TECHNOLOGY EDUCATION
COMPUTER APPLICATIONS

GRADES 9-12
ELECTIVE

The University of the State of New York
The State Education Department
Bureau of Home Economics
and Technology Education Programs
Division of Occupational Education
Albany, New York 12234

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OVERVIEW AND RATIONALE

This is a course involving computer equipment, but unlike other computer courses this course will have little to do with the programming, or the writing of the specialized languages computers use to perform their tasks. Many computer languages do exist, such as **Basic, Cobol, Pascal, "C"**, but this course will not address programming except for a brief overview to describe how the machine processes information.

Instead, students will be trained to use the computer with commercially available software to accomplish tasks that previously required many hours to be performed by hand or by calculation.

Computer technology, both in hardware and software form has had a major impact on life and lifestyles in the last ten years. In this course, students will learn to use the technology for many problem solving techniques, and apply this technology to their lives. whether they will be employed directly after high school, or continue their educations. The power of the machines available and the software to run them are continually improving. A course of this type should reflect the most current technology. Instructors should be proficient in the latest material available.

Because lab equipment varies widely throughout the State, this curriculum is written in a generic format, with the ability to apply the syllabus to labs with Apple, IBM, or any other system available for instruction. The materials listing for the modules will list software for application on different systems.

USE IN SEQUENCE: **Elective course**

This course is one of the New York State approved electives in Technology Education. It is one of several electives courses designed to give students a firm but broad exploration of the technical world in which they live.

Students completing a high school sequence in Technology Education must take a total of 1-3 units of elective course work to fulfill the "elective" portion of their sequence requirement. This course may also be taken by any student as an elective. If the instructor uses this syllabus as a guide for instruction, students may be granted Regents credit for the experience.

Several courses within Technology Education offerings can be offered on a 1/2-unit or 1-unit basis. Course work earning 1/2-unit must comprise a minimum of 54 hours of instruction and course work earning 1-unit must comprise a minimum of 108 hours of instructional time.

Students with Disabilities

The Board of Regents, through the part 100 Regulations of the Commissioner, the Action Plan, and The Compact for Learning, has made a strong commitment to integrating the education of students with disabilities into the total school program. According to Section 100.2(s) of the Regulations of the Commissioner of Education, "Each student with a handicapping condition as such term is defined in Section 200.1(ii) of this Chapter, shall have access to the full range of programs and services set forth in this Part to the extent that such programs and services are appropriate to such student's special educational needs." Districts must have policies and procedures in place to make sure that students with disabilities have equal opportunities to access diploma credits, courses, and requirements.

The majority of students with disabilities have the intellectual potential to master the curricula content requirements for a high school diploma. Most students who require special education attend regular education classes in conjunction with specialized instruction and/or related services. These students must attain the same academic standards as their nondisabled peers to meet graduation requirements, and, therefore, must receive instruction in the same content areas, at all grade levels. This will ensure that they have the same informational base necessary to pass statewide testing programs and meet diploma requirements.

Teachers certified in the subject area should become aware of the needs of students with disabilities who are participating in their classes. Instructional techniques and materials must be modified to the extent appropriate to provide students with disabilities the opportunity to meet diploma requirements. Information or assistance is available through special education teachers, administrators, the Committee on Special Education (CSE) or student's Individualized Education Program (IEP).

Strategies for Modifying Instructional Techniques and Materials

1. Students with disabilities may use alternative testing techniques. The needed testing modification must be identified in the student's Individualized Education Program (IEP). Both special and regular education teachers need to work in close cooperation so that the testing modifications can be used consistently throughout the student's program.

2. Identify, define and pre-teach key vocabulary. Many terms in this syllabus are specific and some students with disabilities will need continuous reinforcement to learn them. It would be helpful to provide a list of these key words to the special education teacher in order to provide additional reinforcement in the special educational setting.

3. Assign a partner for the duration of a unit to a student as an additional resource to facilitate clarification of daily assignments, timelines for assignments, and access to daily class notes.

4. When assigning long-term projects or reports, provide a timeline with benchmarks as indicators for completion of major sections. Students who have difficulty with organizational skills and time sequence may need to see completion of sections to maintain the organization of a lengthy project or report.

Infusing Awareness of Persons with Disabilities Through Curriculum

In keeping with the concept of integration, the following subgoal of the Action plan was established.

In all subject areas, revisions in the syllabi will include materials and activities related to generic subgoals such as problem solving, reasoning skills, speaking, capacity to search for information, the use of libraries and increasing student awareness of and information about the disabled.

The purpose of this subgoal is to ensure that appropriate activities and materials are available to increase student awareness of disabilities.

