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ABSTRACT

This course description outlines an independent-study computer awareness course for community college faculty that uses videotapes, computer-assisted instruction, and individual study modules. The outline includes the rationale for the course and the media to be used; time required to complete the course; the goals of the course; the topics covered by the five course modules; the teaching methods to be used (closed circuit television, study guide, and hands-on use of a microcomputer); evaluation (each module contains a self-test segment); and the required course materials (a diskette for the modules on computer usage and/or computer programming). The modules cover: (1) computer awareness (history of computers, their impact on society, and applications in various areas); (2) computer concepts (terminology, elements of computer systems, types of primary storage, internal data representation, hardware, software, and methods of processing data); (3) computer usage (commercial software selection and acquisition, hands-on computer usage); (4) programming in BASIC and other languages (problem analysis, starting up BASIC, BASIC commands and statements, advanced concepts, programming examples, changing existing programs, and other programming languages); and (5) integrating the computer into the curriculum. The syllabus for the first module, which is included in this document, provides a statement of behavioral objectives, lists the module sequence, estimates the time required for completion, lists key terms and phrases, and presents information on the three topics covered. (DJR)

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ED297702

KIRKWOOD COMMUNITY COLLEGE

Course Description

# COMPUTER LITERACY

IR012537



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I.- Course name: Computer Literacy for Faculty

II.- Course description: prerequisite: none
The course was developed as a series of modules with the thought that computers have a different impact in different academic and vocational areas and therefore that computer literacy will have a different meaning to different individuals. The normal assumption that everyone must learn how to program a computer to be "computer literate" was not considered, rather that there are different levels of computer literacy and that each individual should determine the level they wish to attain with respect to their academic discipline, job requirements, or personal goals. The modular approach will allow those Kirkwood faculty and staff who already are computer literate to some degree to skip some of the modules if desired.

Video tapes, computer assisted instruction, and independent study modules are utilized as much as possible to allow the faculty and staff to take the modules at times most convenient for them.

All of the "hands-on" exposure to computers will be on microcomputers.

III.-Time allocation:
Because it is independent study the time will vary by individual. It is estimated to be 40 hours.

IV.-Course goals:
1.-To make the learner aware of the broad range of computer applications and the impact of those applications on our present and future society.
2.-To make the learner familiar with the terminology of computers.
3.-To provide an overview of the computer: what it is, what it can and cannot do, how it functions, and how it can be utilized for problem solving.
4.-To make the learner familiar with pre-written software applications, where to find information on what pre-written software is available, and how to evaluate pre-written software.
5.-To provide the learner with experience in the use of computers and working knowledge of selected applications in the learner's area of interest.
6.-To provide the learner with the skills necessary to develop and write programs for a computer in one or more computer languages.

7.-To reduce the anxiety level of the learner and eliminate "computer intimidation".

V.-Course objectives:

Specific objectives are included in the outline for each module.

VI.-Course content:

Module one: Computer Awareness
- History of computers
- Impact on Society
- Computer Applications in Various Areas

Module two: Computer Concepts
- Computer Terminology - Begining
- Elements of a Computer System
- Types of Primary Storage
- Internal Data Representation
- Computer Terminology - Advanced
- Hardware
- Software
- Methods of Processing Data

Module Three: Computer Usage
- Pre-written (commercial) software selection and evaluation
- Obtaining pre-written (commercial) software
- Hands-on Computer Usage

Module Four:Programming in Basic and other Languages
- Problem analysis
- Starting up BASIC
- BASIC commands
- BASIC statements
- Advanced concepts in BASIC
- Programming examples
- Changing existing programs
- Other programming languages

Module five: Integrating the computer into the curriculum.

VII.-Teaching methods: closed circuit tv, study guide, hands-on usage of a microcomputer.

VIII.-Evaluation: Each module will contain a self test segment.

IX.-Required Course Materials.
If the learner decides to take the course module on computer usage or the module on programming, one (1) microcomputer diskette will be required. They can be purchased at the Kirkwood bookstore.

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# Module Syllabus

## COMPUTER AWARENESS

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Module name: Computer Awareness.

