Warren County School District

PLANNED INSTRUCTION

COURSE DESCRIPTION

Course Title: **Engineering Design and Applications**

Course Number: 00752

Course Description and Prerequisites:
In Engineering Design and Applications students develop critical thinking and problem-solving skills. Engineering and Design Applications integrates the problem-solving method with knowledge of science, mathematics, communications and other disciplines. It provides students with opportunities to research, design, develop, build, test and evaluate solutions to real life problems related to meeting human needs and wants. Content is drawn from bio-related technology information, and physical technologies. Projects beyond course expectations may require a materials fee.

Final Required

Prerequisite: Technological Design and Systems

Suggested Grade Level: 10th – 12th

Length of Course: X One Semester _____Two Semesters _____Other

Units of Credit: ½

PDE *Certification and Staffing Policies and Guidelines (CSPG)* Required Teacher Certification(s) Technology Education CSPG#65

Certification verified by WCSD Human Resources Department:
X Yes ____No

Board Approved Textbooks, Software, Materials:
Title:
Publisher:
ISBN #:
Copyright Date:

Date of WCSD Board Approval:

BOARD APPROVAL:

Date Written: 10/9/06

Date Approved:_____

Implementation Year: 2007-2008

Suggested Supplemental Materials: None

Course Standards

PA Academic Standards:

3.1.10. (A,B,C,D,E) Unifying Themes
3.1.12. (A,B,C,D,E) Unifying Themes
3.2.10. (A,B,D) Inquiry and Design
3.2.12. (A,B,D) Inquiry and Design
3.6.10. (A,B,C) Technology Education
3.6.12. (A,B,C) Technology Education
3.7.10. (A,B,C,D) Technology Devices
3.7.12. (A,B.C,D) Technology Devices
3.8.10. (A,B,C) Science, Technology and Human Endeavors
3.8.12. (A,B,C) Science, Technology and Human Endeavors

WCSD Academic Standards: None

Industry or Other Standards: None

WCSD EXPECTATIONS

WCSD K-12 Expectations for instruction in writing, reading, mathematics and, technology have been developed and revised annually. The teacher will integrate all WCSD Expectations into this planned instruction

SPECIAL EDUCATION AND GIFTED REQUIREMENTS

The teacher shall make appropriate modifications to instruction and assessment based on a student's Individual Education Plan (I.E.P.) or Gifted Individual Education Plan (G.I.E.P.).

SPECIFIC EDUCATIONAL OBJECTIVES/CORRESPONDING STANDARDS AND ELIGIBLE CONTENT WHERE APPLICABLE

3.1.10 (A,B,C,D,E) Unifying Themes x – performance assessed during that semester

	Performance Indicator	1	2	Assessment
A.	Discriminate among the concepts of systems, subsystems, feedback and control in solving technological problems.			Formative Assessments: • Peer Assessment • Quizzes

B.	Describe concepts of models as a way to predict and understand science and technology.			• Teacher Observation Summative Assessment: • Documentation / Portfolio • Project
C.	Apply patterns as repeated processes or recurring elements in science and technology.			
D.	Apply scale as a way of relating concepts and ideas to one another by some measure.			
E.	Describe patterns of change in nature, physical and man made systems.			

3.1.12 (A,B,C,D,E) Unifying Themes

	Performance Indicator	1	2	Assessment
A.	Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.			Formative Assessments: • Peer Assessment • Quizzes • Teacher Observation Summative Assessment: • Documentation / Portfolio • Project
B.	Apply concepts of models as a method to predict and understand science and technology.			
C.	Assess and apply patterns in science and technology.			
D.	Analyze scale as a way of relating concepts and ideas to one another by some measure.			
E.	Evaluate change in nature, physical systems and man made systems.			

3.2.10 (A,B,D) Inquiry and Design

	Performance Indicator	1	2	Assessment
A.	Apply knowledge and understanding about the nature of scientific and technological knowledge.			Formative Assessments: • Peer Assessment • Quizzes • Teacher Observation Summative Assessment: • Documentation / Portfolio • Project
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 (A,B,D) Inquiry and Design

	Performance Indicator	1	2	Assessment
A.	Evaluate the nature of scientific and technological knowledge.			Formative Assessments: • Peer Assessment • Quizzes • Teacher Observation
B.	Evaluate experimental information for appropriateness and adherence to relevant science processes.			

D.	Analyze and use the technological design process to solve problems.			Observation Summative Assessment: • Documentation / Portfolio • Project

3.6.10 (A,B,C) Technology Education

	Performance Indicator	1	2	Assessment
A.	Apply biotechnologies that relate to propagating, growing, maintaining, adapting, treating and converting.			Formative Assessments: • Peer Assessment • Quizzes • Teacher Observation Summative Assessment: • Documentation / Portfolio • Project
B.	Apply knowledge of information technologies of encoding, transmitting, receiving, storing, retrieving and decoding.			
C.	Apply physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems.			