This curriculum, by design, includes information, activities, and materials regarding persons with disabilities. Teachers are encouraged to include other examples as may be appropriate to their classroom or the situation at hand.

STUDENT LEADERSHIP SKILLS

Development of leadership skills is an integral Part of occupational education in New York State. The New York State Education Department states that, "Each education agency should provide to every student the opportunity to participate in student leadership development activities. All occupational education students should be provided the opportunity to participate in the educational activities of the student organization(s) which most directly relate(s) to their chosen educational program."

Leadership skills should be incorporated in the New York State occupational education curricula to assist students to become better citizens with positive qualities and attitudes. Each individual should develop skills in communications, decision making/problem solving, human relations, management, and motivational techniques.

Leadership skills may be incorporated into the curricula as competencies (Performance Objectives) to be developed by every student or included within the Suggested Instructional Strategies. Teachers providing instruction through occupational educational curricula should familiarize themselves with the competencies. Assistance may be requested from the State advisor of the occupational student organization related to the program area.

Students who elect to become active members of one of the student leadership organizations chartered by the New York State Education Department have the advantage of the practical forum to practice leadership skills in an action oriented format and have the potential for recognition of their achievements at the local, State, and national level.

SYLLABUS OBJECTIVES

Through the implementation of this syllabus, the student will be able to:

1. Analyze a problem and use computer equipment to accomplish the task in a more efficient manner.

2. Appreciate the overall effect computers and computer software have had on both lives and lifestyles.

3. Have a consumer awareness of the variety of advanced systems available for specific applications of computer technology.

PERFORMANCE OBJECTIVES

The performance objectives of the syllabus are intended to clearly present what students are expected to know, do and be like, following instruction in a given topic. The knowledge (K), skills (S) and attitudes (A) that students should acquire are identified for each topic, under "competencies to be developed".

SYLLABUS OUTLINE

Table of Contents

			Estimated Learning Time
I.	Module:	**Introduction to Computer Technology**	**4 hours**
	Topics:		
		A. History and Evolution	2 hours
		B. Personal Computer Systems	2 hours
II.	Module:	**Integrated Software Groups**	**24 hours**
	Topics:		
		A. Word Processing	5 hours
		B. Database Management	7 hours
		C. Spreadsheet Management	7 hours
		D. Telecommunications	5 hours
III.	Module:	**Computer Graphics**	**16 hours**
	Topics:		
		A. Charting of Information	4 hours
		B. Desktop Publishing	4 hours
		C. Computer Animation	4 hours
		D. Computer Aided Drawing (CAD) Applications	4 hours
IV.	Module:	**Computer Control**	**10 hours**
	Topics:		
		A. Computer Aided Manufacturing (CAM)	5 hours
		B. Robotics	5 hours
		Total Estimated Learning Time:	**54 hours**

SYLLABUS

Estimated Learning Time

I. Module: **Introduction to Computer Technology** — **4 hours**

A. Topic: **History and Evolution** — 2 hours

1. **Performance Statement:**

Upon satisfactory completion of this topic, the student will understand the evolution of computer equipment.

Competencies to be Developed:

After studying this topic, the student will be able to:

a. Describe the changes that have occurred in computer equipment since the first digital computer in 1944. **(K)**

b. Appreciate how rapidly the field has progressed. **(A)**

Suggested Instructional Strategies:

1. Present early computer systems to students through display and multi-media.

2. Demonstrate early personal computer equipment systems.

B. Topic: **Personal Computer Systems** — 2 hours

1. **Performance Statement:**

Upon satisfactory completion of this topic, the student will know similiarities and differences among the different computer systems available.

Competencies to be Developed:

After studying this topic, the student will be able to:

a. "Boot" a personal computer to its ready state. **(K) (S)**

b. Understand different computer operating systems, software and hardware terminology. **(K)**

c. Appreciate the technological progress of ease of operation. **(A)**

Suggested Instructional Strategies:

1. Provide instruction in start-up procedures for the equipment available.

2. Provide instruction and time to prepare (format or initialize) a removable storage medium.

3. Provide limited instruction in programming language and time to write and run a short program.

II. Module: **Integrated Software Groups** **24 hours**

A. Topic: **Word Processing**

1. **Performance Statement:**

Upon satisfactory completion of this topic, the student will be able to work with a computer based word processing system.

