or connect with a current STEM 101 school site administrator or instructor. Benefit from existing curriculum evaluative data analysis.

CALENDAR STEM INSTRUCTOR ORIENTATION TRAINING

The curriculum implementation process will formally begin with the scheduling of STEM 101 Orientation Training (4 Day).

STEM SUSTAINABILITY PLAN

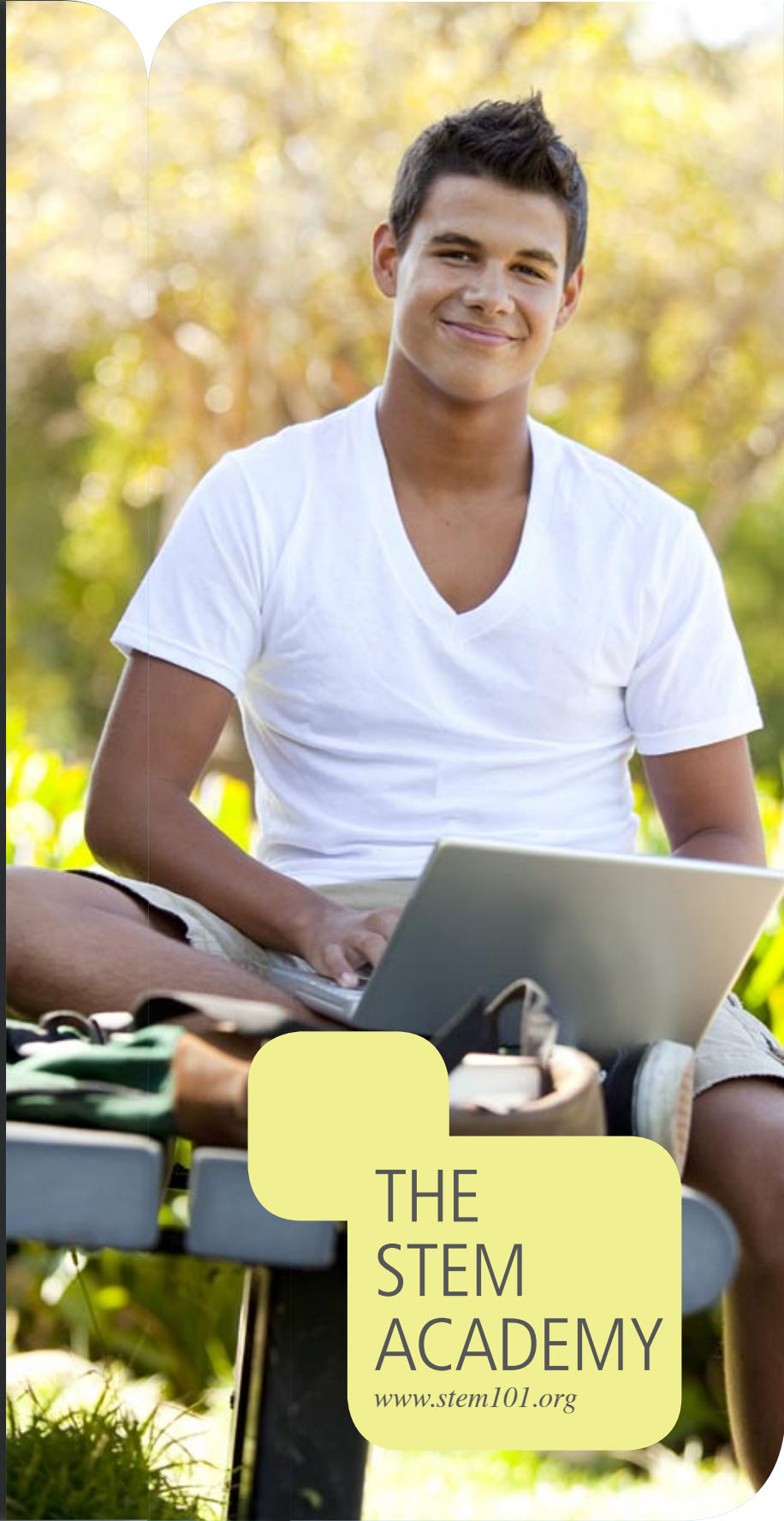
Following orientation training it will be time to implement the school site STEM sustainability plan. This plan will kick off with the STEM banner raising event as part of Engineering Projects in Community Service to announce the school's commitment to STEM education to local political, education, industry leaders; parents and community. The STEM Advisory Committee will be established or enhanced through the outlined process. School counselors are orientated relative to career pathways, recommended course sequencing and complimentary STEM courses. The marketing resources provided by The STEM Academy for student and parent engagement are deployed and generate a heightened awareness of the STEM possibilities. As school begins, within 2-3 weeks, captured student outcomes are available for evaluation and the continuous improvement process (based upon researchable, actionable data). School sites have the option of generating comparative data with nationally identified best practices school sites. Key Philosophy: curriculum practices that are unable to generate research based actionable data are not worthy of implementation.

