

LINDEN HIGH SCHOOL ACADEMY OF SCIENCE & TECHNOLOGY

PHILOSOPHY

It is the philosophy of the Linden High School – Academy of Science & Technology to provide current up-to-date educational programs which will develop each student and enhance their talents to seek higher education or gainful employment. Our program will reflect the individuality of each student and their stated needs. We will advance their preparation and the changes that occur across the years in the industrial, technological, and socio-economic arena and will continuously meet the fluctuations of industry standards. The impetus of our program will be to advance the acquisition of technical skills, encourage higher education and finally promote employment for our graduates.

GOALS

- Provide the learning environment for students to acquire the technological and/or trade related skills.
- Provide a safe learning environment, while practicing processes and using state of the art equipment that meets industry standards.
- Prepare students to advance to institutions of higher learning that may include technical/proprietary schools, county or four-year colleges or seek entry level employment positions in their field of preparation.
- Offer students the preparation and opportunity to practice acquired skills that meet industry standards by participation in the Co-operative Business Education (CBE), Marketing Co-operative or the Co-operative Industrial Education (CIE) programs.
- Develop the foundations for a work ethic that includes appropriate work attitudes, dependability, reliability and how each of these components relate to job security, success, advancement and higher pay as outlined in our school to career curriculum which can be infused in each program.
- Use the commitments made by industrial and community representatives to advise the faculty and the appropriate levels of administration of current industry trends and standards.

I. PROGRAM PHILOSOPHY

Business Education/Computer Science Department

The Business Education/Computer Science Department of Linden High School believes that the mission of business education/computer science is to teach for and about business/computer science. Business education/computer science prepares learners to make wise personal economic and career choices while developing knowledge, skills, and attitudes necessary to succeed in the workforce or to succeed in advanced educational programs at business or technical schools, two-year colleges, and four-year colleges and universities.

Business education means instruction about various roles that all learners will play as economically literate citizens. This instruction includes personal consumer economic skills, knowledge of social and government responsibility, and an understanding of business operations. Learning about business also means developing interpersonal and leadership skills for functioning in multicultural business settings. Preparation for business means building on these general understandings about business in a way that prepares learners to be employed in a variety of careers.

Computer science means the study of computer hardware and computer software design. It includes systems analysis and design, application and system software design, and programming and data center operations. Computer programmers write, test, and maintain detailed instructions that list in a logical order the steps computers must execute to perform their functions. Computer scientists emphasize the application of theory to design computers and software as theorists, researchers, or inventors. Computer engineers apply the theories and principles of science and mathematics to design hardware, software, networks, and processes to solve technical problems. Systems analysts study business, scientific, or engineering data processing problems and design new solutions using computers.

WE BELIEVE THAT, as identified in *Skills and Tasks for Jobs: A SCANS(Secretary's Commission on Achieving Necessary Skills)/Report for America 2000 and Skills for the 21st Century*, the business education/computer science curriculum must prepare competent workers who need:

- **Basic Skills:** reading, writing, arithmetic and mathematics, speaking, and listening.
- **Thinking Skills:** ability to learn, to reason, to think creatively, to make decisions, and to solve problems.
- **Personal Qualities:** individual responsibility, self-esteem and self-management, sociability, integrity, and honesty.

WE BELIEVE THAT, as identified in *Skills and Tasks for Jobs: A SCANS Report for America 2000 and Skills for the 21st Century*, the business education/computer science curriculum must prepare effective workers who can productively use:

- **Resources:** they know how to allocate time, money, materials, space, and staff.
- **Interpersonal skills:** they can work on teams, teach others, serve customers, lead, negotiate, and work well with people from culturally diverse backgrounds.
- **Information:** they can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information.
- **Systems:** they understand social, organizational, and technological systems; monitor and correct performance; and design or improve systems.
- **Technology:** they can select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment.

WE BELIEVE THAT the New Jersey Core Curriculum Cross-Content Workplace Readiness Standards establish the framework for the business education/computer science curriculum. Furthermore, the business education/computer science curriculum supports, addresses, and utilizes many elements of the Language Arts and Literacy Standards, Mathematics Standards, and Science Standards. These standards enable learners to succeed in the workplace and in post-secondary educational programs.

- **Cross-Content Workplace Readiness Standards**

- ✓ Career planning
- ✓ Critical-thinking skills
- ✓ Decision-making skills
- ✓ Problem-solving skills
- ✓ Safety principles
- ✓ Self-management skills
- ✓ Use information
- ✓ Use other tools
- ✓ Use technology
- ✓ Workplace-readiness skills

- **Language Arts and Literacy Standards**

- ✓ Listen actively
- ✓ Read various materials
- ✓ Speak formally and informally
- ✓ Use non-textual visual information
- ✓ Write clear, concise, organized language

- **Mathematics Standards**
 - ✓ Communicate mathematically
 - ✓ Connect mathematics to other learning
 - ✓ Measurement
 - ✓ Number sense
 - ✓ Numerical operations
 - ✓ Reasoning skills
 - ✓ State and solve mathematical problems
 - ✓ Use algebraic concepts/processes to solve problems
 - ✓ Use calculators and computers
 - ✓ Use concepts/methods of discrete mathematics
 - ✓ Use geometric properties/relationships to solve problems
 - ✓ Use high levels of mathematical thought
- **Science Standards**
 - ✓ Formulate usable questions and hypotheses
 - ✓ Plan experiments, investigation, or research
 - ✓ Conduct systematic observations or collect data
 - ✓ Interpret and analyze data
 - ✓ Draw conclusions
 - ✓ Communicate results

WE BELIEVE THAT the following content areas identified by the National Business Education Association constitute a quality business/computer science education:

- Accounting
- Business Law
- Career Development
- Communications
- Computation
- Cooperative Work Experience
- Economics and Personal Finance
- Entrepreneurship
- International Business
- Interrelationships of Business Functions
- Management

- **Marketing**
- **Safety Principles**
- **Information Technology**

WE BELIEVE THAT our institution of the College Board Advanced Placement Computer Science program and the International Baccalaureate Computer Science program and Business and Management courses enhances our overall program by providing a rigorous preuniversity environment within which we can meet the needs of highly motivated students.