Competencies to be Developed:

After studying this topic, the student will be able to:

a. Enjoy the benefits of Word Processing. **(A)**
b. Use electronic word processing in a variety of formats, rather than traditional methods, to produce printed material. **(S) (K)**
c. Apply the unique capabilities of word processing to problem-solving techniques. **(S) (K)**

Suggested Instructional Strategies:

1. Provide instruction in use of word processing.

2. Instruct students to apply word processing techniques to documents you have supplied.

B. Topic: **Database Management** **7 hours**

1. **Performance Statement:**

Upon satisfactory completion of this topic, the student will be able to create, manipulate and work with an electronic database.

Competencies to be Developed:

After studying this topic, the student will be able to:

a. Understand the capabilities of database management of information. **(A) (K)**

b. Use the capabilities of a database management system to categorize, sort and manipulate data for various purposes. **(K) (S)**

Suggested Instructional Strategies:

1. Provide students with a module of information to organize effectively using key features of database management: sorting, filtering and selecting.

2. Demonstrate to students the use of features unique to database management: form or merged letters and mailing labels.

C. Topic: **Spreadsheet Management** **7 hours**

1. **Performance Statement:**

Upon satisfactory completion of this topic, the student will be able to successfully use a spreadsheet to organize numerical and text based information.

Competencies to be Developed:

After studying this topic, the student will be able to:

a. Understand the power of a spreadsheet to organize data requiring both straight entry and complex calculation. **(A) (K) (S)**

b. Use spreadsheet functions to generate appropriate results. **(S) (K)**

Suggested Instructional Strategies:

1. Provide instruction in general spreadsheet structure.

2. Provide instruction in cell manipulation and function calculation.

3. Have students implement spreadsheet techniques learned on documents you have supplied.

D. Topic: **Telecommunications** **5 hours**

1. **Performance Statement:**

   Upon satisfactory completion of this topic, the student will be able to use a telecommunications program to transmit or receive information from another computer system.

   Competencies to be Developed:

   After studying this topic, the student will be able to:

   a. Understand telecommunication hardware and know understand the configuration of a computer-based telecommunications system. **(K) (S)**
   b. Understand telecommunication software and know the application of appropriate file transfer protocols. **(S) (K)**
   c. Appreciate the major effect computer telecommunications has had on lifestyles. **(A)**

   Suggested Instructional Strategies:

   1. Demonstrate various telecommunications devices.

   2. Provide instruction in use of software for telecommunications.

   3. Allow time for students to access commercial and educational telecommunications systems.

III. Module: **Computer Graphics** **16 hours**

A. Topic: **Charting of Information** 4 hours

1. **Performance Statement:**

   Upon satisfactory completion of this topic, the student will understand methods and benefits of displaying information in a graphic format.

   Competencies to be Developed:

   After studying this topic, the student will be able to:

   a. Display information in different graphical formats.**(K) (S)**
   b. Appreciate how computer equipment can simplify and accelerate the process of solving graphical displays problems. **(A)**

   Suggested Instructional Strategies:

   1. Demonstrate multiple graphical solutions from common data, and hold an interactive discussion of positive and negative aspects of the displays.

   2. Have students implement graphical solutions from either teacher or student-supplied data.

B. Topic: **Desktop Publishing** 4 hours

1. **Performance Statement:**

   Upon satisfactory completion of this topic, the student will know how to utilize desktop publishing software for effective communications.

   Competencies to be Developed:

   After studying this topic, the student will be able to:

   a. Compose and print a document integrating text and graphics effectively. **(K) (S)**
   b. Understand the aesthetics of effective layout. **(K) (S) (A)**
   c. Appreciate the computer's role in streamlining the composition process. **(A)**

Suggested Instructional Strategies:

1. Have students publish a short document for assembly or marketing of a common product.

2. Have students view a video demonstrating advanced uses of the software package.

C. Topic: **Computer Animation** 4 hours

1. **Performance Statement:**

   Upon satisfactory completion of this topic, the student will understand how computer equipment has revolutionized the world of animation and display.

   Competencies to be Developed:

   After studying this topic, the student will be able to:

   a. Manipulate graphical displays using techniques of animation. **(K) (S)**

   b. Appreciate how computer software and hardware works together to display animation, and appreciate the geometric evolution of the capabilities in the last ten years. **(A)**

   Suggested Instructional Strategies:

   1. Have students view a video demonstrating advanced uses of the software package.

   2. Have students implement animation sequence solutions from their own designs or situations you have suggested.

D. Topic: **Computer Aided Drawing (CAD)** 4 hours

1. **Performance Statement:**

   Upon satisfactory completion of this topic, the student will understand and be able to demonstrate the use of computer hardware and software to adjust, manipulate and control a drawing.

