WARREN COUNTY SCHOOL DISTRICT

Planned Instruction

Course Title: Pre Engineering Technology

Course Number: 00904 (am) 00954 (pm)

Suggested Educational Level(s): Grades 10-12

Suggested Periods Per Week: 5 **Length of Period**: 120 minutes

Suggested Length Of Course: 3 Years

Units Of Credit (If Appropriate): 3 per year

Date Written: February 15, 2005 **Date Approved**: May 9, 2005

Date Reviewed: Winter 2004/2005 **Implementation Year**: 2005-2006

Teacher Certification Required: Vocational Instruction - Drafting

Standards Addressed:

English 1.1.11(e,f) 1.2.11(a,b) 1.5.11(f) 1.6.11(a,d,e) 1.8.11(a,b,c)

Math 2.1.11(a) 2.2.11(a,b,d,e) 2.3.11(a,b,c) 2.5.11(b) 2.8.11(n,q) 2.9.11(e,f) 2.10.11(b)

Science & Technology 2.11.11(a,b) 3.1.10(a,b,d) 3.2.10(b,d) 3.7.10(a,b,c,d) 3.7.12(a,b,c,d)

Career Education 13.1.11(b,c,f,g) 13.2.11(a,c,d,e) 13.3.11(e,g)

Relationship to Other Planned Instruction: All industrial arts and vocational programs that include blueprint reading and design.

Prerequisites: Industrial Arts, Applied Math or equivalent

Special Requirements: Up-to-date computer lab,
AutoDesk Inventor Series lease (AutoCAD and Inventor)

Writing Team Members: Daniel K. Passmore

Standards addressed:

1.1.11 Learning to Read Independently

E. Expand a reading vocabulary by identifying and correctly using idioms and words with literal and figurative meanings. Use a dictionary or related reference.

F. Understand the meaning of and apply key vocabulary across the various subject areas.

1.2.11 Reading Critically in All Content Areas

A. Read and understand essential content of informational texts and documents in all academic areas.
B. Use and understand a variety of media and evaluate the quality of material produced.

1.5.11 Quality of Writing

F. Edit writing using the conventions of language.

1.6. Speaking and Listening

A. Listen to others.
D. Contribute to discussions.
E. Participate in small and large group discussions and presentations.

1.8.11 Research

A. Select and refine a topic for research.
B. Locate information using appropriate sources and strategies.
C. Organize, summarize and present the main ideas from research.

2.1.11 Numbers, Number Systems and Number Relationships

A. Use operations (e.g., opposite, reciprocal, absolute value, raising to a power, finding roots, finding logarithms).

2.2.11 Computation and Estimation

A. Develop and use computation concepts, operations and procedures with real numbers in problem-solving situations.
B. Use estimation to solve problems for which an exact answer is not needed.
D. Describe and explain the amount of error that may exist in a computation using estimates.
E. Recognize that the degree of precision needed in calculating a number depends on how the results will be used and the instruments used to generate the measure.

2.3.11 Measurement and Estimation

A. Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
B. Measure and compare angles in degrees and radians.
C. Demonstrate the ability to produce measures with specified levels of precision.

2.5.11 Mathematical Problem Solving and Communication

B. Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.8.11 Algebra and Functions

N. Solve linear, quadratic and exponential equations both symbolically and graphically.
Q. Represent functional relationships in tables, charts and graphs.

2.9.11 Geometry

E. Solve problems involving inscribed and circumscribed polygons.
F. Use the properties of angles, arcs, chords, tangents and secants to solve problems involving circles.

2.10.11 Trigonometry

B. Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.

2.11.11 Concepts of Calculus

A. Determine maximum and minimum values of a function over a specified interval.
B. Interpret maximum and minimum values in problem situations.

3.1.10 Unifying Themes

A. Discriminate among the concepts of systems, subsystems, feedback and control in solving technological problems.
B. Describe concepts of models as a way to predict and understand science and technology.
D. Apply scale as a way of relating concepts and ideas to one another by some measure.

3.1.12 Unifying Themes

A. Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
B. Apply concepts of models as a method to predict and understand science and technology.
D. Analyze scale as a way of relating concepts and ideas to one another by some measure.

3.2.10 Inquiry and Design

B. Apply process knowledge and organize scientific and technological phenomena in varied ways.
D. Identify and apply the technological design process to solve problems.

3.2.12 Inquiry and Design

B. Evaluate experimental information for appropriateness and adherence to relevant science processes.
D. Analyze and use the technological design process to solve problems.

3.7.10 Technological Devices

A. Identify and safely use a variety of tools, basic machines, materials and techniques to solve problems and answer questions.
B. Apply appropriate instruments and apparatus to examine a variety of objects and processes.
C. Apply basic computer operations and concepts.
D. Utilize computer software to solve specific problems.

3.7.12 Technological Devices

A. Apply advanced tools, materials and techniques to answer complex questions.
B. Evaluate appropriate instruments and apparatus to accurately measure materials and processes.
C. Evaluate computer operations and concepts as to their effectiveness to solve specific problems.
D. Evaluate the effectiveness of computer software to solve specific problems.

