Engineering Science (POE) Syllabus
Fall 2020

Instructor: Orlando Montalvo

Phone: 580-5300 Ext 1435

Email: See website

Room: 405

Conference: 5th Block

Tutoring: Tuesday and Thursday (4:15pm- 5:00pm)

Course Description: Through problems that engage and challenge, students explore a broad range of engineering topics, including mechanisms, the strength of structures and materials, and automation. In Engineering Science, a.k.a. Principles of Engineering (POE), students develop skills in problem solving, research, and design while learning strategies for design process documentation, collaboration, and presentation.

Course Information: This is an engineering course and use of algebra- based math is required. The student must have pencils or pens, a scientific calculator, and an engineering notebook.

Course Outline: Instructional days will include: checking/reviewing assignments, quizzes, writing assignments, lecture/ explanation, hand-on activities and individual practice questions.

Textbook and Resources: PLTW website, PLTW PowerPoint presentations, notes, science/technology based videos and documentaries, internet, scientific periodicals, newspapers and other relevant media.

Instructional Procedures and Support: The teacher will be available for tutoring in the afternoon. It is the student's responsibility to ask for help when needed and for making the required transportation arrangements. Retesting will be available in accordance with SISD High School Grading Policies.

Classroom Management Procedures: District Policy Will Be Enforced.

Classroom Expectations: As per district policy major exams/projects/assignments will count for 60% of the student's grade. Labs, quizzes, and home/class work will account for the remaining 40%. All District Pre-AP grading policies apply.

Statement for Academic Dishonesty: Academic integrity is fundamental to the activities and principles of our school. No student shall cheat or copy the work of another. Plagiarism, the use of another person's ideas or writing as one's own without giving credit to the true author, will be considered cheating, and the student will be subject to academic discipline that may include loss of credit for the work in question.

Course Timeline

Unit	Lesson	Activity/Project	Week
Unit 1: Energy and Power	1.1 Mechanisms	1.1.1 Simple Machines Lever, Wheel and Axle, and Pulley	

		1.1.1 Simple Machines Inclined Plane, Wedge, and Screw	
		1.1.2 Simple Machines Practice Problems	
		1.1.3 Gears	
		1.1.4 Pulley Drives and Sprockets	
		1.1.6 Compound Machine Design	
		1.1.0 Professional Interview	
	1.2 Energy Sources	1.2.1 Energy Sources	
		1.2.2 Energy Distribution	
		1.2.3 Electrical Circuits	
		1.2.4 Removed by PLTW	
		1.2.5 Mechanical System Efficiency	
		1.2.6 Maximizing Motor Power	
	1.3 Energy Applications	1.3.1 Solar Hydrogen System	
		1.3.2 Fuel Cell Technology	
		1.3.3 Thermodynamics	
		1.3.4 Renewable Insulation	
	1.4 Design Project: Energy and Power	1.4.1 Renewable Electrical Energy Generation and Distribution	
Unit 2: Materials and Structures	2.1 Statics	2.1.0 Career Field Description	
		2.1.1 Centroids	
		2.1.2 Beam Deflection	
		2.1.3 Free Body Diagrams	
		2.1.4 Calculating Force Vectors	
		2.1.5 Calculating Moments	
		2.1.6 Step-by-Step Truss System	
		2.1.7 Calculating Truss Forces	
		2.1.8 Truss Design	
	2.2 Material properties	2.2.1 Product Analysis	
		2.2.2 Manufacturing Processes	
		2.2.3 Recycling	
	2.3 Material Testing	2.3.1 Stress/Strain Calculations	

		2.3.2 Tensile Testing SIM	
	2.4 Design Problem: Materials and Structures	2.4.1 Structural Design	
Unit 3: Control Systems	3.1 Control Systems	3.1.0 Career Demand, Salary, and Education	
		3.1.1 Inputs and Outputs	
		3.1.2 Basic Outputs Programming	
		3.1.3 Removed by PLTW	
		3.1.4 Removed by PLTW	
		3.1.5 Removed by PLTW	
		3.1.6 Open and Closed Loop System	
		3.1.7 Machine Control Design	
	3.2 Fluid Power	3.2.1 Fluid Power Applications	
		3.2.2 Pneumatic Demonstration	
		3.2.3 Removed by PLTW	
		3.2.4 Hydraulic Demonstration	
		3.2.5 Hydraulic Lift Design	
	3.3 Design Problem: Control Systems	3.3.1 Design Problem	
Unit 4: Statistics and Kinematics	4.1 Statistics	4.1.0 Career Reflection, Abstract, and Presentation	
		4.1.1 Data Exploration	
		4.1.2 Candy Statistics	
	4.2 Kinematics	4.2.1 Self-Propelled Vehicle Design	
		4.2.2 Removed by PLTW	
		4.2.3 Design Problem	