Competencies to be Developed:

After studying this topic, the student will be able to:

a. Select the appropriate drawing program to complete the assigned project. **(K)**

b. Select and use the hardware and software to best produce a finished drawing **(K) (S)**

c. Appreciate how the use of computer hardware and software can enhance the process of creating drawings and facilitate making changes or corrections to the original drawing. **(A)**

Suggested Instructional Strategies:

1. After instruction and demonstration of how different software programs work, assign students drawing problems.

2. Provide a selection of drawing problems and have each student choose and solve one.

IV. Module: **Computer Control** **10 hours**

A. Topic: **Computer Aided Manufacturing (CAM)** 5 hours

1. **Performance Statement:**

Upon satisfactory completion of this topic, the student will understand how computers and computer controlled equipment have changed the world of manufacturing.

Competencies to be Developed:

After studying this topic, the student will be able to:

a. Choose and use the hardware and software to best improve the efficiency of a "typical" manufacturing process. **(K)**

b. Select and describe the components of computer controlled or assisted equipment as they could be applied to a product manufacturing system. **(K) (S)**

c. Appreciate how the many capabilities of computer controlled equipment can improve the consistency of any manufacturing process. **(A)**

Suggested Instructional Strategies:

1. Have students view a video demonstrating the commercial applications of CAM.

2. Have students diagram and construct both an open and close-loop control system.

3. Have students choose an available system and apply it to a simulated CAM problem.

B. Topic: **Robotics** 5 hours

1. **Performance Statement:**

Upon satisfactory completion of this topic, the student will understand how computers are adapted to act as controllers and other devices.

Competencies to be Developed:

After studying this topic, the student will be able to:

a. Appreciate how computer controlled robots can be applied to repetitive and dangerous activities, thus freeing people to accomplish other tasks. **(K) (A)**
b. Select and use the hardware and software to best control the robot. **(K) (S)**
c. Identify and describe how computer controlled robots are used to meet specific needs. **(K) (S)**
d. Demonstrate how microprocessors are used as control devices in appliances and vehicles.

Suggested Instructional Strategies:

1. Have students view a video demonstrating the commercial applications of robots.

2. After instruction and demonstration of the available robotic equipment, have the students complete a simple introductory activity, e.g., having the computer turn a motor on or off; or having a robotic arm rotate first in one direction and then in the opposite direction.

3. Have students design, construct and test a computer controlled robot system to accomplish a given simulation.

4. Students can program an appliance such as a microwave oven or washing machine using a microprocessor controller or model such operation using LEGO or FISCHER TECHNIK.

EQUIPMENT LIST

Suggested Equipment to Support Instructional Strategies of Computer Applications

I. Introduction to Computer Technology

Whatever the laboratory situation, the instructor should have available for demonstration several different early computer systems like the Commodore VIC-20 and the Timex Sinclair 1000. These can usually be found within a district or borrowed from colleagues. Supplies of floppy discs, in the appropriate size for the computer system to be used, should be available.

Apple II series	Basic built into ROM on system board.
Macintosh	Microsoft Basic, software loaded.
IBM	Basic built into ROM on system board.
IBM Compatible	GW Basic software, included with DOS software package.

II. Integrated Software Groups

Apple II series	Appleworks. Several versions available. Choice depends on system memory, hard drive availablity, etc.
Macintosh	Microsoft Works. External or internal modem necessary for telecommunications topic. Both integrated packages have telecommunications software included in the package.
IBM	Microsoft Works, Lotus Works. External or internal modem necessary for telecommunications topic. Both integrated packages have telecommunications software included in the package.
IBM Compatible	Same as IBM.

III. Computer Graphics

Apple II	Beagle Bros. add-in for Appleworks; Graphworks, for charting of information; Publish it or First Publisher for Desktop publishing; Animate for computer animation; and CAD Draw for CAD applications.
Macintosh	Silicon Beach, Super Paint for Graphics; Aldus Pagemaker for Desktop Publishing; and Claris CAD 2.0 for Computer Aided Drawing.
IBM	Harvard Graphics for charting; Avagio, by Unison World, for desktop publishing; AutoDesk Animator for computer animation; and AutoSketch for Cad-Cam applications. The computer graphics module requires a hard disk and, quite often, a VGA color display.
IBM Compatible	Same as IBM.

IV. Computer Control

Apple II	Fisher Technik / Lego Dacta Computer Interface.
Macintosh	Fisher Technik / Lego Dacta Computer Interface.
IBM	Fisher Technik / Lego Dacta Computer Interface.
IBM Compatible	Fisher Technik / Lego Dacta Computer Interface.
Robots	Fischer Technik / Lego Dacta.