13.1.11 Career Awareness and Preparation

B. Analyze career options based on personal interests, abilities, aptitudes, achievements, and goals
C. Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
F. Analyze the relationship between career choices and career preparation opportunities (degrees)
G. Assess the implementation of the individualized career plan through the development of a career portfolio.

13.2.11 Career Acquisition (Getting a Job)

A. Apply effective speaking and listing skills used in a job interview
C. Develop and assemble career acquisition documents. (job application, resume)
D. Analyze, revise, and apply an individualized career portfolio to chosen career path
E. Demonstrate essential workplace skills / knowledge such as commitment, dependability, and technology

13.3.11 Career Retention and Advancement

E. Evaluate time management strategies and their application to both personal and work situations.
G. Evaluate the impact of lifelong learning on career retention and advancement.

COURSE DESCRIPTION:

An instructional program that generally prepares individuals to apply technical knowledge and skills as each relates to gathering and translating data or specifications, including basic aspects of planning, preparing, and/or interpreting plans and sketches relating to engineering fields such as mechanical, architectural, structural, civil, pneumatic, marine, electrical / electronic, and topographical. Instruction is designed to provide experiences in drawing and CADD including 3-D, Assemble / Disassemble Animation, and Solid Model Rendering; the use of reproduction materials, equipment, and processes; the preparation of reports and data sheets for writing specifications; the development of plan and process charts indicating dimensions, tolerances, fasteners, joint reinforcements, and engineering data; multiple view assembly and sub-assembly drawings; and the development of models (physical and/or virtual).

Outline of Content Sequence and Recommended Time:

I. DRAFTING/CAD COMPETENCIES YEAR ONE

a.	Computer Aided Drafting	From wk 9
b.	Use of Instruments	04 weeks
c.	Lettering - Measurement - Scales	01 week
d.	Drafting Constructions	12 weeks
e.	Technical Sketching	03 weeks
f.	Shape Descriptions	05 weeks
g.	Constructing Section Views	05 weeks

II. DRAFTING/CAD COMPETENCIES YEAR TWO

a.	Computer-Aided Drafting	Duration
b.	Shape Descriptions	05 weeks
c.	Constructing Section Views	05 weeks
d.	Constructing Auxiliary Views	05 weeks
e.	Revolutions	02 weeks
f.	Size Description	03 weeks
g.	Axonometric Projection	05 weeks
h.	Basic Detail and Assembly	05 weeks

III. DRAFTING/CAD COMPETENCIES YEAR THREE

a.	Computer-Aided Drafting	Duration
b.	Tolerance Dimensioning	04 weeks
c.	Geometric Tolerances	02 weeks
d.	Reproduction and Control	05 weeks
e.	Threads and Fasteners	02 weeks
f.	Keys	01 week
g.	Complex Detail and Assembly	12 weeks
h.	Mechanical Senior Project	05 weeks
	or	
h.	Architectural Senior Project	05 weeks

Specific Educational Objectives to be Taught:

Students in the Pre-Engineering Program will align their projects with ANSI Standards.

The American National Standards Institute (ANSI) is a private, non-profit organization (501(c)3) that administers and coordinates the U.S. voluntary standardization and conformity assessment system.

Comprised of nearly 1,000 businesses, professional societies and trade associations, standards developers, government agencies, and consumer and labor organizations, ANSI represents the diverse interests of more than 120,000 entities and 3.2 million professionals worldwide.

"Machine Vise Project"

1. The students will produce detailed drawings including appropriate views, dimensions, and section views for the Machine Vise Project.
2. The students will complete an assembled 3-D solid model rendering of the vise
3. The students will complete an exploded 3-D assembly of the vise project.

"Reference Material"

1. Using the provided handout, the students will demonstrate their ability of utilizing reference material correctly by receiving 100% on the attached worksheet.

Formative Assessments:

Graded drafting projects, teacher observation, quizzes, tests, writing assignments

Summative Assessments:

First and Second year students - Final Project/Exam (Architectural and/or Mechanical)
Third Year Students – Senior Projects and NOCTI (National Occupational Competency Testing Institute) test

Required/Approved Textbooks and Materials:

Book Title: Hands-On AutoCAD
Publisher: Glencoe
ISBN #: 0-07-861220-9
Copyright: 2005
Date of Adoption: August 29, 2005

Two or More Sample Units:

Unit 1 – Drawing Setup

a. Introduction to Design & Drafting
b. Drawing Media
c. Plotters and Printers
d. Drawing Sheet Specifications
e. Changing a Technical Drawing
f. Drawing Storage
g. Drawing Reproduction
h. Introduction to AutoCAD
i. Working with Drawing Files
j. AutoCAD's Help Files
k. Introduction to Coordinate Systems
l. AutoCAD Drawing Commands
m. Drafting Settings
n. Units of Measure
o. Basic Editing Commands

Unit 8 – Architectural CAD

a. Introduction to Architectural CAD
b. Residential Architectural Styles
c. Basic House Construction
d. Types of Architectural Drawings
e. General Drawing Practices

Unit 14 – Basic 3-D CAD

a. Introduction to 3-D CAD
b. The UCS Command
c. Changing the 3-D Viewport
d. Wireframe Models
e. Surface Models
f. Solid Models
g. Object Display Modes
h. Mass Properties
i. Manipulating 3-D Objects