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HIGH SCHOOL PROGRAM OVERVIEW

Section 3:



The curriculum is based upon national standards and identified best practices to advance STEM literacy for all students. The programming was developed with strategic emphasis on gender, racial and socio-economic concerns. Students establish Engineering Habits of the mind, or an open-ended problem solving capacity. The result is a STEM literate citizenry elevating the welfare of the entire community.

Schools are empowered with a comprehensive STEM pedagogy and a proprietary Learning Management System for continuous improvement planning for students, teachers and administration based upon actionable, research based student outcome data. Following STEM Instructor orientation training participants will be welcomed to the National STEM Professional Learning Environment where collaboration and innovative education practices develop organically.

The STEM Academy curriculum is intended for flexible use based upon national best practice implementation and integration strategies and is accessible via internet. The project-based curriculum is intended to be instructor led and can also be utilized natively for a distance or web-based learning environment. While it is prescribed for high school sites to begin with the implementation of the FOUNDATION COURSE SCHEDULE, schools can initiate their advancement toward full STEM literacy through the implementation of a single course. Courses feature a national third party pre- and post-exam. This examination is designed and scored through an unbiased third party to insure the integrity of the process add to verify that the content has been learned and outcomes and standards have been met by the student. Third party national exams can be used in many ways. A few of these uses are verification of skills for employers, preferred enrollment and transcribed credit in leading universities and technical colleges as well as the continuous improvement of STEM content.

PROFESSIONAL DEVELOPMENT

All instructors, career counselors and administrators from the proposed school site will have the opportunity to attend a (4 Day) STEM orientation training session. Participants will learn the STEM pedagogy, best practices for curriculum delivery, course sequencing, career pathways and how to manage student outcome data. Instructors who will be leading or participating in delivery of a full academic year course can attend the (4 Day) STEM Instructor Training Boot Camp during the summer at one of our university partner sites or at a STEM Professional Development Center.

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COURSES

FOUNDATION COURSE SCHEDULE

The Foundation Course schedule represents the recommended curricular content foundation required to deploy a true STEM academic model with the capacity to empower an entire school site with the resources to integrate an interconnected or multidisciplinary approach to STEM. Courses feature learning activities based upon STEM principles which challenge students to develop critical thinking and problem solving capacity. The real-world learning activities utilize resources demanded by the industry today and of tomorrow. Students activities explore aerodynamics, aeronautics, alternative energy, architecture, biotechnology, electronics, engineering, material science, robotics and sustainability. Instructors can query the LMS to identify curricular units or activities which are specific to their academic subject area. The units or activities can then be integrated into a traditional academic subject area to show application for the learning. An academic model which features both stand-alone course offerings and an interconnected STEM academic philosophy yields the best results.

FOUNDATIONS OF TECHNOLOGY

This course prepares students to understand and apply technological concepts and processes that are the cornerstone of the high school technology education program. Students study the nature and technological issues of the designed world. Students engage in group and individual activities where they develop innovations, design, fabricate, and engineer practical solutions to a variety of problems. Technology content, resources, and laboratory/classroom activities allow students to apply science, mathematics, and other school subjects in authentic situations.

INTRODUCTION TO ENGINEERING

This STEM course is a basic introduction to engineering for all students. Students who complete this course will learn the concepts necessary to develop their ideas into solutions that will improve our lives. Exciting hands-on learning activities like data comparison of heart rates, rating consumer products, destructive testing and 3D solid modeling apply math, science, history and English content from other courses to create a full STEM literacy experience.

3D SOLID MODELING

Learning 3D design is an interactive process. Students learn best when they can explore the practical applications of the concepts that they learn. This STEM course has many activities and exercises that enable students to put design concepts into practice. Students create their ideas such as artificial heart components, extreme sports equipment, hip replacement parts, robotic arm components, musical instruments and their parts as well as many others. Ideas become reality in this course.

