Glendale Unified School District

Middle School

December 12, 2006

Department: Interdisciplinary

Course Title: Technology Lab

Course Number:

Grade Level: 7-8

Semester Hours: 5

Recommended
Prerequisite: None

Course Description: In this course students will develop technical literacy, the ability to understand, use, and manage system information. The course will integrate academic concepts in mathematics, science, reading, and narrative and persuasive writing. Students will work through sixteen of the modules identified below that examine technologies ranging from computer numerical control to video production. Each module has ten days of learning and fulfils six technical objectives, six academic correlations, and six universal outcomes. Project work engages students in three different types of hands-on challenges: mini-problems, minor projects, and major open-ended design initiatives.

I.   Technological Modules

      A.   Audio Communications -- Media and Design Arts Career Pathway

            1.   Module Objective

                  a.   Define the types of audio communications, the components of recording and radio systems, and the history of radio and early radio pioneers.

                  b.   Describe and define the organization and operation of a radio station, spot advertising, radio/recording functions, and personnel.

c.   Identify and distinguish among AM, FM, analog, and digital signals and the scientific principles that explain the workings of radio.

d.   Create and develop a series of radio "copy" such as, writing news, weather, commercials, and weather information.

e.   Select, develop, and use an appropriate radio format and operate the equipment necessary to produce a show in that format.

f.   Write, develop, plan, produce, and record a pre-recorded demo tape.

2.   Academic Integration

a.   Students master appropriate English-language Arts (ELA) content standards related to aural, written, and electronic media projects and products. (CTE Foundation Standards: 1.0; *Reading 2.1, 2.3, 2.5, 2.6;* ELA Written and Oral English Language Conventions ELA Standards: 1.1; 1.2; 1.3)

3.   Vocational Integration

a.   Students understand telecommunication systems, such as electromagnetic, fiber option, and digital that applies to the transmission of data. (CTE Foundation Standards: Computer Hardware, Electrical, and Networking Engineering Standards: B1.0; B5.0; CTE Media and Design Arts Standards: A1.0; A1.6; A1.7.).

4.   Career Integration

a.   Students will understand the various careers within the technology module.

B.   Computer Aided Drafting

1.   Module Objective

a.   Define the use of CAD as a communication process.

b.   Demonstrate the use of computer skills in the use of a CAD software program.

c.   Create a variety of drawings using a CAD software program.

d.   Identify the uses of CAD within manufacturing, production, and construction technologies.

e.   Apply algebraic and geometric math skills to CAD.

f.   Describe the design process for architectural and mechanical drawing.

      2.   Academic Integration

          a.   Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.3, 2.6; Writing 1.4; 1.6; Written and Oral English Language Conventions: 1.1, 1.2, 1.3; Mathematics Number Sense 1.1, 1.2, 1.3; and Mathematical Reasoning 2.3, 2.5, 2.6, 2.8)

      3.   Vocational Integration

          a.   Students understand uses of computer-aided drafting and design (CADD). (CTE Foundation Standards: Engineering Design C4.0, C5.0, C6.0, C10.0 Architectural and Structural Engineering: A6.0)

      4.   Career Integration

          a.   Students will understand the various careers within the technology module.

   C.   Computer Numerical Control with Mill option

      1.   Module Objective

          a.   Explore and identify the components of computer numerical control systems and their application in industry.

          b.   Use the Cartesian Coordinate and Polar Coordinate measuring system in application.

          c.   Write an original computer numerical control program to manufacture a part.

          d.   Prepare a CNC machine for a manufacturing operation.

          e.   Recognize the use of, and work with the principles of reverse engineering.

          f.   Discriminate and contrast and compare CAD and CAM and their interrelationship.

      2.   Academic Integration

a.   Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.3, 2.6; Writing 1.4, 1.5,2.3; Mathematics Number Sense 1.1, 1.2, 1.3, 1.6; and Mathematical Reasoning 2.2, 2.4, 2.5, 2.6, 2.8, 5.0)

3.   Vocational Integration

    a.   Students understand uses of computer-aided drafting and design (CADD). (CTE Foundation Standards: Computer Aided Drafting; Manufacturing Technology C1.0, C2.0, C7.0; Production Technology; and Materials Processing.)

4.   Career Integration

    a.   Students will understand the various careers involved within the technology module.

