

**Syracuse City School District
Career and Technical Education
Course Syllabus
PTP 100: PTECH Pre-Engineering 100**



Program Overview

Students will develop critical and analytical thinking, troubleshooting and problem solving skills through hands-on activities in this project-based curriculum. Electrical and mechanical concepts and processes are taught and topics include ethics in engineering, technical drawing and cad design, measuring tools, simple machines, failure analysis, and data collection and analysis. Career pathways are explored and skills are enhanced through work-based experiences. The PTECH program offers the opportunity to earn college credits toward Electrical Engineering or Mechanical Technology degrees. Upon completion of PTP 100-300, students will earn 11th grade science credit, and following the successful completion of PTP 100-400, students will be awarded specialized math and 12th grade ELA credits.

Course Description

This course will provide an overview of various aspects of the engineering profession. Students will gain skills in career exploration, learn more about pathways to selected engineering careers and begin to develop foundation skills in professional and ethical responsibilities. Students will learn about practical engineering tools, engineering design and the basics of CAD and CAM, air conditioning and refrigeration. Through various speakers and field trip experiences, they will learn about education and licensing requirements, roles and responsibilities, regulatory agencies and work settings. Students will also begin to learn and apply standard engineering nomenclature within the context of the subjects, and based on instruction and research, they will begin to understand the need for industry regulations and protocols. In addition, they will practice team building, critical thinking skills, oral and written communications.

Course Objectives

- Students will identify and understand the major disciplines in the engineering field and associated pathways to becoming educated and licensed.
- Students will apply math and science concepts to the engineering profession.
- Students will learn basic design processes for application to assigned projects.
- Students will identify ethical and professional roles and responsibilities in the engineering profession.
- Students will learn and apply basic skills in technical drawing and design, CAD and use of practical engineering tools.
- Students will understand the concepts of materials and fabrication in the manufacturing process.
- Students will understand motion and simple machines.
- Students will learn basic concepts of mechanical and electrical engineering.
- Students will apply teamwork, communication skills research practices to assigned projects.

Integrated Academics

N/A

Equipment and Supplies

School will provide:

- Computer hardware and software
- Engineering and drawing tools and measurement instruments.
- Plotter/printer

Student will provide:

- 3-Ring Binder
- Dividers
- Writing utensils – pens and pencils
- Notebook and filler paper

Textbook

TBD

Grading

First and Second Quarter

- 25% Homework, quizzes, etc.
- 25% Tests, reports, projects.
- 25% Technical drawings
- 25% Professionalism

Third and Fourth Quarter

- 20% Homework, quizzes, tests
- 20% Technical writing, projects
- 20% Data analysis application
- 20% Research papers
- 20% Professionalism

Additional Course Policies

TBD

Course Calendar

Quarter	Units of Study
1	<ul style="list-style-type: none">• Introduction to Engineering and Engineering Career Pathways• Roles & Responsibilities of Engineers• Ethics in Engineering
2	<ul style="list-style-type: none">• The Engineering Design Process, Designs and Modeling• Measurement Tools and Techniques• Manufacturing Engineering• Math and Science Connections
3	<ul style="list-style-type: none">• Materials and Fabrications• Mechanical Engineering• Electrical Engineering• Electronics
4	<ul style="list-style-type: none">• Air Conditioning and Refrigeration Characteristics• The Engineering Team• Final Project Presentation

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
PTP-100: Pre-Engineering Level 100



Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
Week 1-2 Introductions and Classroom Procedures	<ul style="list-style-type: none"> Who are you? What do you think this course is about? What procedures and safety practices will be important in this class? What does respect and leadership mean? 	<ul style="list-style-type: none"> Understand and engage in icebreaker and “getting to know you” exercises Explain the rationale for and follow classroom rules and procedures State and apply safety rules and procedures for the class and school Discuss classroom respect and leadership 	<ul style="list-style-type: none"> Students will learn about other students and staff Safety quiz Compliance with procedures Posters with Presentations 	Career Ready Practice CRP1,4	Literacy RST.9-10.1,3 WHST.9-10.4
				Cluster Standards ST3	ELA R.9-10.2,7 W.9-10.2,4,6 SL.9-10.1,4 L.9-10.1
				Pathway Standards	Math
					Science
Week 3-4 Introduction to Technology and Engineering	<ul style="list-style-type: none"> What is the definition of engineering? What are the connections among science, technology, engineering, and mathematics? Can you name early examples of engineering and models of great engineering achievements of the past century? How would you compare major engineering activities? 	<ul style="list-style-type: none"> Define engineering Describe how engineering has affected the world in the past and the present Identify several early examples of engineering Evaluate great engineering achievements of the past century Compare and contrast the major engineering activities 	<ul style="list-style-type: none"> Quiz on engineering terms Research and write papers on engineering achievements of the past Research assignment on benefits of the engineering profession Student developed questions for guest speaker – 21st Century Rubric 	Career Ready Practice CRP2,4,7,11	Literacy RST.9-10.1,2 WHST.9-10.4,7
				Cluster Standards ST4	
				Pathway Standards ST-ET2	ELA W.9-10.1,2,4,6,7 R.9-10.1,2,4,8 L.9-10.1,2,3,4
					Math
					Science HS-ETS1-2 HS-ETS1-3

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
Week 5-7 The Engineering Design Process	<ul style="list-style-type: none"> • What is meant by the engineering design process? • What are the common design process steps? • What are the constraints to engineering design? • How can old products or buildings be updated to include new engineering ideas and achievements? • What is brainstorming? 	<ul style="list-style-type: none"> • Outline and describe the engineering design process • List steps in common design process • Identify engineering problems and opportunities • Describe the rationale for detailed documentation • Discuss design constraints • Identify types of research involved in developing a project • Explain prototyping and rapid prototyping 	<ul style="list-style-type: none"> • Design project presentations. (Rubric) • Quiz, Tests • PBL project 	Career Ready Practice CRP1,2,4,7,8,11,12	Literacy RST.9-10.1,2,7 WHST.9-10.4,7
				Cluster Standards ST1,2,6	
				Pathway Standards ST-ET2,5	ELA R 9-10.1,2,4,7 W 9-10.1,3,6 SL 9-10.1,4 L 9-10.1,3,4
					Math G SRT 5, 6, 8 G-MG-1, 3 G-GMD.4 N-Q.1
Week 8-10 Design and Modeling	<ul style="list-style-type: none"> • Why is sketching an important part of engineering, and what are the different types of lines used in engineering drawings? • How are the most common views, perspectives and drawing types of engineered objects used today? • What are the types and uses of theoretical models? • What are the methods of generating three- 	<ul style="list-style-type: none"> • Identify the sketching skills and techniques used by engineers • Recognize the different types of lines in engineering drawings • Examine the methods of generating three-dimensional models • Generate and describe three dimensional views • Compare and explain the types of theoretical models and their uses 	<ul style="list-style-type: none"> • Students will apply techniques learned to a design project involving sketches, drawings, and prototyping • Quizzes • Project completion and assessment (Rubric) 	Career Ready Practice CRP2,4,8	Literacy RST.9-10.1,2,7 WHST.9-10.4,7
				Cluster Standards ST6	
				Pathway Standards ST-ET1,3,4 ST-SM4	ELA R 9-10.4 W 9-10.1,2,4 SL 9-10.5 L 9-10.1,4,6
					Math G SRT 5, 6, 8 G SRT 5, 6, 8 G-GMD.4 N-Q.1 S-IC.4

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
	dimensional models? • What is the purpose and what are the features of a prototype?				Science HS-ETS1-2 HS-ETS1-3 HS-ETS1-4
Week 11-12 Measurement Tools and Techniques	<ul style="list-style-type: none"> What are standard measuring tools? How are measuring devices used? What is tolerance and how is it checked? What is scaling? 	<ul style="list-style-type: none"> Identify standard measuring tools Demonstrate correct use of tools to measure components Define geometric tolerance Analyze dimensions from a drawing and check components Determine where to locate drawing scale from a print 	<ul style="list-style-type: none"> Application of measurement terminology quiz Assessment on drawing dimensions Performance assessment on use of measuring tools 	Career Ready Practice CRP2,4,8	Literacy RST.9-10.1,2
				Cluster Standards ST4,6	
				Pathway Standards ST-SM1,4	ELA R 9-10.1,2,4,7 W 9-10.2,8 SL 9-10.1 L 9-10.6
					Math G-MG.1,3 N-Q.3 S-IC.4
					Science
Week 13-16 Manufacturing Engineering	<ul style="list-style-type: none"> What is rapid prototyping? What are the four basic types of manufacturing? What is quality control? What is computer-aided manufacturing? What is computer-integrated manufacturing? Why is packaging important to a 	<ul style="list-style-type: none"> Discuss the benefits of rapid prototyping Identify four types of manufacturing systems and explain the benefits of each Explain how quality control in manufacturing has evolved Compare and contrast the roles of computer-aided manufacturing and computer-integrated manufacturing 	<ul style="list-style-type: none"> Terminology quiz Students will complete a packaging challenge Exercise to analyze quality issues in a product 	Career Ready Practice CRP2,4,8,11,12	Literacy RST.9-10.1,2,4
				Cluster Standards MN6 ST1,6	
				Pathway Standards MN-MIR1 MN-PPD1,3,4,5 MN-QA6,7	ELA R 9-10.1,3,4,7 W 9-10.1,8 SL 9-10.1,2 L 9-10.1,6
					Math S-IC.1,4,6