DESIGN FOR MANUFACTURING

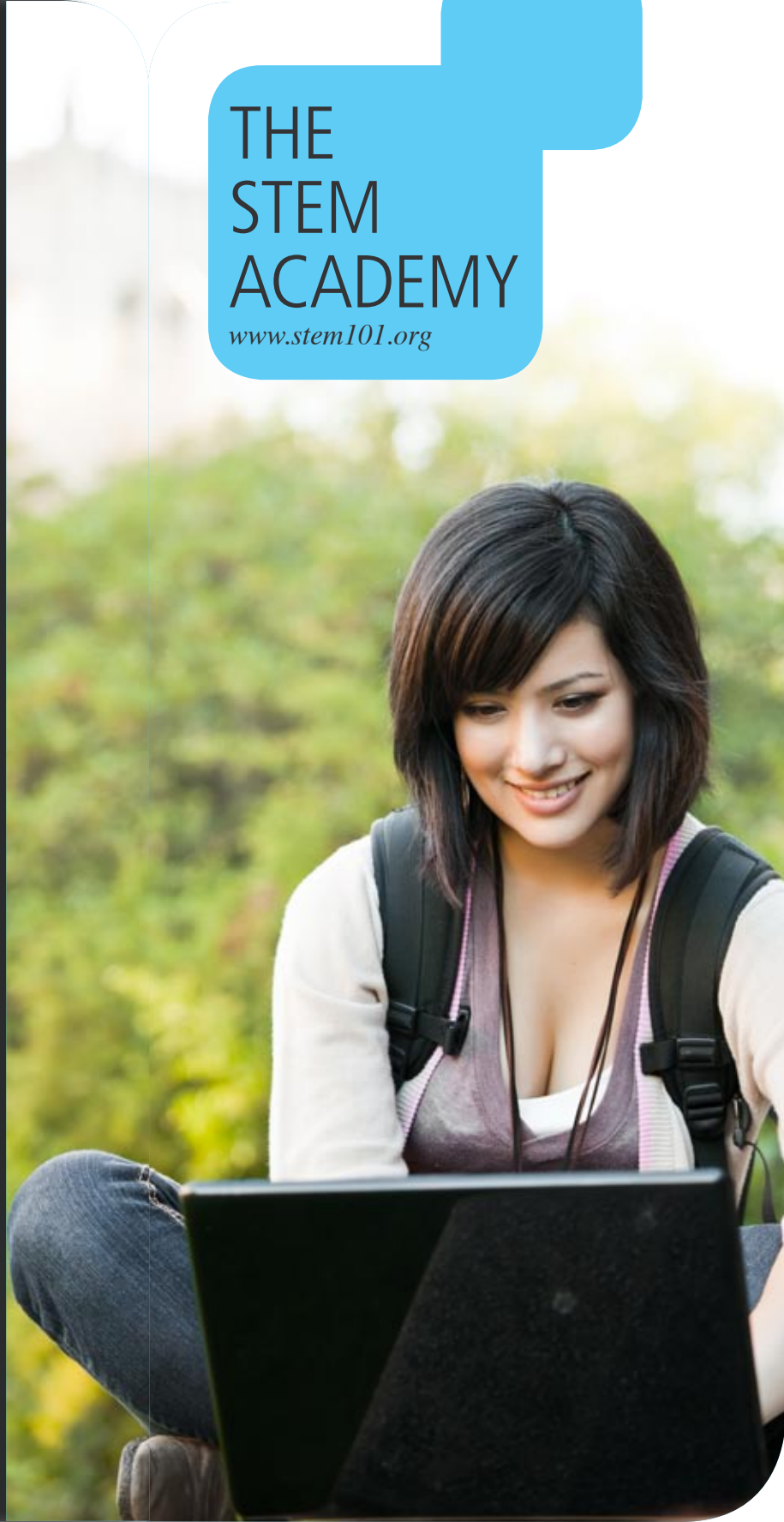
Design for Manufacturing teaches general manufacturing techniques. Calculations and analysis tools are used to design and redesign student's concepts. This course applies and integrates ideas that have been generated in other courses and generates life size models and prototypes. Industry standard software and machinery are used to manufacture student's ideas with verification programs to determine the ability for a plan to be mass produced. Certification will advance students toward continuing education and career opportunities in the fields of engineering, design and machine operation.


PRINCIPLES OF ENGINEERING

This STEM course makes a contribution to the curriculum by providing opportunities for students and teachers to link content together and apply it to solve problems. More and more jobs demand advanced skills, requiring that people be able to learn, reason, think creatively, make decisions, and solve problems. An understanding of science, technology, engineering and math and their methods contribute in an essential way to these skills. Principles of engineering is a team based advanced course designed for most students. Students who complete this course will engage in real world case studies and learning activities that focus on the engineering process and making the world a better place to live and work in.

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ARCHITECTURE FEATURING GREEN METHODS

Architecture is more than just walls around us. The form and function of the spaces we live and work in are at the heart of how any design comes to life. This course will investigate how the structure is designed and build as well as the layout of spaces between the walls. Students will be introduced to a variety of concepts including green building and sustainable design in architecture. Students will apply the concepts introduced to a 'dream home' that they design and model.