Objectives: Upon completion of this course module

.....The learner should be aware of the growing economic, social, and psychological impact of computers on individuals and groups within our society, and on society as a whole.

.....The learner should be familiar with the history of computers.

.....The learner should recognize how much the computer has changed over the past 20 years and that the changing is not done yet.

.....The learner should be aware of the broad range of applications for computers.

Module sequence:

1.-Familiarze yourself with the objectives for this module.
2.-Read the module overview.
3.-Watch "Focusing in on Computers". Tape call # KDP42. Viewing time approximately 15 minutes.
4.-Watch "How Computers Work". Tape call # KDP43. Viewing time approximately 15 minutes.
5.-Look over the key terms and phrases for this module.
6.-Take the self test and then compare your answers to the answer key.

Time allocation:

Estimated time for completion is approximately one hour.

Key terms and phrases:

Artifical Intelligence
Byte
Computer Aided Design (CAD)
Computer Aided Manufacturing (CAM)
Computer Aided Instruction (CAI)
Computer Graphics
Computer Managed Instruction (CMI)
Electronic Mail
Health Information Systems
Hospital Information Systems
Micro-processor
Microcomputer
Medical Information Systems
Management Information Systems
Modem
Numerical Control Machine
Point of Sale Terminals
Process Control
Simulation
Word Processing

## COMPUTER AWARENESS OVERVIEW

I. History of Computers.
II. Impact on Society.
    A.-Computer attitudes - can computers make mistakes?
    B.-Computers and employment - effect on workers.
    C.-Privacy and other legal aspects.
    D.-Computer crime and security.
    E.-Changing lifestyles.
III. Computer Applications.
    A.-Computers in Business and Industry.
    B.-Computers in Education.
    C.-Computers in Health.
    D.-Computers in the Home.
    E.-Computers in Transportation.
    F.-Computers in Government and Politics.
    G.-Computers in the Arts and Humanities.
    H.-Computers in Sports and Games.
    I.-Computers in Science, Engineering, and Research.
    J.-Computers in Agriculture.

COMPUTER AWARENESS OVERVIEW

## I. HISTORY OF COMPUTERS

Early computing devices included the "abacus". In the 1800's came mechanical calculating machines. The first electromechanical computing machine was produced in 1937. It was called the "Mark I". It contained 3,300 relays, weighed 5 tons, and it could multiply two 23 digit numbers together in 6 seconds. In 1946 a machine called the "Eniac" was produced. It occupied 1,500 square feet of floor space, weighed 30 tons, it contained 19,000 vacuum tubes, and required 130kw power (current computers require about 10kw). It could perform 5,000 additions or 300 multiplications per second. The first commercial computer, the UNIVAC-I, was produced in 1951. IBM entered the commercial computer market in 1953. The following table summarizes the characteristics of the various computer generations:

| | 1st generation (1951-1958) | 2nd generation (1958-1964) | 3rd generation (1964-1971) | 4th generation (1971- ) |
|---|---|---|---|---|
| technology | vacuum tubes; mercury delay lines | transistors | integrated circuits | very large scale integrated circuits; mini/ micro computer oriented |
| operation time | milliseconds (thousandths of a second) | microseconds (millionths of a second) | nanoseconds (billionths of a second) | picoseconds (trillionths of a second) |
| cost | $5/function | $.50/function | $.05/function | $.01/function |
| processing speed | 2,000 instructions/ second | 1 million instructions/ second | 10 million instructions/ second | 100 million to 1 billion instructions/ second |
| memory size (bytes) * | 1,000 to 4,000 | 4,000 to 32,000 | 32,000 to 3,000,000 | 3,000,000 + |
| mean time between failures | mins. to hours | days | days to weeks | weeks + |
| auxillary units | punched card oriented | magnetic tape oriented | magnetic disk oriented | disk and mass storage oriented |

* a byte of memcry is what is required to store 1 character or number

## II. IMPACT ON SOCIETY

### Computer Attitudes

Articles you read concerning computer problems border on the sensational.... "computer makes a mistake and overpays employees by $100,000!". Cartoonists give computers robot-like statures and minds of their own. Names of computers have included human analogies..."electronic brain" or "mechanical brain". Consequentially much of the public blames computers, rather than the people using them, for problems that arise in data processing applications. Imagine blaming an automobile when a traffic accident occurs, or a hammer because it hit you in the thumb. Computers can fail, but they do not make mistakes in the sense that a human makes mistakes.