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
	manufacturer?	<ul style="list-style-type: none"> Analyze the role of packaging in the manufacturing process 			Science HS-ETS1-4
Week 17-19 Math and Science Connections	<ul style="list-style-type: none"> Why are math and science important in engineering tasks? How do engineers use mathematics to measure energy savings and construction costs? Do you think that nature and living creatures, even tiny ones like bugs and spiders, can have an impact on engineering design? What types of energy should engineers be able to evaluate? 	<ul style="list-style-type: none"> Explain why math and science are important to the daily tasks of engineers in all disciplines Describe the concept of a normal distribution and two ways in which this concept can be applied in engineering Describe three levels of mathematics used by engineers Discuss how probability and statistics affect the choices applied to engineering designs List applications of geometry and trigonometry in engineering Identify three main physics topics of interest to engineers Describe how engineers work within four fields of science 	<ul style="list-style-type: none"> Written summary to check for understanding Application of learning to a discovery project (Rubric) 	Career Ready Practice CRP1,2,4,8	Literacy RST.9-10.1
				Cluster Standards ST-4	
				Pathway Standards ST-SM1,4	ELA R 9-10.2,4 W 9-10.1,8 SL 9-10.1,2,3,4,5 L 9-10.1,2,4,6
					Math A-CED.4 S-ID.4
Week 20-22 Materials and Fabrications	<ul style="list-style-type: none"> What are the characteristics and classifications of natural and synthetic materials? How do engineers choose materials for a 	<ul style="list-style-type: none"> Identify the characteristics used to classify and group both natural and synthetic materials Evaluate how engineers choose materials for a 	<ul style="list-style-type: none"> Students will assess material types through various testing procedures Terminology Exam 	Career Ready Practice CRP1,2,4,8,12	Literacy RST.9-10.1,3,4 WHST.9-10.2,4
				Cluster Standards MN6 ST1,2,3	

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
	project? • How are the strengths of materials established? • How does the development of new materials affect the techniques used to fabricate various objects and structures?	project • Describe how the strength of a material can be established • Compare and contrast manufacturing and construction • Analyze how fabrication techniques affect the design process	• Team Competition PBL Project	Pathway Standards MN-MIR1 ST-ET1,2	ELA R 9-10.4,7 W 9-10.1,5,7 SL 9-10.1,4 L 9-10.1,2,6 Math A-CED.4 N-Q.1 Science HS-ETS1-2 HS-ETS1-3 HS-PS2-6
Week 23-25 Mechanical Engineering	• What are Newton's laws of motion? • What are the laws of thermodynamics? • What is the difference between hydraulics and pneumatics? • What is a simple machine? • What are the six simple machines? • What are the different types of motion?	• Summarize Newton's three laws of motion • Evaluate the laws of thermodynamics • Compare and contrast hydraulics and pneumatics • Discuss simple machines • Identify five different types of motion. • Analyze the purpose of basic mechanisms	• Task analysis of the engineering steps needed for the development of a selected product (Rubric) • Research a product that uses simple machines, including a description of each machine in reports • Mechanical terminology quiz	Career Ready Practice CRP2,4,8,11	Literacy RST.9-10.1,2 4, 7
				Cluster Standards MN6	ELA R 9-10.1,2,4,5,6 W 9-10.2,4,8 SL 9-10.1,2 L 9-10.1,2,3,6
				Pathway Standards MN-PPD1,3,,5	Math Science HS-PS2-1 HS-PS3-1 HS-PS3-2
Week 26-27 Electrical Engineering	• What is required for licensure of electrical engineers? • How is electricity	• Discuss specialty and licensure options of electrical engineers. • Identify at least four	• Students will construct a simple generator • Electrical	Career Ready Practice CRP1,2,4,6,8,11,12	Literacy RST.9-10.1,2,4, 7

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
	measured and what terms are used in measuring electricity? <ul style="list-style-type: none">How is electricity generated?What is the difference between direct and alternating current?	measurements (and their units of measure) that are critical to electrical and electronics engineers <ul style="list-style-type: none">Describe several ways energy is used to create electricityCompare direct current and alternating current	terminology quiz <ul style="list-style-type: none">Performance test on calculating and measuring volts, ohms, amps	Cluster Standards ST2,5	ELA
				Pathway Standards ST-ET5 ST-SM1,2,3,4	Math A-CED.2,4
					Science HS-PS3-6 HS-PS3-1 HS-PS3-2
Week 28-30 Electronics	What is Electronics Engineering and what are the licensure requirements for electronics engineers? <ul style="list-style-type: none">What is Ohms Law?What type of equipment and components are used in electronics?What is a capacitor?	Discuss electronics engineering, educational and licensure requirements <ul style="list-style-type: none">Explain Ohm’s LawAnalyze the effect of digital electronics and integrated circuitsDescribe the relationship between electrical potential (voltage), rate of flow (current), and resistance in an electric circuit, according to Ohm’s law	Task analysis of the engineering steps needed for the development of a selected product. (Rubric) <ul style="list-style-type: none">Terminology quizAssessment on reading schematic drawings	Career Ready Practice CRP2,4,8,11	Literacy RST.9-10.1,3
				Cluster Standards ST6	ELA R 9-10.1,3,5 W 9-10.2,8 SL 9-10.1,3 L 9-10.1,4,6
				Pathway Standards ST-ET3 ST-SM1,4	Math A-CED.2,4
					Science HS-PS3-6
Week 31-33 Air Conditioning and Refrigeration	What is air-conditioning and refrigeration? <ul style="list-style-type: none">What is latent heat?What is sensible heat?What are conduction, convection and radiation?What is pressure?	Compare and contrast air-conditioning and refrigeration <ul style="list-style-type: none">Explain latent heatExplain sensible heatAnalyze the difference between conduction, convection and radiationExplain pressure and the effects of pressure	Terminology quiz <ul style="list-style-type: none">Lab Practical	Career Ready Practice CRP2,4,8,11	Literacy RST.9-10.1,2,4
				Cluster Standards ST2,6	ELA R 9-10.1,3,5 W 9-10.1,2,6 L 9-10.1,2,4,6
				Pathway Standards ST-ET2,3	Math
					Science HS-PS1-9 HS-PS3-3

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
Week 34-35 The Engineering Team	<ul style="list-style-type: none"> What other professions are involved with engineers? What are the ways in which engineers communicate? Why is communication an integral part of engineering? 	<ul style="list-style-type: none"> Identify the professionals and team members who work with engineers Discuss communication skills engineers must develop to work successfully with others Examine the additional safety, information technology, cultural, and business skills that are important to the engineer's working life Analyze the need to diversify the engineering workforce 	<ul style="list-style-type: none"> Research and present on professional qualities used in the field of engineering 	Career Ready Practice CRP1,2,4,7,11	Literacy RST.9-10.1,2,4,7 WHST.9-10.2,4,7
				Cluster Standards ST5	ELA R 9-10.1,5,6,7 W 9-10.2,4,5,6,7,8 SL 9-10.1,2,4,5 L 9-10.1,2,3,6
				Pathway Standards	Math
					Science HS-ETS1-2 HS-ETS1-3
Week 36-39 Final Class project	<ul style="list-style-type: none"> How can I apply what I know in a final project? 	<ul style="list-style-type: none"> Apply all aspects of the design process to a final project Evaluate peers' projects and provide growth-producing feedback 	<ul style="list-style-type: none"> Final Project with peer and instructor rubrics 	Career Ready Practice CRP1,2,4,8	Literacy RST.9-10.1,2,4,7 WHST.9-10.2,4,7
				Cluster Standards ST2,3,6	ELA R 9-10.1,2,3,7 W 9-10.1-8 SL 9-10.1,2,4,5 L 9-10.1,2,6
				Pathway Standards ST-ET1,2,4,5	Math G-SRT.5,6,8 5G-MG.1,3 G-GMD.4 N-Q.1 S-IC.1,4,6
					Science HS-ETS1-2 HS-ETS1-3
Week 40	<ul style="list-style-type: none"> How can I apply what I know in a final project? 	<ul style="list-style-type: none"> Apply engineering knowledge and principles to 	<ul style="list-style-type: none"> Final Exam 	Career Ready Practice	Literacy RST.9-10.1,2,4

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
Course Wrap- up and Evaluation	<ul style="list-style-type: none">What have I learned?	<ul style="list-style-type: none">a topic as a final project cReview for final exam.		CRP2,4,6,7,8,11	ELA
				Cluster Standards	Math
				Pathway Standards	Science

**Syracuse City School District
Career and Technical Education
Course Syllabus
PTP200: Pre-Engineering: Mechanical/Electrical 200**



Program Overview

Students will develop critical and analytical thinking, troubleshooting and problem solving skills through hands-on activities in this project-based curriculum. Electrical and mechanical concepts and processes are taught and topics include ethics in engineering, technical drawing and cad design, measuring tools, simple machines, failure analysis, and data collection and analysis. Career pathways are explored and skills are enhanced through work-based experiences. The PTECH program offers the opportunity to earn college credits toward Electrical Engineering or Mechanical Technology degrees. Upon completion of PTP 100-300, students will earn 11th grade science credit, and following the successful completion of PTP 100-400, students will be awarded specialized math and 12th grade ELA credits.

