

NEWPORT-MESA UNIFIED SCHOOL DISTRICT Course Description

EXPLORATIONS IN TECHNOLOGY (Elective Course)

Content covered in this course is described in the Course of Study. Based upon student needs, teachers select appropriate materials from the Instructional Materials List. Classroom presentations of course content are determined by the instructor and described under Teacher Activities. A more detailed outline of this course can be obtained from the instructor.

Overview:

This course is designed to prepare the student to function as an informed and effective citizen in a technological society. Using a broad based exploratory experience designed for both boys and girls, the program seeks to acquaint students with technology through hands-on experiences while reinforcing the academic core: language arts, math, science, history-social science, and the visual and performing arts. The explorations program also seeks to meet the needs of the "at-risk" students by providing them with positive learning experiences. The continual technological change in society requires students to possess a strong foundation in the academic core areas as well as a broad base of career awareness.

Activities in the explorations program address the 14 standards as found in the Explorations Technology in the State *Model Curriculum Standards, Program Framework, and Process Guide for Industrial and Technology Education in California*. Activities are designed to help students:

- Emphasize the transferability of knowledge and skills from one discipline to another;
- Develop problem solving and critical thinking skills;
- Become independent thinkers and active learners;
- Learn about the effects of technology on their daily lives;
- Become adaptable to the changing world around them;
- Start thinking about a career; and,
- Develop a strong positive work ethic.

The explorations program is based on the synergistic, modular delivery system. This system encourages students to work in small and large teams to become responsible for their learning. Students work in pairs, using a set of self-directed instructions that guide the students through the learning activity. Students rotate from one module to the next every ten days and may or may not change partners with the change. The modular approach is cost effective in scope and sequence as the equipment is used

on a continual basis and much of the equipment is already in place in existing shop facilities.

Course of Study Objectives:

- 1. VISUAL COMMUNICATION - The student will use symbols, symbol conventions, visual design, printing techniques, photography, holography, drafting, and similar forms of non-verbal communication that is essential in a society dependent on visual representations.**

- 1.1 STUDENT ACTIVITY:**

The student will sketch orthographic projections, oblique pictorials, isometric pictorials, use measuring techniques, convert scale drawings from large to small and small to large, identify differences between orthographic projection, isometric projections, oblique drawings and perspective drawings.

- 1.2 INSTRUCTIONAL MATERIALS USED:**

- Adopted textbook
- CAD Program on computer
- Conventional drafting equipment

- 1.3 TEACHER ACTIVITIES:**

- Conduct lectures/discussions, facilitate collaborative learning.
- Assign drawings, monitor progress, evaluate completed work.
- Give appropriate credit for students completing extra work.

- 2. SIMPLE MACHINES - The student will describe six simple machines and discuss how the principles of simple machines are used to convert, transfer, and change energy into usable power.**

- 2.1 STUDENT ACTIVITY:**

The student will design and build simple machines to perform tasks such as lifting and moving.

- 2.2 INSTRUCTIONAL MATERIALS USED:**

- Adopted textbook
- Machine Lego Kit

- 2.3 TEACHER ACTIVITIES:**

- Conduct lectures, demonstrations, and facilitate collaborative learning.

- 3. ELECTRICITY/ELECTRONICS - The student will describe the difference between AC and DC current. The student will identify simple electronic components, explain their use, and construct simple electronic circuits from identified components. The student will understand basic electronic theory as it relates to current, voltage and resistance.**

- 3.1 STUDENT ACTIVITY:**

The student will complete work sheets after viewing video and complete a series of experiments using electrical components.

- 3.2 INSTRUCTIONAL MATERIALS USED:**

- Adopted Textbook
- Video
- Mr. Circuit Kit

- 3.3 TEACHER ACTIVITIES:**

Conduct lectures, demonstrations, and facilitate collaborative learning.

- 4. ENERGY CONVERSION - The student will understand Hydraulic, solar, and wind-generated electrical power.**

- 4.1 STUDENT ACTIVITY:**

The student will view a video describing the material and then build simple operational models demonstrating the principles of solar power, hydraulic power, and wind generators.

4.2 INSTRUCTIONAL MATERIALS USED:

- Adopted textbook
- Video
- Model kits

4.3 TEACHER ACTIVITIES:

Conduct lectures, demonstrations, facilitate collaborative learning.

5. AIR/SPACE TRANSPORTATION - The student will understand and appreciate the existing and potential variety of air/space vehicles. The student will understand fundamentals of air/space vehicle designs and power sources.**5.1 STUDENT ACTIVITY:**

After viewing video describing history of air and space flight, the student will design and build a model glider and a model rocket. Both vehicles will be flown after using computers to predict performance. The student will experience the flight simulator using a desktop model in the classroom.

5.2 INSTRUCTIONAL MATERIALS USED:

- Adopted Textbook
- Video
- Model glider kit
- Model rocket kit
- Flight simulator

5.3 TEACHER ACTIVITIES:

Conduct lectures, demonstrations, and facilitate collaborative learning.

6. TELECOMMUNICATIONS - The student will define telecommunications and explain the basic principles of radio and television transmission and reception. The student will examine telecommunications as a recreational, educational, and social force.**6.1 STUDENT ACTIVITY:**

The student will complete basic work sheets after viewing video and then make a short video tape using the studio, television camera, and editor.

6.2 INSTRUCTIONAL MATERIALS USED:

- Adopted textbook
- Video equipment
- Student-made video

6.3 TEACHER ACTIVITIES:

Conduct lectures, demonstrations, and facilitate collaborative learning.