### Computers and Employment

Some people have, and will, be displaced by computerization and automation. Frequently, when an employee's job is to be replaced by computerization, he or she will be retrained to work in some other area. The installation of a computer, moreover, almost always entails the creation of some new jobs. There is considerable controversy over the actual overall impact of computerization on the work force. There is no clear answer as to whether the net effect of computerization and automation is to increase or decrease the number of jobs.

### Privacy and other legal aspects

The balance between an individual's right to privacy and the public's "need to know" is indeed a very delicate one. In a recent poll, 54 per cent of the American public considers the present usage of computers to be a threat to personal privacy. 63 per cent of the American public agrees with the philosophy that if privacy is to be preserved, the use of computers must be monitored more closely in the future. With the proliferation of data banks, there are several potential threats to an individual's privacy that must be recognized and dealt with when establishing computer systems and networks: (1) The possibilty that those who have authorization to access the data banks will abuse their authority. (2) That outsiders who have no authorization to access the data bank will find a way to penerate the system. (3) That one or more weaknesses in the design of a system will result in unintentional disclosure of information.

Other points to consider: Can data affect an individual's ideas about what they can do, what they can be, or where they can go? Can data affect the success or failure of a business or government? Does informacion have the power to adjust our image of ourselves, our parents, or our friends? Does information have the power to change our ideas concerning an industry, our local government, our state, or our nation as a whole? What is really happening to individual identity in an information dependent society? What can happen to the American society without the freedom of information?

Computer crime and security

1978 was the first year that a state enacted a law dealing specifically with computer crime. Until 1978, if caught, a computer criminal has stood only a 3 per cent chance of going to jail. Yet, it has been estimated that this type of crime costs American business over 300 million dollars a year. Computer security will be a major budget item for most business concerns over the next few years.

Changing Lifestyles

The computer revolution ranks as a revolution greater than the industrial revolution, and the computer revolution is not yet complete. The computer may make it possible to have an office employee stay at home rather than travel to a central office, and perform their job function via a display terminal hooked to a computer. A person may no longer be obligated to shop for groceries. Orders could be entered into a computer via a home terminal and then automatically paid for by electronic fund transfer. No actual supermarket shopping would be necessary. The groceries would be delivered to your door. In a hospital, new patients may be interrogated by a computer to supply possible diagnoses to the examining physician. Electronic banking (the replacement of paper financial documents with computerized records) is here now. You can have your pay check or social security check automatically deposited at your bank. 24 hour automatic teller machines that are hooked to computers are quite common. An individual can have certain bills paid automatically - house payment, utility bills, insurance premiums, etc.

In the future an increasing per centage of the operations performed in a typical organization will involve information flow. Effects on the workplace and the worker of using computing equipment in the home for communicating with the office may change the entire concept of "work" as we know it. By working at home, the employees who normally drive to work would conserve energy and consequently reduce the amount of pollution. Mass transportation needs would diminish considerably. People would no longer need to live near large cities. The structure of suburban and urban areas could change resulting in a more even population distribution. Workers would have more flexibilty in being able to arrange their working hours to accomodate their personal needs. See attachment A.

## III. COMPUTER APPLICATIONS

### COMPUTERS IN BUSINESS AND INDUSTRY

Banking: check processing, loan accounting, all types of savings account deposits and withdrawls, 24 hour computer controlled banking terminals, electronic fund transfer systems.

Stores and supermarkets: point of sale terminals (computer terminals that replace stand-alone cash registers), hand held wand reader (scanner) to read price and item number from an article and input directly to a computer, credit card validity checking, computer controlled supermarket check out that reads prices and universal product codes (bar codes).

