



CAT Engineering Academy

Carlos E. Haile Middle School

Middle School Technology and Engineering

2012-2013

## **Introduction**

The purpose of this document is to outline the Technology and Engineering Education program at Carlos E. Haile Middle School which consists of Technology and Engineering. These courses will fulfill the requirements for students who wish to complete the engineering dual enrollment program and attempt to receive an industry certification at the middle school level.

### *Mission*

The mission of the Engineering Technology program at Haile Middle School is to make certain that all students can be technologically literate and work ready through industry themed learning and career related skills.

### *A Three-Year Program*

The Engineering Technology program at Haile Middle School is a three year (quarter system) that focuses on the core concepts of technology through project based learning. National, state and Engineering by Design standards help to guide our students through an exciting educational experience. Students are initially introduced to the engineering design curriculum at the elementary level and are further educated into the concepts of project based engineering once enrolled in the engineering program at Haile Middle School. In completion of all three classes of Engineering Technology, students should have an in depth understanding of the core fundamentals of engineering and also receive an industry certification in SolidWorks.

An additional aspect of the curriculum at Carlos E Haile Middle School is the TSA program. The Technology Student Association is a student run organization that strives to promote technology literacy. Students compete in thirty eight different competitions at the district, state, and national level. The TSA organization aligns missions and themes with state

and national standards. The organization encourages students to develop projects using the engineering design process while promoting work based leadership skills.

### *Phases of the Program*

Engineering students' progress through three phases of the program with sound themes involving career based learning. During the three phases the goal for the engineering students is to develop a sound understanding of the engineering design process with a focus on career related skills. The first phase of the program (Introduction to Technology) builds upon the engineering designs process initiated to most students at the elementary level through work based learning. This phase will provide students with a foundation of knowledge, skills and experiences in leadership, safety, materials, machines and technological processes. Phase II of the program (Exploring Technology) focuses on giving students the opportunity to explore all areas of technology and career related fields, with the goal to comprehend the effects that technology has on everyday life. Phase III (Engineering Technology I) builds on prior content knowledge and students will participate in innovative independent studies within career related fields to technology and manufacturing. Part of semester two will be focused on Solidworks industry certification and students will take the SolidWorks certification exam and their final evidence of learning.

During each phase student will assemble a working online portfolio as a collaboration of learning. The portfolio will involve a foundational display of an understanding of the engineering design process along with a display of career based activities. Students will also include writings on technology topics and a working resume. This tool will not only help connect learning to core classes, but will also be of use for entering high school programs and other job related skills.

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## **Program Requirements**

The purpose of program requirements section of the document is to outline the requirements expected of a student completing the three year program at Haile middle School.

Haile Middle School Technology and Engineering students are selected through a written application process and in the first year completing Innovation Technology 1(860010) must have a core understanding of the engineering design process. Students will demonstrate this knowledge through a series of projects centered on the core concepts of technology and the use of technology products and systems. Students will learn to work effectively in groups to solve problems in a career oriented environment. Students will develop a career oriented online portfolio to illustrate understanding and completion of their work.

Haile Middle School Technology and Engineering students for the 2<sup>nd</sup> year course Innovation Technology 2(860020) must have successfully completed Innovation Technology 1, and hold the ability to understand how technology is used to solve problems in everyday life. Students will demonstrate learning through a continuation of a working portfolio and proficient knowledge of use of technology and machines. Students will exhibit the ability to design and manufacture a product through the use of the design process, and continue to build a portfolio of work molded after the engineering design process.

Haile Middle School Technology and Engineering students for the 3<sup>rd</sup> year Engineering Technology I (8600570) course must have completed course 1 and 2 and have the ability to solve problems through innovative independent studies, while developing a professional working portfolio. Studies will consist of solving complex real world problems through engineering and manufacturing. The SolidWorks industry certification exam will be administered as a final demonstration of learning.

	<b>Course Requirements Course Title</b>	<b>Course Length</b>
8600010	Introduction to Technology	Full Year
8600020	Exploring Technology	Full Year
8600570	Engineering Technology 1	Full Year

### The Curriculum

The purpose of this section is to outline the Engineering courses offered at Carlos E. Haile Middle School and the order in which students are required to take the courses. Each course is outlined along with a course description, prefix, course number, course title, course length.

#### Course Prefix

Introduction to Technology (IT)

Exploring Technology (ET)

Engineering Technology I (ET1)

<b>Introduction to Technology (IT) 8600010</b>		
	The purpose of this course is to give students an introduction to the areas of technology and to introduce students to the design and problem solving processes using manipulative skills while working cooperatively with others in team activities. This hands-on course includes introductory studies in areas of technology. Students will create innovative projects in robotics, Manufacturing, Laser Engraving and CNC Manufacturing.	
6 <sup>th</sup> 7 <sup>th</sup> 8 <sup>th</sup> Grade	Semester/Full Year	

### Exploring Technology (ET) 8600020

	<p>The purpose of this course is to give students an opportunity to explore the areas of technology and associated careers available in technical fields. Students will be given the opportunity to solve technological problems while gaining an understanding of the effects of technology on our everyday lives. Students will engage in advanced projects utilizing a variety of machines and lab mechanisms. Students will participate in career based projects and competitions. Students will create innovative projects in robotics, Manufacturing, Laser Engraving, 3D CAD design and CNC Manufacturing.</p>	
6 <sup>th</sup> 7 <sup>th</sup> 8 <sup>th</sup> Grade	Semester/Full Year	

