

East Penn School District
Secondary Curriculum

A Planned Course Statement
for

Engineering Technology II

Course # 907

Grade(s) 9,10,11,12

Department: Technology Education

Length of Period (mins.) 42

Total Clock Hours: 63

Periods per Cycle: 6

Length of Course (yrs.) 0.5

Type of Offering: required elective

Credit: 0.5

Adopted: 4/23/07

Developed by:

Scott Ramson

Description of Course #907

Course Title: Engineering Technology II

Description: Students will study in greater depth the principles encountered in Engineering Technology I. Problems involving electricity/electronics, structures, materials testing, and robotics may be studied. In addition, students will learn the basics of CNC (Computer Numerical Machining). They will develop programs using the machinist shop language and execute them on CNC Controlled Lathe & Milling machines.

Goals:

- To give students a better understanding of technology.
- To give students an understanding of computer automated manufacturing processes.

Requirements:

- Engineering Technology I

Text:

Teacher created materials

Key to Levels of Achievement (Listed with each learning objective)

Awareness (A):	Students are introduced to concepts, forms, and patterns.
Learning (L):	Students are involved in a sequence of steps and practice activities, which involved further development and allow evaluation of process.
Understanding (U):	Students demonstrate ability to apply acquired concepts and skills to individual assignments and projects on an independent level.
Reinforcement (R):	Students maintain and broaden understanding of concepts and skills to accomplish tasks at a greater level of sophistication.

Unit	Num	Objective	Level	Content	Evaluation	Standard
I. Safety Review	1	Students will learn about personal safety in the Engineering Tech lab.	R	<ul style="list-style-type: none"> • Protective eyewear • Proper dress • Appropriate footwear • Long hair • Jewelry 	<ul style="list-style-type: none"> • Safety quiz • Teacher observation 	3.7A
	2	Students will learn about the safe operation of the tools and machines in the Engineering Tech lab.	R	<ul style="list-style-type: none"> • Safety rules specific to each tool and machine used in the lab 	<ul style="list-style-type: none"> • Ongoing teacher observation 	3.7A
	3	Students will learn how to safely handle hazardous materials.	R	<ul style="list-style-type: none"> • Lecture and discussion of MSDS designations and product labels 	<ul style="list-style-type: none"> • Ongoing teacher observation 	3.7A
	4	Students will learn how to safely handle hazardous and flammable liquids/chemicals.	R	<ul style="list-style-type: none"> • Lecture and discussion of MSDS designations and product labels 	<ul style="list-style-type: none"> • Ongoing teacher observation 	3.7A
	5	Students will learn how to safely work with and around electricity.	R	<ul style="list-style-type: none"> • Lecture and discussion pertaining to electric shock, burns, fire and electrocution 	<ul style="list-style-type: none"> • Ongoing teacher observation 	3.7A
II. Robotics	6	Students will explore a brief history of Robotics.	L	<ul style="list-style-type: none"> • Karel Capek Rossum's Universal Robots • Origin – forced labor • Definition • Characteristics • Properties • Structure 	<ul style="list-style-type: none"> • Quizzes • Worksheets • Lab work 	3.6
	7	Students will learn the different classifications.	L	<ul style="list-style-type: none"> • Manual handling devices • Fixed sequence robot • Variable sequence robot • Playback robot • Numerical control robot • Intelligent robot 	<ul style="list-style-type: none"> • Quizzes • Worksheets • Lab work 	3.6
	8	Students will explore the different uses for robots.	A	<ul style="list-style-type: none"> • Exploration • Industry • Hazardous duty • Maintenance • Fire fighting • Medical 	<ul style="list-style-type: none"> • Quizzes • Worksheets • Lab work 	3.6
	9	Students will design and build	U	<ul style="list-style-type: none"> • Planning/design 	<ul style="list-style-type: none"> • Lab work 	3.6

Unit	Num	Objective	Level	Content	Evaluation	Standard
		their own walking robot.		<ul style="list-style-type: none"> • Sheet metal • Fasteners • Soldering • Wiring • Gear drives • Cams 		3.7 3.8
III. Introduction to Computer-Numerical Control (CNC) Machining	10	Students will be introduced to a history of CNC Machining.	A	<ul style="list-style-type: none"> • NC machines • Tape formats • Punch cards • Binary numbers • Application to industry 	<ul style="list-style-type: none"> • Quizzes/Tests 	3.6
	11	Students will gain an understanding of the current CNC System used today.	L	<ul style="list-style-type: none"> • Types of control systems • Servo mechanisms • Loop Systems • The Cartesian Coordinate System • Positive and negative movement • Positioning Systems • Setting machine origin • Dimensioning 	<ul style="list-style-type: none"> • Quizzes/tests • Worksheets 	3.6
IV. Computer Numerical Control Lathe (CNC Lathe)	12	Students will process planning and tool selection.	L	<ul style="list-style-type: none"> • Tooling for CNC • Tooling for turning operations • Tooling for drilling operations • Tooling for boring operations • Specialized inserted cutter • Speeds & feeds 	<ul style="list-style-type: none"> • Quizzes/tests • Worksheets 	3.6 3.7 3.8
	13	Students will learn Two Axis Programming	L	<ul style="list-style-type: none"> • X-Y Axis identification • Machinist shop language • Programming coordinates • Absolute programming • Incremental programming • Machinist shop language • Word address format • G-codes • M-codes 	<ul style="list-style-type: none"> • Worksheets 	3.6 3.7 3.8
	14	Students will learn Two Axis Machining/CNC Lathe Turning	L	<ul style="list-style-type: none"> • Lathe bed design • Axis movement • Tool holders 	<ul style="list-style-type: none"> • Quizzes/Tests • Worksheets • Project work 	3.6 3.7 3.8

Unit	Num	Objective	Level	Content	Evaluation	Standard
				<ul style="list-style-type: none"> • Tool changing • Spindle speeds • Feed rates • Machine origin • Work coordinates • Turning • Facing • Taper turning • Drilling • Reaming • Threading 		
V. Computer Numerical Control Milling Machine/CNC Mill	15	Students will learn the basics of Process Planning and Tool Selection	L	<ul style="list-style-type: none"> • Tooling for CNC • Tooling for milling operations • Tooling for drilling operations • Tooling for boring operations • Specialized inserted cutters • Speeds & feeds 	<ul style="list-style-type: none"> • Worksheets 	3.6 3.7 3.8
	16	Students will learn Three Axis Programming	L	<ul style="list-style-type: none"> • X-Y-Z Axis Identification • Machinist shop language • Programming coordinates • Absolute programming • Incremental programming • Machinist shop language • Word address format • G-Codes • M-Codes 	<ul style="list-style-type: none"> • Worksheets • Lab work 	3.6 3.8
	17	Students will learn Three Axis Machining/CNC Milling	L	<ul style="list-style-type: none"> • Milling machine design • Axis movements • Tool holders • Tool Changing • Spindle speeds 	<ul style="list-style-type: none"> • Quizzes/Tests • Worksheets • Project work 	3.6 3.8

Unit	Num	Objective	Level	Content	Evaluation	Standard
				<ul style="list-style-type: none"> • Feed rates • Machine origin • Work coordinates • UP milling • Down (climb) milling • Drilling • Reaming • Threading 		