Course Description

This course will continue the engineering concepts, practices and projects in the level 100 course and cover various aspects of the engineering profession. Students gain additional knowledge in career exploration, including pathways to selected engineering careers. They will work to further develop skills in professional and ethical responsibilities and behaviors. The course introduces students to technical drawing, the use of practical engineering tools, engineering design, CAD, data collection and analysis methods. Fundamentals of electricity, electrical circuits and input/output devices, as well as drive systems and hydraulics are also covered. Students continue to learn about education and licensing requirements, roles and responsibilities, regulatory agencies and work settings through various speakers and field trip experiences. Students learn and apply standard engineering nomenclature within the context of the subjects and utilize instruction and research for understanding the need for industry regulations and protocols. Research, teamwork, critical thinking and oral/written communication skills will also be expanded.

Course Objectives

- Students will understand and identify the major disciplines in the engineering field and associated pathways to becoming educated and licensed.
- Students will identify ethical and professional roles and responsibilities of the engineering profession.
- Students will apply teamwork, communication skills research practices to assigned projects.
- Students will learn and apply electrical, hydraulic and drive system concepts.
- Students will learn and apply basic skills in technical drawing and design, CAD and use of practical engineering tools.
- Students will learn and apply

- Students will learn and apply data collection and elementary statistics to a variety of designs in both student produced and industry produced projects.

Integrated Academics

N/A

Equipment and Supplies

School will provide:

- Computer hardware and software
- Engineering and drawing tools and measurement instruments.
- Plotter/printer

Student will provide:

- 3-Ring Binder
- Dividers
- Writing utensils – pens and pencils
- Notebook and filler paper

Textbook

TBD

Grading

First and Second Quarter

- 25% Homework and Quizzes
- 25% Tests, Reports/Research Papers
- 25% Technical Drawings and Projects
- 25% Professionalism

Third and Fourth Quarter

- 20% Homework, Quizzes, Tests
- 20% Technical Writing
- 20% Projects
- 20% Data Analysis Application
- 20% Professionalism

Course Calendar

Quarter	Units of Study
1	<ul style="list-style-type: none"> • Introduction to Engineering and Engineering Career Pathways • Roles & Responsibilities of Engineers • Ethics in Engineering
2	<ul style="list-style-type: none"> • Electricity and Electrical Circuits • Drive Systems • Hydraulics
3	<ul style="list-style-type: none"> • Technical Drawing and CAD Design • Use of Practical Measuring Tools • Simple Machines
4	<ul style="list-style-type: none"> • Failure Analysis • Data Collection and Analysis • Final Project Presentations

Syracuse City School District
Career and Technical Education Program
Scope and Sequence

PTP 200: P-TECH Pre-Engineering: Mechanical/Electrical 200



Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
Week 1-2 Introductions and Classroom Procedures	<ul style="list-style-type: none"> Who are you? What do you think this course is about? What procedures and safety practices will be important in this class? What does respect and leadership mean? 	<ul style="list-style-type: none"> Understand and engage in icebreaker and “getting to know you” exercises Explain the rationale for classroom rules and procedures State and apply safety rules and procedures for the class and school Discuss classroom respect and leadership 	<ul style="list-style-type: none"> Students will learn about other students and staff Safety quiz Compliance with safety rules and procedures 	Career Ready Practices CRP2,4,7,10	Literacy RST.9-10.1,2,4 WHST.9-10.2,7,8,9
				Cluster Standards ST4,5	ELA R.9-10.3,5 W.9-10.1 S.9-10.1,3,6 L.9-10.3,4,6
				Pathway Standards ST-ET2	Math Science
Week 3 Roles and Responsibilities of an Engineer	<ul style="list-style-type: none"> What are the roles and responsibilities of engineers? What are the personal attributes of successful engineers? What are the legal/ethical responsibilities for engineers? What does teamwork look like in engineering with U.S. companies? How do U.S. companies manage engineering teams with locations overseas? 	<ul style="list-style-type: none"> Describe the tasks engineers perform Define the duties and obligations of engineers Understand the personal attributes to consider when pursuing an engineering career Explain the concept of teamwork in businesses employing engineers Determine a plan for the management of U.S. based companies with sites abroad 	<ul style="list-style-type: none"> Guest speaker. Rubric Quiz on roles and responsibilities of engineers Group projects illustrating the personal attributes necessary for success in engineering with rationale about why the attributes are important Teamwork problem solving activity: Strategic plan for collaborating with overseas teams Rubric 	Career Ready Practices CRP1,2,4,8,10,12	Literacy RST.9-10.1,2,4 WHST.9-10.2,7,8,9
				Cluster Standards ST1,4,5	ELA R.9-10.1,3,7 W.9-10.1,2,3,6,7,8 SL.9-10.1-5 L.9-10.1,2,4,6
				Pathway Standards ST-ET1,2	
Week 4 Engineering Careers	<ul style="list-style-type: none"> What types of engineering titles exist within the profession? What is the demand for 	<ul style="list-style-type: none"> Describe duties of engineers Understand the responsibilities and duties 	<ul style="list-style-type: none"> Research project and presentations on selected engineering careers 	Career Ready Practices CRP1,2,4,7,10,11	Literacy RST.9-10.1,2,,4,9 WHST.9-10.2,7,8,9
				Cluster Standards ST4,5	

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
	engineers? • What are the duties of an engineer? • How do legal and ethical concerns impact the public? • What professional organizations and memberships are available to engineers?	of engineers • Explain the legal and ethical responsibilities of engineering • Identify the organizations for engineering professionals • Understand the need for policies and regulations for the profession	• Field trip to engineering company • 21 st Century Rubric • Written assessment on roles and responsibilities in the profession • Discussion of legal and ethical responsibilities in engineering-Group Activity Rubric • Discussion of current articles and research in ethics in engineering - Group Activity Rubric	Pathway Standards	ELA R.9-10.1-7 W.9-10.1,2,4-8 SL.9-10.1,2,4-6 L.9-10.1,2,3,4,6 Math Science
Week 5-6 Use of Practical Measuring Tools	• What is the relationship between English and metric linear measurement? • What tools are used for measurements in engineering?	• Convert English to metric linear measurement • Apply metric measurement to design models • Identify measurement tools used in mechanical and electrical engineering	• Hands-on test of use of measuring instruments	Career Ready Practices CRP1,2,4,7,11 Cluster Standards ST2,6 Pathway Standards ST-SM2	Literacy RST.9-10.1,2,3 WHST.9-10.2,4 ELA R.9-10.3,4,6 W.9-10.4 SL.9-10.3 L.9-10.4,6 Math Science
Weeks 7-8: Mechanical / Electrical Engineering	• What is a mechanical/ electrical engineer? • How do engineers impact our daily lives?	• Define mechanical or electrical engineering • Describe the roles and responsibilities of	• Application of engineering terminology (Quiz) • Task analysis of the	Career Ready Practices CRP4 Cluster Standards ST4,5	Literacy RST.9-10.1,2,4 WHST.9-10.2,7,8, 9