Office computers: word processing (word processing combines text editing with formatting and printing capabilities), electronic mailing systems, payoll and other accounting functions, management information systems (a decision making aid).

Stock exchange applications: all large brokerage houses use computers to keep track of accounts, the New York Stock Exchange uses a computer to speed up trading.

Information retrieval: medicine, law, scientific research, government agencies, and libraries are all potential users of such systems. DIALOG, a subsidiary of Lockheed Corp., is probably the oldest of the dial-up information services. It features over 200 different data bases.

Manufacturing: industrial robots (painting and welding), computer aided design(CAD), computer aided manufacturing(CAM), numerical controlled machines (they are controlled by a tape that is produced on a computer), process control (computer equipment used to measure and control variables such as temperature or flow of a fluid).

### COMPUTERS IN EDUCATION

Computer Assisted Instruction(CAI): drill and practice, tutorials, testing done directly on the computer with remedial information supplied as needed based on user response.

Computer Managed Instruction(CMI): instead of direct instruction, the computer oversees the learners instruction but directs them elsewhere for the actual learning.

Computer based simulation: A computer programmed to behave like some other system. Simulation is used when direct experimentation is impossible (system is not available), undesireable (nuculear explosion), uneconomical, or to slow (ecology). Anything that can be described mathematically can be simulated by computer.

COMPUTERS IN HEALTH

Hospital information systems: automate hospital procedures and maintain records on employees and patients.

Medical information systems: use of computers for clinical research, diagnosis, treatment and evaluation.

Health information systems: combination of hospital information and medical information systems.

Patient monitoring: using a computer to monitor critically ill patients.

Pharmacy automation: record keeping, generation of labels for vials and bottles, audit trails for controlled substances as required by federal law.

Dentistry: information processing and accounting tasks (such as insurance claims processing).

COMPUTERS IN THE HOME

Micro-processor controlled devices: microwave oven, washing machine, dryer, dishwasher, sewing machine, smoke and fire detectors, home entertainment devices, cameras, certain automobile accessories. (note: a micro-processor is not a computer system as such, but it does accept input and perform some function based on that input).

Home microcomputer: entertainment (games), education, services - household budget, taxes, stock portfolio analysis, etc.
(note: a microcomputer is a computer that is built around a single micro-processor chip).

Information systems available in the home: "The Source" - information on airline schedules, travel club information, games, news, and weather bulletins. "Compuserv" - primarily news. "QUBE" - the first 2-way interactive cable tv system. Dow-Jones news service - stock quotations and financial news.

Home security systems: systems that call a specific phone number, probably the police or a security service, when forced entry to a home is attempted.

COMPUTERS IN TRANSPORTATION

Reservation systems: airlines, hotel/motel

Traffic control: air traffic control, motor vehicle - traffic light systems.

Railway freight: automated rail car identification.

Rapid transit systems: systems such as the Bay Area Rapid Transit (BART) are computer controlled.

Space transportation: NASA - simulation is used to train potential astronauts, onboard computers control the flight of the space vehicle.

COMPUTERS IN GOVERNMENT AND POLITICS

United States Government is the largest user of computers in the world. In 1950 the U.S. government had 2 computers, in 1980 - 15,800.

Census bureau uses computers to collect and process census data.

IRS uses computers to check and control income tax collection.

Federal budget data preparation - information is gathered from all government agencies about how they will want and need to spend money during the budget year. Information is studied to evaluate the effective use of money in each area. It takes about 3 months before the budget is approved and would be almost impossible without computers.

Office of administration: does nothing but develop and propose methods for providing the office of the President with better information - almost entirely via computer.

FBI: Computerized crime information network.

Postal department uses machines that automatically move the mail and are computer controlled.

Military systems: many of the weapons systems are controlled by computer.

Social Security administration uses computers to keep track of more than 200 million Americans covered by Social Security.

Political polls -information collected in polls is analyzed by computer.

Political vote counting - votes are marked on a special ballot that is input to a computer.

Election night predictions - TV networks use computers to predict the outcome of an election before all the votes are counted.