D.   Digital Music

1.   Module Objective

    a.   Determine the relationship of computer programming theory and principles to digital music production.

    b.   Develop and apply fundamental musical structure and systematically apply these principles to digital and analog music.

    c.   Distinguish among different forms of digital music and identify equipment used in digital music production.

    d.   Explore the history of musical instruments and audio recording to determine the sources for digital music.

    e.   Appropriately use digital music terminology in the application of a variety of computer applications.

    f.   Arrange and produce a digital music composition.

2.   Academic Integration

    a.   Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.3, 2.5, 2.6; Writing 1.6, 1.7, 1.8, 2.3; Mathematics Reasoning 2.2, 2.3, 3.0; Science 4.d, 4.e, 4.f; and History 1.3, 11.5.6, 11.8.8)

3.   Vocational Integration

a. Students understand how music and technology have evolved. (CTE Foundation Standards; Performing Arts Standards with a career option aural performance B1.2, B2.0, B2.2, B3.0)

        4.   Career Integration

            a.   Students will understand the various careers within the technology module.

   E.   Electricity

        1.   Module Objective

            a.   Develop and describe electrical system and their components.

            b.   Describe the elements and concerns of electrical safety and practice.

            c.   Use and apply electronic graphical symbols used in electrical schematics.

            d.   Demonstrate a working knowledge of the proper use of an electrical multimeter.

            e.   Determine the interrelationship of electricity and magnetism.

            f.   Use Ohm's Law to calculate formulas pertaining to electrical circuits.

        2.   Academic Integration

            a.   Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.3, 2.6; Writing 1.4, 1.5, 2.3; Mathematics Number Sense 1.1, 1.2, 1.3, 1.6; Algebra and Functions 1.1, 2.4; Mathematical Reasoning 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 3.2, 5.0; and Science 5.a, 5.b)

        3.   Vocational Integration

            a.   Students understand uses of electricity in energy and industry sector and engineering and design industry sector. (CTE Foundation Standards: Electrical Installation A1.0, A2.2, A4.1; Energy and Environmental Technology B1.1, B2.3, B4.1)

        4.   Career Integration

        a.   Students will understand the various careers within the technology module.

F.   Energy and Power

    1.   Module Objective

       a.   Identify and characterize the six main forms of energy.

       b.   Perform the conversion of different forms of energy into power.

       c.   List and describe the careers relating to energy and power. Appropriately identify the tools needed to test, disassemble, measure, and reassemble a small engine.

       d.   Describe the relationship of the main system to the components of a small internal combustion engine.

       e.   Determine the efficacy of alternative energy sources.

2.   Academic Integration

       a.   Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.6; Writing 1.4, 1.5, Mathematics Number Sense 1.1, 1.2, 1.3, 1.6; Algebra and Functions 1.1, 3.4; Measurement and Geometry 1.1; Mathematical Reasoning 2.2, 2.4, 2.5, 2.6, 2.7, 2.8, 3.2, 5.0; and Science 5.a)

3.   Vocational Integration

       a.   Students understand principles and uses of energy. (CTE Foundation Standards: Energy and Environmental Technology A1.1, A2.0, A3.0, A4.0; Energy and Environmental Technology B1.0, B2.0, B3.0, B4.0; B1.1, B2.3, B4.1)

4.   Career Integration

       a.   Students will understand the various careers involved within the technology module.

G.   Flight Technology

1.   Module Objective

       a.   Discuss the history and future of rocketry and flight systems.

       b.   Identify and describe the forces that affect rocket flight.

       c.   Identify and describe basic laws and effects of aerodynamics.

d.   Identify and describe factors influencing rocket stability.

e.   Assemble and safely launch a rocket.

f.   Calculate the angle of trajectory, altitude, and azimuth of a rocket.

      2.   Academic Integration.

          a.   Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.3, 2.6; Writing 1.4, 1.5; Written and Oral English Language Conventions 1.4; Listening and Speaking 1.1, 1.3, 1.5, 1.6, 2.2; Mathematics Number Sense 1.1, 1.2, 1.3, 1.6; Algebra and Functions 1.1, 2.4; Measurement and Geometry 1.1; Mathematical Reasoning 2.1, 2.2, 2.3, 2.5, 2.6, 2.7, 2.8, 3.1, 3.2; and Science 3.a)

      3.   Vocational Integration

          a.   Students understand principles of aviation and aerospace technology. (CTE Foundation Standards: Aviation and Aerospace Transportation Services A1.1, A1.3, A1.6, A2.4, A3.1, A3.2, A3.3, A4.5, A4.6)

      4.   Career Integration

          a.   Students will understand the various careers within the technology module.