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
	<ul style="list-style-type: none"> What are the education and licensing requirements for mechanical/electrical engineers? Where do mechanical engineers work? 	<ul style="list-style-type: none"> mechanical or electrical engineers Explain the education and licensing requirements for mechanical or electrical engineers Understand the career paths for mechanical v engineers Describe the physical settings and/or types of companies that employ mechanical or electrical engineers 	<ul style="list-style-type: none"> engineering steps needed for the development of a selected product Rubric Research paper on mechanical or electrical engineering career paths, education, and degree required Field trip to engineering facility 21st Century Rubric 	Pathway Standards ST-SM3	<div> ELA R.9-10.1-4 W.9-10.1,2,4-8 SL.9-10.1,2,4,6 L.9-10.1,2,4,6 </div> <div> Math </div> <div> Science </div>
Weeks 9-10 Fundamentals of electricity	<ul style="list-style-type: none"> What is Ohm's Law? What is magnetism? What is a resistor and how are resistors measured? What are volts, amps and resistance? What are circuits? What is electricity? Can you name the differences between alternating and direct current? What is engineering notation? 	<ul style="list-style-type: none"> Understand Ohm's Law Identify volts, amps and resistance in electrical theory Understand magnetism as it applies to electrical theory Use a resistor color code chart Define electricity Explain ways in which electricity is generated, transmitted, and used Describe the how AC and DC are different? 	<ul style="list-style-type: none"> Vocabulary of electrical terms assignment Worksheets Summative assessments Performance evaluations Skill sheet assessment Quiz relating to electrical symbols 	Career Ready Practices CRP1,2,4,7,11	Literacy RST.9-10.1,2,4 WHST.9-10.2,7,8,9
				Cluster Standards ST4,5	ELA R.9-10.3,4,7 W.9-10.1,2,4,5 SL.9-10.1 L.9-10.1,2,3,4
				Pathway Standards ST-SM3	Math A-CED.4
					Science HS-PS 3-5 HS-PS 3-6
Weeks 11-12 Electrical Circuit Components	<ul style="list-style-type: none"> What are the basic components of an Electrical circuit? What are the types of power supplies? What is an electrical schematic? 	<ul style="list-style-type: none"> Describe the function of the four basic components of an electrical circuit Describe the operation of two types of power supplies Draw a schematic sing the symbols for circuit components 	<ul style="list-style-type: none"> Electrical terminology quiz Performance quiz on calculating and measuring volts, ohms, amps Troubleshoot a simple circuit 	Career Ready Practices CRP1,2,4	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards ST1	
				Pathway Standards ST-ET2,4	ELA R.9-10.3,4 W.9-10.1,2,4,5 SL.9-10.1,2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
					L.9-10.1-4 Math A-CED.4 Science HS-PS 3-6 HS-ETS 1-2 HS-ETS 1-3
Week 13-14 Input/output Devices	<ul style="list-style-type: none"> What are manual input devices? What is the meaning of NO and NC? Identify three manual input devices? Why do engineers use electrical schematic drawings for manual input devices? 	<ul style="list-style-type: none"> Correctly identify each manual input device Explain the difference between NO and NC Draw an electrical schematic and legend Construct a circuit using input and output device by reading a schematic 	<ul style="list-style-type: none"> Performance task to construct a simple circuit Troubleshoot a simple circuit 	Career Ready Practices CRP2,4,8,11	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards MN6	
				Pathway Standards	ELA R.9-10.3,4 W.9-10.4,8 SL.9-10.3 L.9-10.1-3
					Math A-CED.4 Science HS-PS 3-6 HS-ETS 1-2 HS-ETS 1-3
Week 15 Mechanical Drive Systems	<ul style="list-style-type: none"> What is the function of a mechanical drive? Can you name the methods of rotary mechanical power? Why are safety rules for power transmission equipment important? When do we use Lockout/tagout? What methods are applied to check RPM? 	<ul style="list-style-type: none"> Explain the function of a mechanical drive Identify the mechanical advantage of each drive system Give an example of for each type of drive system Explain and demonstrate a lockout/tagout procedures Name and assemble three types of foundations Use set-up devices 	<ul style="list-style-type: none"> Performance evaluations Application of safety rules practical situations Quiz/test Individual projects: Constructing a functioning simple machine 	Career Ready Practices CRP2,4,8,11	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards ST3 MN6	
				Pathway Standards MN-HSE1	ELA R.9-10.1,3,5 W.9-10.1,2,4-8 SL.9-10.2-4 L.9-10.1-4,6

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
		<ul style="list-style-type: none"> Identify and apply different fasteners in an installation Calculate and verify RPMs 			Math A-CED.4 F-IF.6
					Science HS-PS 3-3 HS-ETS 1-2 HS-ETS 1-3
Week 16 Key Fasteners	<ul style="list-style-type: none"> What are the different types of fasteners? What are keys and keyseats? How are shafts assembled? What are the methods of loading a mechanical drive system? What is mechanical efficiency and how is it calculated? 	<ul style="list-style-type: none"> Identify and apply different types of fasteners Identify and give an example of key Measure and cut a key from stock Assemble a motor coupling 	<ul style="list-style-type: none"> Vocabulary of fasteners terms assignment Lab practicals Worksheets Unit Exam 	Career Ready Practices CRP2,4,8,11	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards ST3 MN6	ELA R.9-10.3,4-6 W.9-10.1,2,8 SL.9-10.3,6 L.9-10.3,4,6
				Pathway Standards MN-HSE1	Math S-IC.4 A-CED.4
					Science HS-PS 3-3
Week 17-18 Power Transmission	<ul style="list-style-type: none"> How are shafts specified and used in machinery and what is the purpose of shaft alignment? What is the function of a bearing and how are they loaded? What are the types and 	<ul style="list-style-type: none"> Explain the function of a shaft and identify shaft sizes from samples Categorize bearings from a sample Install a motor shaft and bearing assembly Recognize where and 	<ul style="list-style-type: none"> Vocabulary assignment Worksheets Unit exam Performance evaluation 	Career Ready Practices CRP2,4,8,11	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards ST3 MN6	ELA R.9-10.1-4 W.9-10.1,2,4,5 SL.9-10.1,3 L.9-10.1-4
				Pathway Standards	

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
	functions of couplings?	when to use a coupling <ul style="list-style-type: none"> • Problem solve shaft alignment and misalignment • Demonstrate the use of measuring devices in shaft alignment 			Math A-CED.4 F-IF.4 A-REI.6 Science HS-ETS 1-2 HS-ETS 1-3
Week 19-20 Spur Gears / Multiple Shaft Drives	<ul style="list-style-type: none"> • How do the three components of a gear drive system function? • How are speed, torque, and ratios calculated? • What is a compound gear system? • How is gear rotation determined? • How is a multiple shaft system aligned? • What is Backlash and how does it determined? 	<ul style="list-style-type: none"> • Describe the three functions of a gear drive system • Calculate pitch, speed, torque, and ratios • Calculate gear pitch, circle and diameters • Define the twelve dimensions of a gear • Describe the features of a gear drive system • Diagnose and correct backlash • Calculate speed and torques in a multiple shaft system • Describe a compound gear system 	<ul style="list-style-type: none"> • Vocabulary assignment • Research project on the application of a gear drive system. (Rubric) • Worksheets • Unit exam • Performance evaluation 	Career Ready Practices CRP2,4,8,11	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards ST3 MN6	ELA R.9-10.1-7 W.9-10.1,2,4-8 SL.9-10.1-5 L.9-10.1-4,6
				Pathway Standards ST-SM1	Math A-REI.1 A-CED.2,4 F-IF.6 F-TF.1 Science HS-PS2-1
Week 21-22 V-Belt and Chain Drives	<ul style="list-style-type: none"> • What are the basic types and components of a Belt and Chain Drive? • How is a Belt size determined? • How might you describe Pitch? • What is tension and deflection? 	<ul style="list-style-type: none"> • Identify belt and chain types • Identify the basic components of a belt or chain drive system • Measure and size V-belt 	<ul style="list-style-type: none"> • Vocabulary of Belt and Chain Drives • Worksheets • Quizzes • Unit Exam • Performance evaluation 	Career Ready Practices CRP 2,4,8,11	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards MN6	
				Pathway Standards ST-SM1	ELA R.9-10.3,4,7 W.9-10.1,4,8 SL.9-10.1,3 L.9-10.1,2,4

