WARREN COUNTY SCHOOL DISTRICT

Planned Instruction

Course Title: Building Construction Occupations

Course Number: 00903

Suggested Educational Level(s) 10 – 12

Suggested Periods Per Week: 15 (3 PER DAY) **Length of Period**: 40 MIN PER PD.

Suggested Length Of Course: 3 SUCCESSIVE YEARS

Units Of Credit (If Appropriate): 3 PER YEAR/9 TOTAL

Date Written: FEBRUARY 2005 **Date Approved**: June 13, 2005

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

Teacher Certification Required: VOCATIONAL- BUILDING CONSTRUCTION OCCUPATIONS

Standards Addressed (code):
National Association of Home Builders Standards
Career Education and Work: 13.1.11. A,B,C,; 13.3.11 A.
Science and Technology: 3.1.10.B,D; 3.6.10.C; 3.7.10.A,B; 3.8.10.A,B,C.
Math: 2.1.11.A; 2.2.11.A,B,C,D,E; 2.3.11.A,B,C; 2.4.11.A,E; 2.5.11.A,B,C; 2.10.11.B.
Reading, Writing, Speaking, and Listening: 1.2.11, 1.4.11, 1.5.11,

Relationship to Other Planned Instruction:
Woodtech 1A & 1B, Applied Math.

Prerequisites:
Students must be in10th Grade or higher.

Special Requirements
Basic mechanical ability, problem solving, the ability to work with one's hands, and the willingness to work are very important. The student must also be able to pass the safety program with 100% accuracy. Modifications will be made for special needs students

Writing Team Members: Greg Waterman and Mark Lindberg.

Standards addressed:

13.1.11A: Analyze career options based on students interests, abilities, aptitudes, and accomplishments.

13.1.11B: Analyze how the male/female roles relate to career choice.

13.1.11C: Evaluate opportunities for career preparation.

13.3.11A: Analyze work habits needed to advance within a career.

Career Education and Work

13.1.11 Career Awareness and Preparation

A. Analyze career options based on individual interests, abilities, aptitudes, achievements, and goals.
B. Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
C. Evaluate school-based opportunities for career awareness/preparation, such as, but not limited to:
    - Career days
    - Career portfolio
    - Community service
    - Cooperative education
    - Graduation/senior project
    - Internship
    - Job-shadowing
    - Part-time employment
    - Registered apprenticeship
    - School-based enterprise

13.3.11 Career Retention and Advancement

A. Evaluate personal attitudes and work habits that support career retention and advancement.

Science and Technology

3.1.10 Unifying Themes

B. Describe concepts of models as a way to predict and understand science and technology.
    - Distinguish between different types of models and modeling techniques and apply their appropriate use in specific applications (e.g., kinetic gas theory, DNA).
    - Examine the advantages of using models to demonstrate processes and outcomes (e.g., blue print analysis, structural stability).

- Apply mathematical models to science and technology.

D. Apply scale as a way of relating concepts and ideas to one another by some measure.
- Apply dimensional analysis and scale as a ratio.
- Convert one scale to another.

3.6.10 Technology Education

C. Apply physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems.
- Describe and classify common construction by their characteristics and composition.
- Compare and contrast specific construction systems that depend on each other in order to complete a project.
- Evaluate material failure common to specific applications.
- Demonstrate knowledge of various construction systems by building or interpreting models.
- Select and apply the necessary resources to successfully conduct a manufacturing enterprise.
- Apply concepts of design engineering and production engineering in the organization and application of a manufacturing activity.
- Apply the concepts of manufacturing by redesigning an enterprise to improve productivity or reduce or eliminate waste and/or pollution.
- Evaluate the interrelationship of various transportation systems in the community.
- Analyze the impacts that transportation systems have on a community.

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.
- Select and safely apply appropriate tools, materials and processes necessary to solve complex problems.
- Apply advanced tool and equipment manipulation techniques to solve problems.

B. Apply appropriate instruments and apparatus to examine a variety of objects and processes.
- Describe and use appropriate instruments to gather and analyze data.
- Compare and contrast different scientific measurement systems; select the best measurement system for a specific situation.
- Explain the need to estimate measurements within error of various instruments.
- Apply accurate measurement knowledge to solve everyday problems.
- Describe and demonstrate the operation and use of advanced instrumentation in evaluating material and chemical properties (e.g., scanning electron microscope, nuclear magnetic resonance machines).

3.8.10 Science, Technology and Human Endeavors

A. Analyze the relationship between societal demands and scientific and technological enterprises.
- Identify past and current tradeoffs between increased production, environmental harm and social values (e.g., increased energy needs, power plants, automobiles).
- Compare technologies that are applied and accepted differently in various cultures (e.g., factory farming, nuclear power).
- Describe and evaluate social change as a result of technological developments.
- Assess the social impacts of a specific international environmental problem by designing a solution that applies the appropriate technologies and resources.