  H.   Information Technology

      1.   Module Objective

          a.   Identify and describe the components of modern information processing systems in contrast to the past.

          b.   Design and produce a document using word processing software.

          c.   Demonstrate the use of spreadsheet software including programming features.

          d.   Develop a multimedia presentation demonstrating a variety of aspects of movement and animation.

          e.   Use of various research tools to complete a project.

          f.   Develop a personal Web page with multiple features.

      2.   Academic Integration

a. Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.3, 2.6; Writing 1.3, 1.4, 1.5, 1.8, 1.9, 2.3; Written and Oral English Language Conventions 1.1, 1.2, 1.3, 1.4; Mathematics Number Sense 1.1, 1.2; and Mathematical Reasoning 2.3, 2.5)

3. Vocational Integration

a. Students understand the principles and technology to manage information. (CTE Foundation Standards: Information Technology Standards A1.1, A7.1, A7.3, A10.2, 10.5; Media Support and Services B1.1, B1.6)

4. Career Integration

a. Students will understand the various careers within the technology module.

I. Laser Technology

1. Module Objective

a. Identify laser applications for industrial and communications operations, as well as, daily life.

b. Use appropriate safety measures when using a laser in experimental practice.

c. Describe the characteristics of sound transmission using laser technology.

d. Describe the elements of physical properties of light impact laser systems.

e. Describe how fiber optics is used in common and technological application.

f. Develop and apply the physical properties of lenses in laser application.

2. Academic integration

a. Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts.

(CTE Foundation Standards: Reading 2.1, 2.3, 2.6; Writing 1.3, 1.4, 1.5, 2.6; Written and Oral English Language Conventions 1.1, 1.2, 1.3; Mathematics Number Sense 1.1; and Mathematical Reasoning 2.4, 2.5, 2.6)

3.   Vocational Integration

 a.   Students understand principles of energy and electrical engineering. (CTE Foundation Standards: Computer Hardware, Electrical, and Networking Engineering B2.2; and Energy and Utilities D4.5)

4.   Career Integration

a.   Students will understand the various careers within the technology module.

J.   Material Processing

1.   Module Objective

a.   Apply, appropriately use, and enforce safety procedures when using tools and machines.

b.   Determine the most suitable tool for each process in the development of project work and problem solutions.

c.   Identify the characteristics and select the most appropriate materials for use in a variety of projects.

d.   Describe the processes involved in manufacturing a variety of products.

e.   Apply technical vocabulary relating to a variety of material processing operations.

f.   Design and complete the manufacturing of a multi-process and multi-material product.

2.   Academic Integration

a.   Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.6; Writing 1.4, 1.5; 1.6, 2.6; Mathematics Number Sense 1.1; and Mathematical Reasoning 2.5, 2.6)

3.   Vocational Integration

a.   Students understand principles of machine and forming technology. (CTE Foundation Standards: Manufacturing and Product Development C2.1, 2.2, C5.1, C6.2)

4.   Career Integration

        a.   Students will understand the various careers within the technology module.

K.   Mechanisms

    1.   Module Objectives

    a.   Demonstrate a functional open-loop mechanical system and create a mechanical system to produce a given result.

    b.   Use mathematical operations to calculate mechanical advantage.

    c.   Demonstrate how gear ratio affects RPM, conceptualize and apply other work and power.

    d.   Improve the efficiency of mechanical devices and mechanisms by manipulating gear ratios to control speed and RPM rates.

    e.   Utilize levers, pulleys, and friction reduction devices to increase efficiency and decrease a given work load.

    f.   Describe how mechanical systems impact technology and society and increasing humankind's ability to manipulate materials and manufacturing process.

2.   Academic Integration

    a.   Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.6; Writing 1.3, 1.4, 1.5, 2.6; Written and Oral English Language Conventions 1.1, 1.2, 1.3; and Mathematical Reasoning 2.3, 2.4, 2.5)

3.   Vocational Integration

    a.   Students understand principles of machine and forming technology. (CTE Foundation Standard: Machine and Forming Technology Pathway C1.2, 2.2, C6.1)

L.   Research and Development

1.   Module Objectives

    a.   Identify and define specifications and tolerances, and their required use in vehicle design.

    b.   Produces a prototype following the design/development continuum.

    c.   Apply, appropriately use, and enforce safety procedures when using tools and machines.

d. Define, demonstrate, and use in application the laws of aerodynamics and mass in order to maximize vehicle performance.

      e.   Design safety restraint and airbag systems and destructive test for effectiveness.

      f.   Use "crush zone" engineering in a vehicular design program and test for integrity.