Reshaping of election districts (reapportionment) - without computers the reapportionment of New York state took 6 years. Now its a matter of days.

Administration of welfare and food stamp programs is all done on computers.

COMPUTERS IN THE ARTS AND HUMANITIES

Computer art: a creative process of interaction between the artist and the computer. Several well known museums have exhibited pieces of computer art and private galleries have also held computer art shows.

Computer animation: many recent movies used a great deal of computer animation - "Tron", "Starwars", "The Empire Strikes Back", etc.

Poetry and Literature: computers are employed to analyze the structure of word patterns.

Computer-aided sculpture: computer programs have been developed that establish sets of numerical co-ordinates in computer storage which sketch out abstract sculptural forms on a digital plotter. A tape can then be recorded which will cause a numerically controlled machine tool to automatically cut a three-dimensional object.

Computer music: computer-aided music composition systems. Computers can also produce electronic sound. Music synthesizers can be attached to a computer to produce actual music from the electronic sounds.

Fabric design: a rug designer uses a computer system to produce rug designs in color, and when they are finalized, a computer-controlled dye-jet sprayer is used to spray the patterns and colors on a roll of white rug, much as a newspaper is printed. When the dyes dry the rugs are cut to size and shipped.

Museums: New York's Metropolitan Museum of Art, Washington's National Gallery and fourteen other Northeastern United States museums have launched the museum computer network. All a teacher lecturing on Roman art would have to do is go to a computer terminal, dial a special phone number, and have pictures and an arsenal of information about Roman art available the instant he or she needs it.

COMPUTERS IN SPORTS AND GAMES

Sports statistics: individual player and team statistics are kept on computers for all professional and most college athletics.

Scoreboard animation: scoreboard animation at all athletic events is controlled by computer.

Football play analysis: most professional football teams use computers to analyze their opponents plays - to determine the other team's tendencies in particular situations.

Computer games: PACMAN, etc.

Casino games: many of the slot machines in gambling casinos are now computer controlled.

Amusement centers: Disneyland, Disneyworld, and the Epcot Center use computers to control a majority of their rides and exhibits.

Sports betting: (even though it may be illegal in most areas of the country, gambling on sporting events is a very big business). Computers are used to attempt to handicap the horses and to predict point spreads in other sporting events for gambling purposes.

COMPUTERS IN SCIENCE, ENGINEERING, AND RESEARCH

Engineering design: structural and mechanical design. Computer graphics (communications with the computer by means of graphical symbols) is used largely in engineering design work.

"Problem solver": complex math calculations that might take an engineer with a desk calculator months or years to complete, can be performed by the computer in hours.

Simulation: simulate certain types of design situations, such as simulation of an atomobile crash to test the structural design of an automobile.

Architect's tool: drawing maps, drawing building perspectives, building optimization studies, analyzing beams, designing and analyzing heating and cooling load on a building, optimizing lighting, analyzing acoustics, evaluating land usage.

Space science/space research: the United States space program would have been impossible without the computer. Computers were used to produce the pictures of the moon we all saw when the first human arrived there. Computers are being used in all areas of space (solar) exploration.

Artifical intelligence: AI is programming of computers in such a fashion that they appear to make "intelligent" decisions. A main area of AI research focuses on the use of machines to simulate the problem-solving techniques of humans. Game playing, such as chess, is an attempt at artifical intelligence. Computerized robots, not industrial robots, use artifical intelligence techniques. Another area of AI research focuses on the study of language - linguistics. Programming a machine to understand words and idioms is possible, but understanding the syntax or context of a sentence is far more difficult. See attachment B.

COMPUTERS IN AGRICULTURE

Commodity charting and analysis: numerous computer programs exsist that attempt to predict commodity price movements.

Weather forecasting information services: Iowa has one called the Iowa Crop Advisory Network (ICAN), which can be accessed by anyone with a home computer and a modem. (a modem is a device that allows access to a computer via phone lines).

Grain storage analysis and dryer energy cost calculations calculate grain storage costs and drying costs for various grains.

Decision making aids: many computer programs exist for crop and livestock budgeting.