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
					Math A-REI.1 A-CED.2,4 F-IF.6 F-TF.1 N-Q.1 Science
Weeks 23-25 Introduction to Technical Drawings	<ul style="list-style-type: none"> What is the terminology of technical drawings? What are isometric, oblique and orthographic drawings and designs? What are basic line conventions? What is the purpose of multi-view drawings? How are geometric shapes used in technical drawings? 	<ul style="list-style-type: none"> List and explain the views of each drawing Define isometric, oblique and orthographic as they apply to technical drawing Explain basic line conventions Understand uses for multi-view drawings Apply basic drawing techniques to project design 	<ul style="list-style-type: none"> Class discussions using terminology in the context of the subject Application of simple drawing techniques to basic projects 	Career Ready Practices CRP2,4,8,11	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards ST 1	ELA R.9-10.1,3,4 W.9-10.1,4,8 SL.9-10.1,2,3 L.9-10.1,4
				Pathway Standards ST-ET 2,4	Math N-Q.1 Science HS-PS3-1
Weeks 26-27 Intro to CAD	<ul style="list-style-type: none"> What is CAD and what makes it different? What are some different types of CAD applications? What is important to consider in using CAD? 	<ul style="list-style-type: none"> Describe essential drawing tools in CAD Apply CAD drawing applications to basic designs Differentiate between CAD and other drawing tools 	<ul style="list-style-type: none"> Quiz on terminology Written critique on pros and cons of CAD Application of CAD software in project design-Rubric 	Career Ready Practices CRP2,4,8,11	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards ST6	ELA R.9-10.1,3,4,5 W.9-10.1,2,4,7 SL.9-10.1,2,3 L.9-10.1,3,4,6
				Pathway Standards ST-ET1	Math N-Q.1 Science HS-PS3-1
Weeks 28-29	<ul style="list-style-type: none"> What is Fluid Power? 	<ul style="list-style-type: none"> Describe Hydraulics 	<ul style="list-style-type: none"> Lesson review sheets 	Career Ready Practices	Literacy RST.9-10.1,2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
Hydraulics	<ul style="list-style-type: none"> Why are hydraulics used? What are Pascal's laws? What is viscosity? 	<ul style="list-style-type: none"> Explain the principles of hydraulics List and explain the components used in a hydraulic system Utilize the principles of Pascal's Laws Explain viscosity 	<ul style="list-style-type: none"> Component identification worksheet 	CRP1,2,4,8,9	WHST.9-10.2,4
				Cluster Standards ST3	
				Pathway Standards	ELA R.9-10.1,3 W.9-10.1,8 SL.9-10.3,6 L.9-10.1,4
					Math A-CED.4 A-REI.1 G-GMD.3,4 G-MG.2,3
Weeks 30-32 Introduction to Problem Solving Failure Analysis	<ul style="list-style-type: none"> What is the importance of problem solving and how do engineers apply problem solving skills? Why is failure analysis important to engineers and what are its impacts in engineering? What is Rapid Root Cause Analysis (RRCA)? How is data analysis applied to failure analysis? 	<ul style="list-style-type: none"> Understand the application of problem solving to the design process Analyze and troubleshoot designs Analyze structural integrity Understand about why structures fail 	<ul style="list-style-type: none"> Technical drawings for bridge project (Rubric) Summary report on bridge project 	Career Ready Practices CRP1,2,4,8	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards	ELA R.9-10.1,3,5 W.9-10.1,4,5 SL.9-10.1,3 L.9-10.1-4,5
				Pathway Standards ST-ET5	Math SIC.1 SID.1.2.4.6 S-CP.1 F-LE.1
					Science HS-ETS1-2 HS-ETS1-3
Weeks 33-34 Simple Machines	<ul style="list-style-type: none"> What are the six classic machines? How are the six machines similar and different? How can I apply what I 	<ul style="list-style-type: none"> Identify the six classic machines and explain their use Distinguish similarities and differences of the six 	<ul style="list-style-type: none"> Group projects: Construct a functioning simple machine-Rubric Written final project 	Career Ready Practices CRP1,2,3,4,8,9	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards ST6	ELA R.9-10.1,3,4-6 W.9-10.1,4,5

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
	know in a final project?	simple machines • Apply collaborative and critical thinking skills to project planning and development • Develop a final project proposal	proposal		SL.9-10.1,4 L.9-10.1,2,4
				Pathway Standards ST-ET2,5	Math G-SRT.6,.8 A-CED.4 Science HS-PS3-3 HS-PS2-1 HS-ETS1-2 HS-ETS1-3
Week 35 Computer Programs	<ul style="list-style-type: none"> What are the common programs used in engineering? How have they improved today's production processes? 	<ul style="list-style-type: none"> Compare and contrast traditional technical drawing and CAD Explain how computer engineering software aids in the production process 	<ul style="list-style-type: none"> Application of engineering software in product design exercises-Rubric 	Career Ready Practices CRP2,4	Literacy RST.9-10.1,2,3,7 WHST.9-10.2,4
				Cluster Standards ST2	
				Pathway Standards ST-ET2,5	ELA R.9-10.3,4 W.9-10.1,2,4 SL.9-10.1,4 L.9-10.1,4
					Math A-CED.1,4 Science HS-ETS1-2 HS-ETS1-3
Week 36 Collecting and Analyzing Data, Statistics	<ul style="list-style-type: none"> What methods of data collection are used in product and production analysis? What is Statistical Process Control (SPC) and how is it used by engineers? How is the data analyzed? 	<ul style="list-style-type: none"> Understand the importance of Statistical Process Control to our society Analyze product data to predict product outcomes Compose product outcomes for sets of data 	<ul style="list-style-type: none"> Written report on root cause of failure through analysis of given problem and data 	Career Ready Practices CRP2,4,8	Literacy RST.9-10.1,2,3 WHST.9-10.2,4
				Cluster Standards	ELA R.9-10.1,3,5 W.9-10.1,4,5 SL.9-10.1,3 L.9-10.1-4,5
				Pathway Standards ST-SM4	Math SIC.1 SID.1.2.4.6 S-CP.1 F-LE.1

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
					Science
Week 37 Ethics	<ul style="list-style-type: none"> What are ethics? What are the ethical obligations of engineers? What are the results of non-ethical practices? 	<ul style="list-style-type: none"> Understand how engineering decision are based on ethical decisions Understand the relationship between ethical decisions and product safety 	<ul style="list-style-type: none"> Research paper on ethical impact of product failures 	Career Ready Practices CRP1,9	Literacy RST.9-10.1,2,3 WHST.9-10.2.8.9
				Cluster Standards ST3	
				Pathway Standards ST-ET6	ELA R.9-10.1,3,4 W.9-10.1,4 S.9-10.1,2 L.9-10.1,3,6
					Math Science HS-ETS1-1
Weeks 38-39 Final Project Presentations	<ul style="list-style-type: none"> How can I apply what I know in a final project? 	<ul style="list-style-type: none"> Apply engineering principles and knowledge to a topic as a final project Evaluate peers projects and provide growth-producing feedback 	<ul style="list-style-type: none"> Final Project with peer and instructor rubrics 	Career Ready Practices CRP1,2,4,7,8,9,11	Literacy RST.9-10.1,2,3 WHST.9-10.2,7,8,9
				Cluster Standards ST6	
				Pathway Standards ST-ET5	ELA R.9-10.1,3,4,6,7 W.9-10.1,4-7,9 SL.9-10.1,2,3,4,5 L.9-10.1,3,4,6
					Math Science HS-ETS1-2 HS-ETS1-3
Week 40 Course Wrap-up and Evaluation	<ul style="list-style-type: none"> How can I apply what I know in a final project? What have I learned? 	<ul style="list-style-type: none"> Apply engineering principles and knowledge to a final project topic Review for final exam 	<ul style="list-style-type: none"> Final Exam 	Career Ready Practices CRP1,2,4,7,8,9,11	Literacy RST.9-10.1,2,3 WHST.9-10.2,7,8,9
				Cluster Standards ST6	

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
				Pathway Standards ST-ET5	ELA R.9-10.3,4 W.9-10.6,9 SL.9-10.1,6 L.9-10.1,3,6
					Math
					Science

**Syracuse City School District
Career and Technical Education Program
Course Syllabus
PTM300: Mechanical Technology 300**



Program Overview

Students will develop critical and analytical thinking, troubleshooting and problem solving skills through hands-on activities in this project-based curriculum. Mechanical concepts and processes are taught and topics include ethics in engineering, technical drawing and cad design, measuring tools, simple machines, failure analysis, and data collection and analysis. Career pathways are explored and skills are enhanced through work-based experiences. The PTECH program offers the opportunity to earn college credits toward a Mechanical Technology degree. Upon completion of PTT100-300, students will earn 11th grade science credit, and following the successful completion of PTT 100-400, students will be awarded specialized math and 12th grade ELA credits.

Course Description

Mechanical Technology is an introduction to basic concepts underlying the computer and its applications in technology and science fields. The focus is on studying the computer for acquiring and presenting information, using spreadsheets to solve problems, collecting and storing data and word processing documents. Topics include: Hardware and software computer concepts, introduction to internet to acquire and share information, introduction to spread sheet applications for solving problems and charting, and using text editors in word processing documents. Introduction to technical presentations, use of application programs for organizing data, and drawing charts and schematics are also covered. Student will develop professional skills along with the application of engineering theory into practice.

Pre-Requisites

PTT100, PTT200 and Regents Math

Course Objectives

Students will:

1. Demonstrate the ability to use Microsoft (MS) Office applications through hands-on activities including the use of the Windows operating system.
2. Build quality reports with MS Word.
3. Analyze technical data with MS Excel.
4. Integrate information from both MS Word and Excel.
5. Prepare PowerPoint presentations.
6. Manipulate flat file data with MS Excel.
7. Produce and deliver MS PowerPoint presentations.

Integrated Academics

11th grade integrated Science Credit

Equipment and Supplies

- **School will provide:** Laptop Computers, and software programs.
- **Student will provide:** Notebook and writing utensils.

Textbook

No Textbook is required

Grading

First and Second Quarter

25%	Assigned Coursework
25%	Lab Projects
25%	Quizzes and Assessments
25%	Professionalism & Participation

Third and Fourth Quarter

20%	Assigned Coursework
20%	Lab Projects
20%	Participation
20%	Quizzes and Assessments
20%	Professionalism

Additional Course Policies

Missed Classes: You are responsible for the activities of each class period. If you know of a conflict ahead of time, you are welcome to submit projects early. If you do not take a test on the scheduled day, contact me for a makeup.