SUSTAINABLE METHODS

This course is a general introduction to sustainability and renewable energy. Often as individuals we do not understand the impact of simple choices we make every day. This course will attempt to offer insight into these and other decisions we make. Major topics in this STEM based course are food, shelter, water, air, energy, waste, transportation and consumerism. Also included will be a study of the 101 things we all need to know. The investigation of these topics will be at the global, national, local and personal levels.

ENGINEERING TECHNOLOGY

Students build skills for success through, research, experiments, and challenges that incorporate science, technology, engineering, and math (STEM) concepts. Engineering Technology introduces students to a variety of different technologies. They gain experience with using measurement tools and instruments, and perform experiments with electrical circuits, mechanical and fluid systems.

GENERAL FABRICATION METHODS

This course is a general introduction to fabrication practices that every student should know and be able to do. Procedures and projects in this course are simple and easy to do for all students. The methods that will be introduced will be applicable to advanced courses in the STEM academy, and everyday home living. Students will become familiar with general tools and building methods that they can utilize when they construct working prototypes and models. Several simple projects will be completed by students while they learn new techniques.

MATERIAL SCIENCE

This course appeals to a wide range of students with its unique combination of science, ingenuity, creativity, and exciting hands-on labs. Material Science uses a multidisciplinary approach to science and technology. Students learn about materials, material uses and applications, scientific theories, and practical experiences that prepare them to work in a technologically-rich environment. The basic principles of physics, chemistry and biology are used in the study of materials.

FOUNDATIONS IN BIOTECHNOLOGY

This STEM based course explores the world of biotechnology including the basics of microbiology, bio-processing, generic engineering, and biotechnology careers as well as examining the role of biotechnology in the medical field. Bioengineering and forensics and food biotechnology are also topics students will explore. This course is a hands-on, experiment based experience that will keep students interested with exciting lab based learning.

ENGINEERING PROJECTS IN COMMUNITY SERVICE


EPICS students gain long-term define-design-build-test-deploy-support experience, communication skills, experience on multidisciplinary teams, and leadership and project management skills. They gain an awareness of professional ethics, the role of the customer in engineering design, and the role that engineering can play in the community. Community organizations gain access to technology and expertise that would normally be prohibitively expensive, giving them the potential to improve their quality of service or to provide new services.

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MIDDLE SCHOOL PROGRAM OVERVIEW

Section 4:

Curriculum is based upon national standards and identified best practices to advance STEM literacy for all students. Programming was developed with strategic emphasis on gender, racial and socio-economic concerns. Students establish Engineering Habits of the Mind or an open-ended problem solving capacity which will provide the served community with a STEM literate citizenry. Schools are empowered with a comprehensive STEM pedagogy and a proprietary Learning Management System for continuous improvement planning for students, teachers and administration based upon actionable, research based student outcome data. Following STEM Instructor Orientation Training participants will be welcomed to the National STEM Professional Learning Environment where collaboration and innovative education practices develop organically.

Curriculum is intended for flexible use based upon national best practice implementation and integration strategies and is accessible via internet. Teachers will find themselves at the center of this curriculum delivery with the prescribed activities, resources, and technological tools to capture and retain the inquisitive imagination of the middle school level student. Sound assessment strategies, reference resources, as well as instructional strategies for tools, materials and processes support the STEM curriculum treatment.

PROFESSIONAL DEVELOPMENT

All instructors, career counselors and administrators from the proposed school site will have the opportunity to attend a (4 Day) STEM Orientation Training session. Participants will learn the STEM pedagogy, best practices for curriculum delivery, course sequencing, career pathways and how to manage student outcome data. Instructors who will be leading or participating in delivery of a full academic year course can attending the (4 Day) STEM Instructor Training Boot Camp during the summer at one of our university partner sites or at a STEM Professional Development Center.

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COURSES

DISCOVERING STEM (6)

Discovering STEM curriculum students will be introduced to basic STEM concepts. Students will take part in an activity from each STEM area with two culminating activities that put their STEM skills to the test. Students will enjoy hands on minds on approach to learning about science, technology, engineering, and math. Each activity is designed to give the teacher flexibility of delivery and in material choice.

DESIGNING WITH STEM (7)

Designing with STEM curriculum is packed with all the tools to excite students and instructors alike! Designing with STEM introduces educators and students to the fun and powerful tools of designing and problem solving. The activities and academic applications engage the learner to embrace Science, Math, Engineering, and Technology while they examine each of the integral steps of critical design and problem solving.

INVESTIGATING STEM SKILLS (8)

Investigating STEM Skills curriculum integrates the design skills and introductory STEM ideas from the discovering and designing courses. Investigating STEM Skills was designed with an 18 week semester instructional schedule in mind. The activities are intended to highlight the three primary elements of manufacturing: tools, materials and processes. As always, this guide is intended to be used and customized by educators to meet the specific needs of students within specific instructional settings.

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