7. BIO-TECHNICAL - The student will understand the uses of technology in monitoring, diagnosing, and evaluating the human body in sports medicine, preventative medicine, and holistic health.**7.1 STUDENT ACTIVITY:**

The student will use the exer-cycle and a galvanic skin-monitoring device to monitor the response of the human body exercise. Heart rate, breath rate, and blood pressure will be monitored using a computer. The student will also learn to use a stethoscope, sphygmomanometer, and skin calipers.

7.2 INSTRUCTIONAL MATERIALS USED:

- Adopted textbook
- Video
- Exercise cycle
- Galvanic skin response machine
- Simple medical examination instruments

7.3 TEACHER ACTIVITIES:

Demonstrate, lecture, and facilitate collaborative learning.

8. DESKTOP PUBLISHING - The student will understand the uses of desktop publishing using design, layout and printing a variety of assignments on the Apple IIGS and the Macintosh LC computers.**8.1 STUDENT ACTIVITY:**

The student will complete two different publishing assignments combining graphic and text.

8.2 INSTRUCTIONAL MATERIALS USED:

- Apple IIGS
- Macintosh LC
- PageMaker Software

8.3 TEACHER ACTIVITIES:

- Conduct lectures, demonstrations, and evaluate printed projects.

9. ENGINEERING - Students will understand the history of bridge design and construction. Students will examine possible designs and select one for team construction. Computer simulation for stress analysis will be used.**9.1 STUDENT ACTIVITY:**

After completing a section on the history and construction of bridges, the teams will select, analyze, and construct a small, wooden truss bridge. The bridge will be tested for strength.

9.2 INSTRUCTIONAL MATERIALS USED:

- Video
- Bridge building simulation software
- Bridge tester

9.3 TEACHER ACTIVITIES:

Conduct lectures, demonstrations, and facilitate collaborative learning.

10. APPLIED PHYSICS - The student will understand the principles of laser technology along with gear systems of power transmission.**10.1 STUDENT ACTIVITY:**

Students will use low powered lasers to calculate angles and transmit vocal communication. Gear ratios will be calculated and assembled for confirmation.

10.2 INSTRUCTIONAL MATERIALS USED:

- .8mw Modulated laser
- Applied physics gear trainer
- Video

10.3 TEACHER ACTIVITIES:

Conduct lectures, demonstrations, and facilitate collaborative learning.

11. RESEARCH AND DESIGN - Students will learn that research is important to discover new processes, materials, and techniques and that development is the application of these discoveries to solve a particular problem.**11.1 STUDENT ACTIVITY:**

Students will design and construct a small model car that will be tested for drag in a wind tunnel. The cars will then compete against each other for time and be timed with student-operated computers.

11.2 INSTRUCTIONAL MATERIALS USED:

- Conventional drafting equipment
- Simple wood-working machines
- Wind tunnel
- Apple IIe/software

11.3 TEACHER ACTIVITIES:

Lecture, demonstrate, and assist in final competition.

12. ROBOTICS - Students will learn the parts and nomenclature of robots. The various types of sensing systems used by robots are also studied.

12.1 STUDENT ACTIVITY:

Students will view a videotape of the history and uses of robots before using a computer to program a robot to complete simple tasks such as moving along a planned path, picking and placing.

12.2 INSTRUCTIONAL MATERIALS USED:

- Video/VCR
- Line sensing robot
- Robotic arm
- Apple IIe with robotic software

12.3 TEACHER ACTIVITIES:

Lectures, demonstrate, and facilitate collaborative learning.

13. CAREERS - Students study different career options and use various sources located in their modules to research short papers relating to their interests.

13.1 STUDENT ACTIVITY:

Students will take the Job-O Inventory and research occupations. They will produce a paper using word processing or desktop publishing.

13.2 INSTRUCTIONAL MATERIALS USED:

- Apple IIe/Job-O and Word Processing software
- Dictionary of Occupational Titles
- Career Briefs
- California Job Outlook

13.3 TEACHER ACTIVITIES:

Demonstrate use of Job-O and research materials. Evaluate papers.

14. GAS ENGINES - Students will learn the principles of the four stroke cycle and the effects of this innovation on society.

14.1 STUDENT ACTIVITY:

Students will disassemble a four stroke single cylinder engine and reassemble the engine. The engine will then be run on a dynamometer to check horsepower, torque, RPM, specific fuel consumption and air consumed. The engine will also be checked for emissions using infra-red analyzers. A technical report will be written regarding the results of these tests.

14.2 INSTRUCTIONAL MATERIALS USED:

- Briggs and Stratton lawn mower engine
- Engine dynamometer
- Air analysis system
- Infra-red tester
- Word processor

14.3 TEACHER ACTIVITIES:

Lecture, demonstrate, facilitate collaborative learning, and evaluate papers written.

INSTRUCTIONAL MATERIALS:

TEXTBOOK

Living With Technology, Del Mar Publishing

SUPPLEMENTARY MATERIALS

Construction: Design Shelters and Structures, Hearlihy & Co.

Moving Goods and People Through the Air, Hearlihy & Co.

Lasers: New Technology, Hearlihy & Co.

CAD: Fundamentals and Applications, Hearlihy & Co.

How Bridges Are Made, Pitsco

Complete Book of Robotics, Pitsco

AUDIOVISUAL MATERIALS

Discover CAD, Computer Program, Pitsco

Car Builder, Computer Program, Pitsco

Bridge Builder, Computer Program, Pitsco

History of Flight, NOVA