2.   Academic Integration

      a.   Language Arts, Mathematics, and Science.

3.   Vocational Integration

      a.   Transportation Technology

4.   Career Integration

      a.   Students will understand the various careers within the technology module.

M.   Robotics

1.   Module Objective

      a.   Identify the characteristics of various types and sizes of robots.

      b.   Describe how artificial intelligence is applied to robotics systems.

      c.   Identify, sketch, and label all major parts of industrial robots.

      d.   Describe the basic components that allow an operator to program robots.

      e.   Compare and contrast robotics applications in medicine, industrial, and entertainment applications.

      f.   Set up and program an interactive robotics station.

2.   Academic Integration

      a.   Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.3; Writing 1.4; Written and Oral English Language Conventions 1.2; Mathematics Number Sense 1.1; and Mathematical Reasoning 2.5, 2.6)

3.   Vocational Integration

a.   Students understand principles of robotics technology. (CTE Foundation Standards: Manufacturing and Product Development C7.3; and Engineering Technology D1.1, D1.2)

4.   Career Integration

a.   Students will understand the various careers within the technology module.

N.   Structure Engineering

1.   Module Objective

a.   Identify and strength test different types of beams and panels used in structures.

b.   Appropriately use handheld cutting tools and safely operate a testing device.

c.   Identify and classify the portion of a structure's frame under tension, torsion, shear, and compression.

d.   Demonstrate, predict, and evaluate the behaviors of loaded structure systems.

e.   Identify, describe, and evaluate the behavior of loaded structural systems.

f.   Describe preparation and requirements for careers related to building structures.

2.   Academic Integration

a.   Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.3; Writing 1.4, 1.7; Written and Oral English Language Conventions 1.4; Mathematics Number Sense 1.1; and Mathematical Reasoning 2.5, 2.6)

3.   Vocational Integration

a.   Students understand principles of structural engineering. (CTE Foundation Standards: Engineering and Heavy Construction B6.2;

Mechanical Construction C6.2; and Architectural and Structural Engineering A4.0, A5.0)

4.   Career Integration

a.   Students will understand the various careers within the technology module.

O.   Virtual Architecture

1.   Module Objective

a.   Identify and appropriately select tools commonly used by architects, designers, and homeowners for designing structures.

b.   Determine suitable replacements for a conventional residential exterior and use a computer program to apply a chosen modification.

c.   Rate and use systems of graphic communication and identify how CAD software fosters a common graphic language.

d.   Create an original 3-D living room, bedroom, or bathroom using the database of objects.

e.   Apply a variety of components of architectural 3-D modeling, visualization, and navigational tools in a problem solving experience.

f.   Identify and describe the preparation and requirements for careers related to architecture and interior design.

2.   Academic Integration

a.   Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts. (CTE Foundation Standards: Reading 2.1, 2.3, 2.6; Writing 1.4; 1.6; Written and Oral English Language Conventions 1.1, 1.2, 1.3; Mathematics Number Sense 1.1, 1.2, 1.3; and Mathematical Reasoning 2.3, 2.5, 2.6, 2.8)

3.   Vocational Integration

a.   Students understand uses of computer-aided drafting and design (CADD).   (CTE Foundation Standards: Architectural and

Structural Engineering A2.3, A2.4, A6.0; Interior Design, Furnishing and Maintenance B3.0)

    4.   Career Integration

        a.   Students will understand the various careers within the technology module.

II.   Assessments

    A.   Assessments are imbedded in each module and include technology-based examinations, performance assessments including mini-problems, minor projects, major open-ended design initiatives, and open-ended questions.

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III.   Topic of Study - Suggested Time Distribution

    A.   Each module has ten days of learning.

IV.   Recommended Materials

    A.   Commercially developed applied technology curriculum.

    B.   Interactive CD-ROM technology delivered via desktop PC and directed through a network server with an Electronic Classroom Management System.

    C.   Hands-on activities, off-line video, text references, experiments, Electronic Daily Journal and module guidebook.