

School of Science, Technology, Engineering & Math (STEM) – Four-Year Plan
Jefferson County Pre-Engineering Academy

Subject	Grade 9	Grade 10	Grade 11	Grade 12	Sample Occupations
English/Language Arts	Choose One: <ul style="list-style-type: none"> ▪ English 9 ▪ Adv English 9 	Choose One: <ul style="list-style-type: none"> ▪ English 10 ▪ Adv English 10 	Choose One: <ul style="list-style-type: none"> ▪ English 11 ▪ Adv English 11 ▪ AP English Lang & Comp 	Choose One: <ul style="list-style-type: none"> ▪ English 12 ▪ Adv English 12 ▪ AP English Lit & Comp 	Aeronautical Engineer Aerospace Engineer Agricultural Engineer Agricultural Technician Application Engineer Architectural Engineer Automotive Engineer Biomedical Engineer Biotechnology Engineer CAD Technician Chemical Engineer Civil Engineer Communications Engineer Computer Engineer Computer Programmer Construction Engineer Electrical Engineer Electronics Technician Geothermal Engineer Industrial Engineer Manufacturing Engineer Manufacturing Technician Marine Engineer Mechanical Engineer Metallurgist Mining Engineer Nuclear Engineer Petroleum Engineer Product/Process Engineer Survey Technician Systems Engineer Transportation Engineer
Math	<ul style="list-style-type: none"> ▪ Algebra I (if not taken in Grade 8) ▪ Advanced Geometry 	Advanced Algebra II with Trigonometry	Advanced Pre-Calculus	AP Calculus AB	
Science	Advanced Biology	Advanced Chemistry	AP Physics I (and Advanced Human Anatomy & Physiology if considering Biomedical Engineering)	AP Physics 2 (or AP Chemistry if considering Chemical Engineering, or AP Biology if considering Biomedical Engineering)	
Social Science	Choose One: <ul style="list-style-type: none"> ▪ World History ▪ Adv World History 	Choose One: <ul style="list-style-type: none"> ▪ US History 10 ▪ AP US History 1 	Choose One: <ul style="list-style-type: none"> ▪ US History 11 ▪ AP US History 2 	<ul style="list-style-type: none"> ▪ Government (1/2 credit) ▪ Economics (1/2 credit) 	
Required Electives	Career Preparedness LIFE PE	Health	NA	NA	
Pathway Courses	Introduction to Engineering Design PLTW	Digital Electronics PLTW	Principles of Engineering PLTW	Engineering Design and Development PLTW	
Additional Courses	AP Computer Science Principles				
College and/or Career Readiness Indicators	Credential: Autodesk Inventor Certified User Dual Enrollment: Jefferson State Community College or Lawson State Community College				
Club Membership	Technology Student Association (TSA)				
Academy Experiences	BEST Robotic Competition, VEX Robotic Competition, Alabama LEAP (Linemen, Engineers and Apprentice Program), Guest Speakers, Public Speaking Activities, Fieldtrips/Tours, Field Experiences, Senior Project				
Membership	This academy is open to students inside and outside the Jefferson County School District. Applications are posted on our school's website in January: http://shadesvalleyhigh.jefcoed.com .				
Coordinators	Mr. Clay Ninas – (205) 379-3300 – cninas@jefcoed.com Mr. David Kwong – (205) 379-3300 – dkwong@jefcoed.com				

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Jefferson County Pre-Engineering Academy

Jefferson County Pre-Engineering Academy students will learn the close relationship of mathematics and science to engineering and technology disciplines. Mathematics and scientific principles are regularly applied throughout the courses in this program. Curricula challenges students by involving practical applications of engineering principles and technological literacy. Students will learn science and mathematics principles applicable to engineering and engineering-related careers. As technology continues its rapid expansion, it is essential to adequately prepare students for engineering-related careers; this goal serves as the primary purpose of this program. The Pre-Engineering Academy classroom and laboratory provide safe and appropriate settings for student exploration and learning. The structured, yet active environment stimulates students' creativity and helps them develop the necessary skills for future employment.

560015 Introduction to Engineering Design PLTW **1 Credit Grade 9**

Introduction to Engineering Design is the entry course for the Jefferson County Pre-Engineering Academy. Students will look at various fields of engineering and study the elements of design related to these fields. Classical skills such as hand-drawn isometric view sketches will be practiced along with orthographic projections of three-dimensional objects. Students will do most of their work using the *Autodesk Inventor* software. Students will be given standard exercises and will also be challenged to create their own designs and inventions. They will learn

communication and documentation skills in reports describing their work. Both individual efforts and team work will be assessed in the grading scheme.

Prerequisite: Acceptance to the Jefferson County Pre-Engineering Academy

Co-requisites: Algebra I/Geometry and Biology

Fee: \$25.00

560017 Digital Electronics PLTW **1 Credit Grade 10**

Digital Electronics is the second course in the Pre-Engineering Academy curriculum. Students will begin with the basics of DC electricity. Experiments will test Ohm and Kirchhoff laws. This is followed by the elements of digital design including Logic Symbols, Boolean algebra and Karnaugh maps. Students will design circuits with *CircuitMaker 2000* software and build them on breadboards. Practice soldering on a small kit will prepare them for the final project in the course which will be to build and test a complete microcontroller (8085). Some experience with machine code is part of this course. Both individual efforts and teamwork will be assessed in the grading scheme.

Prerequisites: Introduction to Engineering Design PLTW

Fee: \$25.00

560016 Principles of Engineering PLTW **1 Credit Grade 11**

Principles of Engineering is a survey course of engineering designed to acquaint juniors at the academy with the training and skills required by

various fields of engineering. Students will interview an engineer in a field of their choice and research the educational requirements for a degree in that field. They will learn communication and documentation skills in technical writing. Lab work will include the design and construction of mechanical and electrical systems with open and closed loop control. Also included in the scope of this course are exercises in moments and static equilibrium, materials testing, flowcharting and machine code, and statistical process control. Both individual efforts and teamwork will be assessed in the grading scheme.

Prerequisite: Digital Electronics PLTW

Fee: \$25.00

560022 Engineering Design & Development PLTW **1 Credit Grade 12**

Engineering Design and Development is the capstone course of the *Project Lead the Way* curriculum. It is designed to make full use of the skills acquired in the preliminary engineering courses. Students will work in teams to design, research, build and test a project. Lab work will include research of technical journals as well as the internet. The project will incorporate fundamentals of mechanics, electricity, electronics, and computer programming. The project will be documented in daily journals and required technical reports. Both individual efforts and teamwork will be assessed in the grading scheme.

Prerequisite: Principles of Engineering PLTW

Fee: \$25.00