Assignments: All assignments are due at the end of class on the date due. Late assignments receive partial credit.

Academic Dishonesty: Plagiarism and cheating are serious offenses and may be penalized by failure on exam, paper or project.

Course Calendar

Quarter	Units of Study
1	<ul style="list-style-type: none">• Introduction to Engineering and Engineering Career Pathways• Personal & Professional Characteristics in Mechanical Technology• Intro to Basic Computer Applications• Inputting and Modifying Data, Basic Formatting & Formulas• Using Averages, Percent Weighting, and IF statements• Technical Reports & PowerPoint Presentations• Percent Error, Elementary Statistics & Plotting Data Results• Industry Cert Assessment (NOCTI)• Understanding Formulas and Plots in Excel
2	<ul style="list-style-type: none">• Conversion and Calculation• Engineering Lists & Historical Logs• Intermediate Formulas and Mechanical Analysis
3	<ul style="list-style-type: none">• Product Proposals and Marketing• Electrical Plotting and Analysis• Advanced Statistics and Data Analysis in Excel
4	<ul style="list-style-type: none">• Engineering Functions in Excel• Curve Fitting and Plotting in Excel• Tables and Selecting Data for Engineering Calculation• Final Comprehensive Project with Industry Professionals

**Syracuse City School District
Career and Technical Education
Scope and Sequence
PTM300: Mechanical Technology 300**



Time Frame/Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
Week 1 Introduction to Manufacturing Technology	<ul style="list-style-type: none"> Who are you? What are the course expectations? What are the classroom procedures and safety practices? What are the objectives of this course? Can you identify the benefit of this course in a future professional environment? 	<ul style="list-style-type: none"> Communicate & engage in "getting to know you" exercises Understand, explain and follow classroom procedures Identify and explain safety rules and procedures for the class, lab area and school Identify hazards of a manufacturing shop floor Interpret the course syllabus, and identify the course objectives Discuss the application of this course to a professional environment 	<ul style="list-style-type: none"> Participation in "getting to know you" activity Safety quiz Poster and Presentation Student compliance with classroom procedures and safety practices 	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4,9 WHST.11-12.4,6 ELA R.I.3,4,7 L.1,2,4 SL.1,2,4,5
				Cluster Standards ST2,3,4,6	Science
				Pathway Standards ST-SM1,2,4	
Week 2 Unit 2 Personal & Professional Characteristics in Mechanical Technology	<ul style="list-style-type: none"> What is time management? Can you name the professional characteristics necessary for success in the engineering field? How do your habits influence the way you present yourself to others? What habits and 	<ul style="list-style-type: none"> Discussion of personal and professional attributes Reflect and self-assess personal habits and attitudes Develop employability goals appropriate for the profession Student will learn to open the excel program, save, and modify documents. 	<ul style="list-style-type: none"> Class room worksheets. Student discussion Development of a employability profile 	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4,9 WHST.11-12.4,6 ELA RI.1,4,7 W.2,5,6 SL.1,4,5 L.1,2,6
				Cluster Standards ST2,3,4,6	Math

Time Frame/Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
	practices do you need to work on during this course?			Pathway Standards ST-SM1,2,4	Science
Week 3 Unit 3 Introduction to Basic Computer Applications	<ul style="list-style-type: none"> What is the function of Microsoft Excel and Word? How is data analysis useful to the engineering industry? Can you describe connections between process improvement and data statistics? How has excel revolutionized the analysis of engineered data previously completed without computers? 	<ul style="list-style-type: none"> Describe the primary purpose of Microsoft Excel and Word applications Explore menus, tools and functional capabilities of Excel and Word Open, create, and save documents Perform basic formatting Excel and Word 	<ul style="list-style-type: none"> Lab application of basic Excel and Word functions Creation of a basic weekly schedule Creation of a business letter template 	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4,9 WHST.11-12.4,6
				Cluster Standards ST 1,2,3,4,6	ELA L 1,2,3,4,6 SL 1,2,4,5 RI 3,4,7 W 2,4,5,6
				Pathway Standards ST-SM1,2,4	Math S-ID.7
					Science HS-ETS1-4
Week 4 Unit 4 Inputting and Modifying Data, Basic Formatting & Formulas	<ul style="list-style-type: none"> Are you able to describe gross income? How is net pay defined and calculated? How are percentages converted to decimals? How can unit conversion be important to engineers utilizing complex equations in calculations? 	<ul style="list-style-type: none"> Discuss how data analysis affects the choices applied to engineered designs or processes Generate a pay stub table, identify gross vs net pay, utilize basic math calculations, and utilize percentages in excel Create linear equation plots Explore Excel as it applies to data and chart plotting Plot results as a graphical 	<ul style="list-style-type: none"> Students will apply techniques learned within assignments for submittal and feedback Lab: Assigned application projects (Rubric) First Submission to "Office 365 One Note" 	Career Ready Practices CRP 1,2,4,5,6,8,9,11	Literacy RST.11-12.4,9 WHST.11-12.4,6
				Cluster Standards ST1,2,3,4,5,6	ELA L.11-12.1,2,3,4,6 SL.11-12.1,2,4,5 RI.11-12.3,4,7 W.11-12.2,4,5,6
					Math N-Q.1

Time Frame/Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
	<ul style="list-style-type: none"> In what ways does a graphical plot assist data or engineering analysts perform tasks more effectively? 	representation		Pathway Standards ST-SM 1,2,4	Science HS-ETS1-4
Week 5 Unit 5 Using Averages, Percent Weighting, and IF statements	<ul style="list-style-type: none"> How are averages calculated? How can percentages be used to weight grades? What is the purpose or benefit of organized data tables, summary tables, and auto updating formulas? In what ways might an Excel template be useful for engineers who frequently perform similar data analyses? 	<ul style="list-style-type: none"> Create gradebook with formulas for average and weighted final average Utilize IF statements to return a text string from a conditional formula Input information into organized excel spreadsheet Identify and use shortcut keys, Excel tools, ribbon functions Discuss advantages of using templates for analyzing data in daily engineering operations 	<ul style="list-style-type: none"> Project/Lab: Students apply functions and tools (Rubric) Cloud computing submittal of assignment Written summaries of improved efficiency in the use of electronic data analysis 	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4,9 WHST.11-12.4,6 ELA RI.11-12.4,5,7 W.11-12.1,8 SL.11-12.1,3,5 L.11-12.1,2,6
				Cluster Standards ST1,2,3,4,5,6	Science HS-ETS1-2 HS-ETS1-3 HS-ETS1-4
				Pathway Standards ST-SM1,2,4	
Week 6 Unit 6 Technical Reports & PowerPoint Presentations	<ul style="list-style-type: none"> What can we learn from an inspiring engineer of the past? What are important attributes of a good public speaker? Is it possible to save time through advanced skill in Microsoft Office programs? 	<ul style="list-style-type: none"> Demonstrate use of title page templates Create an "auto updating" table of contents, citations, and bibliography in Microsoft Word Create and present a short 3-4 min PowerPoint on selected subject 	<ul style="list-style-type: none"> PowerPoint presentations Student self-assessment with a presentation rubric Technical reports Completed list of sources cited in a bibliography MLA or APA style 	Career Ready Practices CRP1,2,4,5,6,7,8,9,1,12	Literacy RST.11-12.4,9 WHST.11-12.4,6 ELA RI.11-12.1,2,3,5,7 W.11-12.1-8 SL.11-12.1,2,4,5 L.11-12.1,2,3,6
				Cluster Standards ST1,2,3,4,5,6	Math

Time Frame/Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
				Pathway Standards ST-SM1,2,4	Science
Week 7 Unit 7 Percent Error, Elementary Statistics & Plotting Data Results	<ul style="list-style-type: none"> Are you able to define histogram? What is percent error used for? What is the difference between SORT and FILTER in Excel? Why is data analysis important in industry? 	<ul style="list-style-type: none"> Generate simple experimental data Examine error or differences between theoretical and experimental data Utilize Excel to SORT results, generate a scatter plot and a frequency histogram plot 	<ul style="list-style-type: none"> Project/Lab application of Excel functions to assigned documents (Rubric) Vocabulary Quiz 	Career Ready Practices CRP1,2,4,5,6,8,9,11,12	Literacy RST.11-12.4,9 WHST.11-12.4,6
				ELA RI.11-12.1,3,7 W.11-12.1,6,8 SL.11-12.1,3,5 L.11-12.1,2,3,6	
				Math N-Q.3 S-ID.1,2,4,6	
Week 8 Industry Certification Assessment	<ul style="list-style-type: none"> NOCTI Manufacturing Technology Assessment 	<ul style="list-style-type: none"> NOCTI Manufacturing Technology Assessment 	<ul style="list-style-type: none"> Summative Industry Testing 	Cluster Standards ST1,2,3,4,5,6	Science HS-PS3-1 HS-PS3-6
				Pathway Standards ST-SM1,2,4	
				Career Ready Practices CRP2	Literacy RST.11-12.4,9 WHST.11-12.4,6
Weeks 9-10 Unit 8	<ul style="list-style-type: none"> What is Amortization plotting used for? 	<ul style="list-style-type: none"> Understand the variables of an amortization plot and 	<ul style="list-style-type: none"> Project/Lab application of assigned formulas 	ELA RI.11-12.1-4 SL.11-12.2 L.11-12.1,6	
				Math	
Weeks 9-10 Unit 8	<ul style="list-style-type: none"> What is Amortization plotting used for? 	<ul style="list-style-type: none"> Understand the variables of an amortization plot and 	<ul style="list-style-type: none"> Project/Lab application of assigned formulas 	Cluster Standards ST 5,6	Science
				Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4,9 WHST.11-12.4,6