### Engineering Technology I (ET1) 8600570

	<p>This course provides students with an introduction to the knowledge, human relations, and technological skills found today in technical professions. This course is designed for the student who has taken two years of technology, computer, or graphics design courses. Building on knowledge obtained from year one and two, students will engage in advanced projects utilizing a variety of equipment and software. Students will participate in career based projects and competitions. Students will be introduced to industry certifications and career fields by creating innovative independent study projects in robotics, Manufacturing, Laser Engraving, 3D CAD design and CNC Manufacturing.</p>	
6 <sup>th</sup> 7 <sup>th</sup> 8 <sup>th</sup> Grade	Full Year	

Table 1: Conceptual Framework/Curriculum Vision

Proficiency Number	Proficiency: Program Completers of Initial preparation programs...	Course Prefix and Course Number		
<b>1</b>	demonstrate extensive understanding of prior knowledge.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
<b>2</b>	have a desire to exhibit continuous lifelong learner.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
<b>3</b>	have a clear perceptive of learning environment.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
<b>4</b>	have a clear understanding lesson objective and evaluations.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
<b>5</b>	have a clear knowledge and understanding of selecting appropriate engineering attributes, techniques and practices.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
<b>6</b>	have an understanding of professional responsibility and ethics.	(IT) 8600010	(ET) 8600020	(ET1) 8600570



Table 2: Florida Sunshine State Standards

Proficiency Number	Proficiency: Program Completers of Initial preparation programs...	Course Prefix and Course Number		
		(IT) 8600010	(ET) 8600020	(ET1) 8600570
1	Demonstrate an understanding of the characteristics and scope of technology.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
2	Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
3	Demonstrate an understanding of the cultural, social, economic, and political effects of technology.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
4	Demonstrate an understanding of the effects of technology on the environment.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
5	Demonstrate an understanding of the role of society in the development and use of technology.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
6	Demonstrate an understanding of and be able to select and use energy and power technologies.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
7	Demonstrate an understanding of and be able to select and use information and communications technologies.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
8	Demonstrate an understanding of and be able to select and use transportation technologies.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
9	Demonstrate an understanding of and be able to select and use manufacturing technologies.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
10	Demonstrate an understanding of and be able to select and use construction technologies.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
11	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. Exhibit positive human relations and leadership skills.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
12	Discuss individual interests, aptitudes, and opportunities as they relate to a career.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
13	Demonstrate an application of basic electronic publishing techniques.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
14	Identify, describe and utilize the major types of printing techniques used in print production.	(IT) 8600010	(ET) 8600020	(ET1) 8600570

15	Identify and demonstrate the role of electronic communication.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
16	Identify and demonstrate the role of optical technology.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
17	Identify evolving technologies of Production Systems.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
18	Perform special skills unique to Manufacturing Technology.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
19	Express knowledge of factors that impact Manufacturing Technologies and practices.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
20	Perform special skills unique to Construction Technology.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
21	Express knowledge of factors that impact Construction Technology and practices.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
22	Demonstrate knowledge of the basic principles of aerostatics and aerodynamics.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
23	Identify and demonstrate knowledge of both liquid and solid propellant rocket propulsion systems.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
24	Define and describe the stages and forms of interference in basic satellite communication systems.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
25	Perform special skills unique to power and energy technologies.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
26	Express knowledge of the industries that deal with power and energy technology.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
27	Perform special skills unique to transportation technologies.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
28	Express knowledge of the industries that deal with transportation technology.	(IT) 8600010	(ET) 8600020	(ET1) 8600570
29	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials	(IT) 8600010	(ET) 8600020	(ET1) 8600570
30	Exhibit positive human relations and leadership skills	(IT) 8600010	(ET) 8600020	(ET1) 8600570

31	Perform special skills unique to manufacturing technology	(IT) 8600010	(ET) 8600020	(ET1) 8600570
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### **How the Program Developed is a Redesign of Student Education**

The Engineering by design program at Carlos E. Haile Middle School meets the needs of a diverse student population by offering a variety of technology lessons and modules. The lessons and modules are developed and redesigned with different levels of difficulty to challenge each student’s ability. With project based monitoring, teamwork as an essential ingredient to the program success allows students to learn not only from the teacher, but from each other.

Upon completion of the program students will have gained many valuable experiences that will affect their lives tremendously. Students will have gained the knowledge needed in the Engineering Design Process to be successful in work environments. The redesign of the program will fulfill the learning of a design to manufacturing process. According to Sorby in 1999, students can develop a better understating of space through physically handling a model. A model that is touched and viewed simultaneously on screen stimulates the learning of an object and space around it (Sorby, 1999). Students who complete this program should have a better understanding on the manufacturability objects and engineered parts designed throughout all courses. This process will be a step closer the producing work-ready students solving real world problems, rather than talented button pushers on computers.

For more information, application and project examples please visit the CAT academy website:

<http://hailetsa.manateeschools.net/CAT-ACADEMY-WEBSITE/engineering.html>

## References

Sunshine State Standards: Engineering Technology Career Path, retrieved from:  
[http://www.fldoe.org/workforce/dwdframe/stem\\_cluster\\_frame08.asp](http://www.fldoe.org/workforce/dwdframe/stem_cluster_frame08.asp), 6/20/2012.

Sorby, S.A.(1999). Developing 3-D Spatial visualization skills. *Engineering Design Journal*, 63(2), 21-32