3.6.12 (A,B,C) Technology Education

	Performance Indicator	1	2	Assessment
A.	Analyze biotechnologies that relate to propagating, growing, maintaining, adapting, treating and converting.			Formative Assessments: • Peer Assessment • Quizzes • Teacher Observation Summative Assessment: • Documentation / Portfolio • Project
B.	Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding.			
C.	Analyze physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems.			

3.7.10 (A,B,C,D) Technological Devices

	Performance Indicator	1	2	Assessment
A.	Identify and safely use a variety of tools, basic machines, materials and techniques to solve problems and answer questions.			Formative Assessments: • Peer Assessment • Quizzes • Teacher Observation Summative Assessment:
B.	Apply appropriate instruments and apparatus to examine a variety of objects and processes.			

C.	Apply basic computer operations and concepts.			• Documentation / Portfolio • Project
D.	Utilize computer software to solve specific problems.			

3.7.12 (A,B,C,D) Technological Devices

	Performance Indicator	1	2	Assessment
A.	Apply advanced tools, materials and techniques to answer complex questions.			Formative Assessments: • Peer Assessment • Quizzes • Teacher Observation Summative Assessment: • Documentation / Portfolio • Project
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.			

3.8.10 (A,B,C) Science, Technology and Human Endeavors

	Performance Indicator	1	2	Assessment
A.	Analyze the relationship between societal demands and scientific and technological enterprises.			Formative Assessments: • Peer Assessment • Quizzes • Teacher Observation Summative Assessment: • Documentation / Portfolio • Project
B.	Analyze how human ingenuity and technological resources satisfy specific human needs and improve the quality of life.			
C.	Evaluate possibilities consequences and impacts of scientific and technological solutions.			

3.8.12 (A,B,C) Science, Technology and Human Endeavors

	Performance Indicator	1	2	Assessment
A.	Synthesize and evaluate the interactions and constraints of science and technology on society.			Formative Assessments: • Peer Assessment • Quizzes • Teacher Observation Summative Assessment: • Documentation / Portfolio • Project
B.	Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.			
C.	Evaluate the consequences and impacts of scientific and technological solutions.			

ASSESSMENTS

PSSA Assessment Anchors Addressed: The teacher must be knowledgeable of the PDE Assessment Anchors and/or Eligible Content and incorporate them into this planned instruction. Current assessment anchors can be found at pde@state.pa.us.

Formative Assessments: The teacher will develop and use standards-based assessments throughout the course.

Portfolio Assessment: _X_ Yes ____ No

District-wide Final Examination Required: _X_ Yes ____ No

Course Challenge Assessment:
Written Test(s)
Performance Assessment(s)

REQUIRED COURSE SEQUENCE AND TIMELINE

Content Sequence	Dates
Safety	1 Week
System Models	.5 Week
Engineering Principles	3.25 Weeks
Mechanical Systems	3.25 Weeks
Electrical & Electronic Systems	3.25 Weeks
Design	3 Weeks
Optimization	1.5 Weeks
Technological/Societal	1 Week
Ethical & Legal Responsibilities	.5 Week
Careers in Design and Engineering	.5 Week
Historical Antecedents and Future Trends	.25 Weeks
	Total: 18 Weeks

Objectives:

1. Demonstrate proficiency in identifying and using appropriate modeling techniques.
2. Identify and describe the component parts and operation of technological systems.
3. Differentiate between open loop and closed loop systems through developing, producing, using and assessing technological control systems.
4. Identify the laws, principles and phenomena that describe engineering systems and synthesizing working models of engineered systems.
5. Explain and utilize decision making strategies commonly used by engineers including: optimization, break-even analysis and risk assessment.
6. Describe how technology and society interact. Specifically, assess technological impacts in real life contexts and make decisions based upon the assessments.
7. Demonstrate an understanding of the design process that includes: framing design briefs, selecting problem solving strategies, design execution, materials testing, research, prototyping and testing.

WRITING TEAM: Arthur Anderson, Elizabeth Anderson, Patrick Cronmiller, David Krack, Andrew Perlstein, John Victor

WCSD STUDENT DATA SYSTEM INFORMATION

1. Is there a required final examination? _X_ Yes ____ No
2. Does this course issue a mark/grade for the report card?
   _X_ Yes____ No
3. Does this course issue a Pass/Fail mark? ____ Yes _X_ No
4. Is the course mark/grade part of the GPA calculation?
   _X_ Yes ____ No
5. Is the course eligible for Honor Roll calculation? _X_ Yes ____ No
6. What is the academic weight of the course?
   ____ No weight/Non credit _X_ Standard weight
   ____ Enhanced weight (Describe)_____