Time Frame/Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
Understanding Formulas and Plots in Excel	<ul style="list-style-type: none"> How could understanding a loan payment schedule be important to manufacturing facilities? When expensive equipment is procured by a company, could they use amortization plotting to finance their purchase? 	<ul style="list-style-type: none"> generate loan payment schedules Assess and analyze data Use and apply math formulas to analyze data tables in excel 	<ul style="list-style-type: none"> and plotting activities (Rubric) Terminology Quiz 		ELA RI.11-12.1,3,4,7 W.11-12.1, 8 SL.11-12.1,2,3 L.11-12.1,3,6
				Cluster Standards ST 1,2,3,4,5,6	Math A-SSE.3 F-IF.6,8 F-BF.1,2
				Pathway Standards ST-SM 1,2,4	Science HS-PS2-1 HS-PS3-5
Week 11-12 Unit 9 Conversions and Calculation	<ul style="list-style-type: none"> How could excel be beneficial as a quick unit conversion calculator? What are common equations that utilize unit conversion? Do people do unit conversion in daily life with time, distance, or money? 	<ul style="list-style-type: none"> Perform fundamental unit conversion and utilize excel for basic multivariable calculations Identify where unit conversion is required or necessary Formulate a plan to convert units using Excel application 	<ul style="list-style-type: none"> Project/Lab in conversions and calculations (Rubric) Word problem and unit conversion assignments 	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4,9 WHST.11-12.4,6 ELA RI.11-12.3,7 W.11-12.4,5 SL.11-12.1,4 L.11-12.1,6
				Cluster Standards ST1,2,3,4,5,6	Math A-CED.4 N-Q1
				Pathway Standards ST-SM1,2,4	Science HS-PS2-1 HS-PS3-5 HS-PS3-6
Week 13-14 Unit 10 Engineering Lists & Historical Logs	<ul style="list-style-type: none"> What is the definition of a List? What is the purpose of an engineering log template? Why would a 	<ul style="list-style-type: none"> Apply key terms and engineering vernacular Create important engineering lists and historical data logs commonly created in 	<ul style="list-style-type: none"> Creation of excel database Project/Lab application of Excel functions and tools (Rubric) Terminology Quiz 	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4,9 WHST.11-12.4,6
				Cluster Standards ST2,4,5,6	ELA RI.11-12.1,3,4,7 W.11-12.2,4,6 SL.11-12.1,2,4,6

Time Frame/Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
	manufacturing facility need an "Approved Vendor List"? • What issues would occur if we design and build a product without a proper "Bill of Materials?" • How could an engineer be more effective in his/her role using a "Lessons Learned Log?"	industry • Pull important information from engineering motor database. • Utilize the FILTER and FREEZE PANES tools in Excel			L.11-12.1,3,6
				Pathway Standards ST-SM1,2,4	Math
					Science HS-ETS 1-3 HS-ETS 1-4
Week 15-18 Unit 11 Intermediate Formulas and Mechanical Analysis in Excel	• What is a spring constant? • Are material selections important to engineers when designing a car suspension? • Can you define oscillation? • What is resonance and how could it be catastrophic to engineering design? • What is a dampening system? • How can civil engineers use calculations in project design to prevent damage from earthquakes?	• Mathematically model spring constant data • Analyze critical information for solution of the model • Understand the differential equation variables provided • Discuss how civil engineers use calculations in project design	• Students will apply intermediate formulas in Excel • Project/Lab with write up and excel plots • Analysis of mechanical data using Excel • Terminology quiz	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4,9 WHST.11-12.4,6
				Cluster Standards ST1,2,4,5,6	ELA RI.11-12.3,4,7 W.11-12.1,2,4,9 S.11-12.1,2,3,4 L.11-12.1,2,6
				Pathway Standards ST-SM1,2,4	Math A-SSE.1
					Science HS-PS2-1
Week 19-20 Unit 12	• What is the fundamental	• Develop rectified wave plot from engineered data	• Terminology Quiz • Rectified Wave plot	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4, 9 WHST.11-12.4, 6

Time Frame/Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
Intermediate Formulas and Electrical Analysis in Excel	difference between AC and DC current • Why do electrical engineers rectify voltage? • What is the “period” of a wave equation? • What is amplitude and how is phase shift defined?	source • Create a lexicon of electrical engineering terminology • Demonstrate competence in data analysis using higher level formulas	activity • Project/Lab with write up and excel plots.		ELA RI.11-12.3,4,7 W.11-12.1,4,8 SL.11-12.1,2,4
					Math A-CED.4 F-TF.5 N-Q.1
				Cluster Standards ST1,2,3,4,5,6	Science HS-PS4-1 HS-PS4-2 HS-PS3-6
				Pathway Standards ST-SM1,2,4	
Week 21-23 Unit 13 Product Proposals and Marketing	• What is included in an engineer's "Career Profile," in addition to a resume? • Why does a company that manufactures engineered products provide customers with a technical product proposal? • How can you distinguish the difference between technical and commercial proposals?	• Support attractiveness to employer recruiting with an all-inclusive career profile • Develop a technical product proposal • Compare the difference between technical and commercial information	• Student presentations of product proposals • Student self-evaluation (rubric) • Development of Career Profiles	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4,9 WHST.11-12.4,6
					ELA RI.11-12.3,4 W.11-12.1,2,4,5 SL.11-12.1-5 L.11-12.1,2,3,6
				Cluster Standards ST1,2,3,4,5,6	Math
				Pathway Standards ST-SM1,2,4	Science HS-ETS 1-3
Week 24-26 Unit 14	• In the International System of Units, what	• Create a saw tooth wave plot in Excel	• Student Projects/Lab exercises (Rubric)	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4,9 WHST.11-12.4,6

Time Frame/Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
Continuing Electrical Plotting and Analysis	<ul style="list-style-type: none"> is a unit of electric charge called? Who is Charles-Augustin de Coulomb what was his contribution to the electrical engineering field? What is Fourier Analysis? 	<ul style="list-style-type: none"> Develop a square wave function with plot in Excel Compare and contrast wave differences Create a short technical report describing work completed Discuss the contributions of Charles Augustin de Coulomb 	<ul style="list-style-type: none"> Fourier Analysis Activity 		ELA RI.11-12.1,3,6,7 W.11-12.1,2,3,6,7 SL.11-12.1-5 L.11-12.1-4,6
				Cluster Standards ST1,2,3,4,5,6	Math F-TF.5
				Pathway Standards ST-SM1,2,4	Science HS-PS3-5
Week 27-30 Unit 15 Advanced Statistics and Data Analysis in Excel	<ul style="list-style-type: none"> What is Regression Analysis used for? What is P Value telling us? What is the difference between overhead (fixed) costs and variable costs? What is a significant indicator? 	<ul style="list-style-type: none"> Model, develop, interpret, and evaluate regression analysis of actual industry data Calculate and predict future electrical consumption in a manufacturing facility 	<ul style="list-style-type: none"> Project/Lab for students to apply understanding of advanced concepts/functions in excel (Rubric) Electrical consumption analysis of a real manufacturing facility with empirical data 	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST11-12.4,9, WHST.11-12.4,6 ELA RI.11-12.1,3,4,7 W.11-12.1,6,8 SL.11-12.1,2,3,5 L.11-12.1,4,6
				Cluster Standards ST1,2,3,4,5,6	Math N-Q.3 S-IC.2 S-ID.1,2,4
				Pathway Standards ST-SM1	Science HS-ETS 1-3 HS-ETS 1-4
Week 31-32 Unit 16 Engineering Functions in Excel	<ul style="list-style-type: none"> What is a Bessel Function? What is the VLOOKUP function used for? How is normalization used in data analysis? 	<ul style="list-style-type: none"> Build tables in Excel utilizing the BESSEL function Perform a vertical lookup of data by searching for a value in the first column of a table and returning the value Develop plots after 	<ul style="list-style-type: none"> Project/Lab with write up and excel plots. (Rubric) 	Career Ready Practice CRP 1,2,4,5,6,8,9,11 Cluster Standards ST1,2,3,4,5,6 Pathway Standards ST-SM1,2,4	Literacy RST.11-12.4,9 WHST.11-12.4,6 ELA RI.11-12.1,3,4 W.11-12.1,8 SL.11-12.1,3,5 L.11-12.1,6