B. Analyze how human ingenuity and technological resources satisfy specific human needs and improve the quality of life.
- Identify several problem and opportunities that exist in your community, apply various problem-solving methods to design and evaluate possible solutions.
- Analyze a recently invented item, describing the human need that prompted its invention and the current and potential social impacts of the specific invention.
- Apply knowledge of oceanography, meteorology, geology and human anatomy to explain important considerations that need to be made for construction of homes, buildings and businesses in the United States.
- Assess the impacts that agricultural science has had on meeting human needs and improving the quality of life.

C. Evaluate possibilities consequences and impacts of scientific and technological solutions.
- Relate scientific and technological advancements in terms of cause and effect.
- Describe and evaluate the impacts that financial considerations have had on specific scientific and technological applications.
- Compare and contrast potential solutions to technological, social, economic and environmental problems.
- Analyze the impacts on society of accepting or rejecting scientific and technological advances.

<u>Math</u>

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.
C. Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.

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.

2.4.11 Mathematical Reasoning and Connections

A. Use direct proofs, indirect proofs or proof by contradiction to validate conjectures.
E. Demonstrate mathematical solutions to problems (e.g., in the physical sciences).

2.5.11 Mathematical Problem Solving and Communication

A. Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.
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.
C. Present mathematical procedures and results clearly, systematically, succinctly and correctly.

2.10.11 Trigonometry

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

<u>Reading, Writing, Speaking, and Listening</u>

1.2.11 Reading Critically in All Content Areas

A. Read and understand essential content of informational texts and documents in all academic areas.
- Differentiate fact from opinion across a variety of texts by using complete and accurate information, coherent arguments and points of view.
- Distinguish between essential and nonessential information across a variety of sources, identifying the use of proper references or authorities and propaganda techniques where present.
- Use teacher and student established criteria for making decisions and drawing conclusions.

- Evaluate text organization and content to determine the author's purpose and effectiveness according to the author's theses, accuracy, thoroughness, logic and reasoning.

B. Use and understand a variety of media and evaluate the quality of material produced.
- Select appropriate electronic media for research and evaluate the quality of the information received.
- Explain how the techniques used in electronic media modify traditional forms of discourse for different purposes.
- Use, design, and develop a media project to demonstrate understanding (e.g., a major writer or literary period or movement.)

C. Produce work in at least one literary genre that follows the conventions of the genre.

1.4.11 Types of Writing

A. Write short stories, poems and plays.
- **Apply** varying organizational methods.
- Use relevant illustrations.
- Utilize dialogue.
- Apply literary conflict.
- Include varying characteristics (e.g., from limerick to epic, from whimsical to dramatic).
- Include literary elements (Standard 1.3.11B).
- Use literary devices (Standard 1.3.11C).

B. Write complex informational pieces (e.g., research papers, analyses, evaluations, essays).
- Include a variety of methods to develop the main idea.
- Use precise language and specific detail.
- Include cause and effect.
- Use relevant graphics (e.g., maps, charts, graphs, tables, illustrations, photographs).
- Use primary and secondary sources.

C. Write persuasive pieces.
- Include a clearly stated position or opinion.
- Include convincing, elaborated and properly cited evidence.
- Develop reader interest.
- Anticipate and counter reader concerns and arguments.
- Include a variety of methods to advance the argument or position.

D. Maintain a written record of activities, course work, experience, honors and interests.

E. Write a personal resume.

1.5.11 Quality of Writing

A. Write with a sharp, distinct focus.
- Identify topic, task and audience.
- Establish and maintain a single point of view.
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B. Write using well-developed content appropriate for the topic.
    - Gather, determine validity and reliability of, analyze and organize information.
    - Employ the most effective format for purpose and audience.
    - Write fully developed paragraphs that have details and information specific to the topic and relevant to the focus.

C. Write with controlled and/or subtle organization.
    - Sustain a logical order throughout the piece.
    - Include an effective introduction and conclusion.

D. Write with a command of the stylistic aspects of composition.
    - Use different types and lengths of sentences.
    - Use precise language.

E. Revise writing to improve style, word choice, sentence variety and subtlety of meaning after rethinking how questions of purpose, audience and genre have been addressed.

F. Edit writing using the conventions of language.
    - Spell all words correctly.
    - Use capital letters correctly.
    - Punctuate correctly (periods, exclamation points, question marks, commas, quotation marks, apostrophes, colons, semicolons, parentheses, hyphens, brackets, ellipses).
    - Use nouns, pronouns, verbs, adjectives, adverbs, conjunctions, prepositions and interjections properly.
    - Use complete sentences (simple, compound, complex, declarative, interrogative, exclamatory and imperative).