Time Frame/Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
		normalizing data sets			Math S-ID.4 S-CP.1 Science
Week 33 Unit 17 Curve Fitting and Plotting in Excel	<ul style="list-style-type: none"> What is Array Curve Fitting used for? What does a 2nd order polynomial equation look like? What are the slope and y-intercept variables in a linear equation? 	<ul style="list-style-type: none"> Identify the difference between linear and non-linear equations Create a best fit equation for differing order equations Utilize the LINEST function in excel 	<ul style="list-style-type: none"> Project/Lab with write up and excel plots. (Rubric) Applied Engineering Math Assignments 	Career Ready Practice CRP1,2,4,5,6,8,9,11 Cluster Standards ST1,2,3,4,5,6 Pathway Standards ST-SM1,2,4	Literacy RST.11-12.4,9 WHST.11-12.4,6 ELA RI.11-12.4 W.11-12.1,4 SL.11-12.1,3 L.11-12.1,6 Math A-CED.2 F-LE.1,2,5 Science HS-PS3-5
Week 34 Unit 18 Tables and Selecting Data for Engineering Calculation	<ul style="list-style-type: none"> Where do reference tables come from? Why would engineers use reference tables? What information is found on Steam Tables? 	<ul style="list-style-type: none"> Read and pull critical information from reference tables Solve for missing reference information using interpolation Understand and describe the importance of engineering reference tables 	<ul style="list-style-type: none"> Quiz on excel functions Project/Lab skill application (Rubric) Extracting important data from text strings of raw unfiltered data 	Career Ready Practices CRP1,2,4,5,6,8,9,11 Cluster Standards ST1,2,3,4,5,6 Pathway Standards ST-SM1,2,4	Literacy RST.11-12.4,9 WHST.11-12.4,6 ELA RI.11-12.1,3,4,5,6 W.11-12.1,4,6 SL.11-12.1,2 L.11-12.1,4,6 Math N-Q.1 Science HS-PS1-9

Time Frame/Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
Week 35-40 Final Comprehensive Project with Industry Professionals	<ul style="list-style-type: none"> What have we learned about the important Excel tools in this course? Why are technical reports so important in the engineering industry? How have we improved our professionalism and public speaking through the course? 	<ul style="list-style-type: none"> Generate experimental data and examine percent error between theoretical vs experimental data Utilize engineering reference tables, interpolation, and theoretical derivation of engineering equations Calculate results using engineering formulas and variables in Excel Produce a presentation and technical report 	<ul style="list-style-type: none"> Mentor-based project utilizing industry partners for supply of authentic data and analysis requirements Technical research & report documentation Excel data analysis and plotting Completion of a list of professional references, including mentor interview Final PowerPoint presentation to professional panel 	Career Ready Practices CRP1,2,4,5,6,8,9,11	Literacy RST.11-12.4 9 WHST.11-12.4,6
					ELA RL.11-12.1,3,6,7 W.11-12.1,3,4,5,6,7,8 SL.11-12.1,2,4,5,6 L.11-12.1,2,3,6
				Cluster Standards ST1,2,3,4,5,6	Math A-CED.4 N-Q.1,3 S-ID.1,2,4,6
				Pathway Standards ST-SM1,2,4	Science HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4

**Syracuse City School District
Career and Technical Education Program
Course Syllabus
PTM400: Mechanical Technology 400**



Program Overview

Students will develop critical and analytical thinking, troubleshooting and problem solving skills through hands-on activities in this project-based curriculum. Electrical and mechanical concepts and processes are taught and topics include ethics in engineering, technical drawing and cad design, measuring tools, simple machines, failure analysis, and data collection and analysis. Career pathways are explored and skills are enhanced through work-based experiences. The PTECH program offers the opportunity to earn college credits toward Electrical Engineering or Mechanical Technology degrees. Upon completion of PTP 100-300, students will earn 11th grade science credit, and following the successful completion of PTP 100-400, students will be awarded specialized math and 12th grade ELA credits.

Course Description

The Professional Technology and Cooperative Work Experience Program component expands and enhances skills taught throughout the P-TECH program. Students will be assigned mentors and work with specific manufacturing industry professionals who will facilitate growth opportunities according to the needs of mentoring enterprise. Topics include employability, professionalism, teamwork, time management, design theory problem and solving/analysis. Students will develop 21st Century skills with the application of engineering theory in authentic industry environments within the Syracuse Manufacturing field. Students will perform these internship experiences 5 periods per week.

Pre-Requisites

PTP 100, PTP 200, PTP 300

Course Objectives

1. Students will demonstrate professionalism in an industry environment with professionals.
2. Students will analyze technical data and apply engineering theory.
3. Students will prepare PowerPoint presentations.
4. Students will present results in front of a group.
5. Students will produce and deliver a high quality assignments meeting and exceeding expectations of industry mentors.

Integrated Academics

12th Grade integrated ELA Credit

Equipment and Supplies

- **School will provide:** Laptop Computers, and software programs.
- **Student will provide:** Notebook and writing utensils.

Textbook

No Textbook is required

Grading

First and Second Quarter

25%	Assigned Coursework
25%	Mentor Projects
25%	Quizzes and Assessments
25%	Professionalism & Participation

Third and Fourth Quarter

20%	Assigned Coursework.
20%	Mentor Projects
20%	Employability Skills
20%	Quizzes and Assessments
20%	Professionalism

Additional Course Policies

Missed Classes: Students are responsible for the activities of each class period. If you know of a conflict ahead of time, you are welcome to submit projects early. If you do not take a test on the scheduled day, contact me for a makeup.

Assignments: All assignments are due at the end of class on the date due. Late assignments receive partial credit.

Academic Dishonesty: Plagiarism and cheating are serious offenses and may be penalized by failure on exam, paper or project.

Course Calendar

Quarter	Units of Study
1	<ul style="list-style-type: none">• Professionalism & Employability• Mentor Lab Project 1• Safety in the Manufacturing Facility
2	<ul style="list-style-type: none">• NOCTI Certification Assessment• Time Management• Team Presentations
3	<ul style="list-style-type: none">• Cooperative Work Experience with Industry Mentors• Mentor Lab Project 2• Project Solving & Analysis
4	<ul style="list-style-type: none">• Cooperative Work Experience with Industry Mentors• Comprehensive Team Project & Presentation• Mentor Lab Project 3• Design and Decision Theory



Syracuse City School District
Career and Technical Education Program
Scope and Sequence
PTM 400: P-TECH Pre-Engineering: Mechanical 400



Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, ELA
Quarter 1 & 2 Core courses consisting of (College English, Math, College Science, Economics) College Technical course sequence Job Shadow Senior independent project	<ul style="list-style-type: none"> Core courses follow each scope and sequence College technical course follow college sequence time line Why are job shadows important to my success? What are the opportunities available for employment? Student portfolio wrap-up 	<ul style="list-style-type: none"> Core High School and College classes follow course syllabus Compose and present a rational for or against the use of job shadows in the program Students finalize portfolios and prepare for future college or career 	<ul style="list-style-type: none"> Job shadow evaluations will be based on career coaches, business partners and company representative feedback and student reflections Students present portfolios to career coaches, perspective employers and instructors 	Career Ready Practices CRP2,4,7,10	Literacy RST.9-10.1,2,4 WHST.9-10.2,7,8,9
				Cluster Standards ST4,5	ELA R.9-10.3,5 W.9-10.1 S.9-10.1,3,6 L.9-10.3,4,6
				Pathway Standards ST-ET2	Math
Quarter 3 & 4 Core courses consisting of (College English, Math, College Science, Economics) College Technical course sequence Job Shadow College or Career preparation	<ul style="list-style-type: none"> Core courses follow each scope and sequence College technical course follow college sequence time line Where do I go from here? Student focus on technical writing Student will develop an individual culminating project relating to their field of study. 	<ul style="list-style-type: none"> Core High School and College classes follow course syllabus Student develop technical and report writing skills based on their job shadow experiences Develop a comprehensive individual research project. Present project proposal to instructor for approval 	<ul style="list-style-type: none"> Job shadow evaluations will be based on career coaches, business partners and company representative feedback and student reflection Evaluation of student projects based on rubric 	Career Ready Practices CRP2,4,7,10	Literacy RST.9-10.1,2,4 WHST.9-10.2,7,8,9
				Cluster Standards ST4,5	ELA R.9-10.3,5 W.9-10.1 S.9-10.1,3,6 L.9-10.3,4,6
				Pathway Standards ST-ET2	Math Science