G. Present and/or defend written work for publication when appropriate.

COURSE DESCRIPTION:

The Building Construction Occupations program is designed to develop the knowledge, skills and attitudes necessary to for entry-level employment or further training in the construction field. All instruction is aligned to the industry standards of the National Association of Home Builders.

Students will learn to operate hand and power tools safely, to read blueprints, and to prepare a cost estimate. Basic skills are developed in the areas of carpentry, masonry, electrical wiring, plumbing, and painting. Students experience instruction in these skills during each year of the three-year program. The instructor, who provides hands-on instruction throughout the year, supervises building projects.

Graduates of the Building Construction Occupations program often pursue post-secondary associate degree programs. Advance placement is possible for Tech Prep students through Penn College of Technology in Williamsport, PA. Graduates may also directly enter apprentice programs within the building industry.

Senior students passing the NOTCI exam receive a certificate of advanced credit—depending on performance on the exam. Professional attitudes will be developed through SKILLS USA and class activities.

Course Outline

The following content is addressed each year with more advanced skills expected and performed by 11th and 12th grade students. The content is aligned to the industry standards of the National Association of Home Builders.

I. Safety (3 weeks – ongoing)
   - A. General safety rules
   - B. Shop safety
   - C. Hand tool safety
   - D. Portable power tool safety
   - E. Power equipment safety
   - F. Ladder and scaffolding safety
   - G. OSHA and OSHA requirements

II. Carpentry (18 weeks)
   - A. General safety
   - B. Equipment used by the carpenter
   - C. Wood, wood products, and fasteners
   - D. Blueprints, codes, and building layout
   - E. Concrete for construction
   - F. Floor, wall and ceiling, and roof framing
   - G. Roofing and siding
   - H. Windows and doors
   - I. Insulation and drywall
   - J. Interior and exterior trim
   - K. Stairs
   - L. Cabinet making

III. Residential Wiring (5 weeks)
   - A. General safety
   - B. Tools and equipment for the electrician
   - C. Hardware and material
   - D. Reading mechanical blueprints
   - E. Basic wiring skills and procedures
   - F. Service entrance equipment and installation

IV. Residential Plumbing (5 weeks)
General safety
A. Tools and equipment for the plumber
B. Hardware and material
C. Reading mechanical blueprint
D. Basic plumbing skills and procedures

V. Residential Masonry (5 weeks)
A. General safety
B. Tool and equipment for the mason
C. Hardware and material
D. Reading blueprints
E. Basic masonry skills and procedures

Specific Educational Objectives to be Taught:

The student completing the Building Construction Occupation program will be able to—

1. state and practice general safety rules for operating the tools and equipment utilized in building construction occupations.
2. identify and avoid safety hazards.
3. describe and explain the role of OSHA in building construction
4. identify and use the tools used in the carpentry field.
5. identify and use the materials in the carpentry field.
6. read blueprints and identify codes.
7. identify and use the skills essential to rough and finish carpentry.
8. identify and use the tools of the electrician.
9. identify and use the materials of the electrician.
10. rough-in the electrical system of a residence.
11. trim-out the electrical system of a residence.
12. install and connect system to service panel.
13. identify and use the tools of the plumber.
14. identify and use the materials of the plumber.
15. rough-in the plumbing system of a residence.
16. trim-out the plumbing system of a residence.
17. identify and use the tools of the mason.
18. identify and use the materials of the mason
19. pour a footer.
20. lay block for a foundation wall.
21. lay brick.

Formative Assessments:

Quizzes
Written tests
Skill projects—competency checklists
Teacher observation
Oral teacher-student exchanges

Summative Assessments:

Written exams
Performance assessments
NOTCI (Senior completers)

Required/Approved Textbooks and Materials:

Book Title: ***Residential Construction Academy Series***: **Carpentry**
Residential Construction Academy Series: **House Wiring**
Residential Construction Academy Series: **Plumbing**
Residential Construction Academy Series: **Masonry**
(all four textbooks required)

Publisher: Thomson Delmar Learning
ISBN #: Carpentry: 1-4018-1343-7
House Wiring: 1-4018-1371-2
Plumbing:
Masonry:

Copyright: 2004
Date of Adoption: 2005 (waiting board approval)

Material: All equipment, tools, and materials to complete the above course outline and objectives. Interactive CD-ROMS are necessary for student use.

Safety Component:

Each year is begun with an opening safety unit. Safety rules, shop safety rules, written safety tests, videos, video based tests, teacher demonstration, student demonstration are utilized to instruct and assess safety. In addition, safety is discussed at the beginning of each specific instructional unit.