WE BELIEVE THAT a strong business education/computer science program is responsive to shifting educational and instructional paradigms. Therefore, curriculum revision must be continuous and based on a sound, carefully thought-out assessment of many variables. Some variables to consider include changing technology, changing demographics, the economy, political developments with their accompanying rules and regulations, and local educational policies and practices.

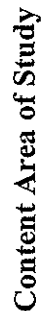
WE BELIEVE THAT education for and about business/computer science should be guided by a global vision recognizing business/computer science as an essential educational component involving all learners in real-life applications of learning.

II. PROGRAM GOALS

- Develop career planning and workplace readiness skills
- Use information, technology, and other tools
- Use critical thinking, decision-making, and problem-solving skills
- Demonstrate self-management skills
- Apply safety principles

Business Education/Computer Science Department

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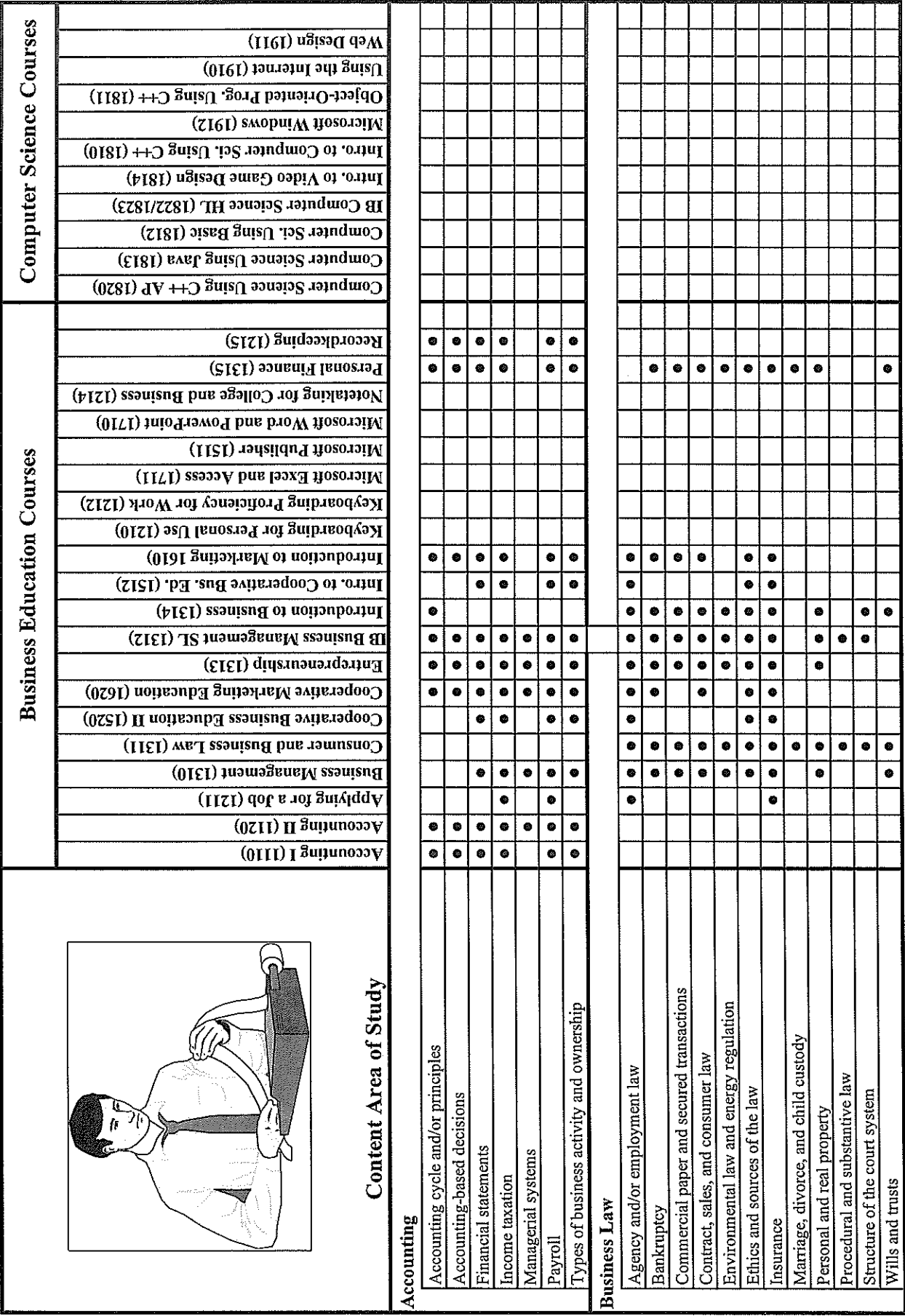
Communicate mathematically
Connect mathematics to other learning
Measurement
Number sense
Numerical operations
Reasoning skills
State and solve mathematical problems
Use algebraic concepts/processes to solve problems
Use calculators and/or computers
Use concepts/methods of discrete mathematics
Use geometric properties/relationships to solve problems
Use high levels of mathematical thought

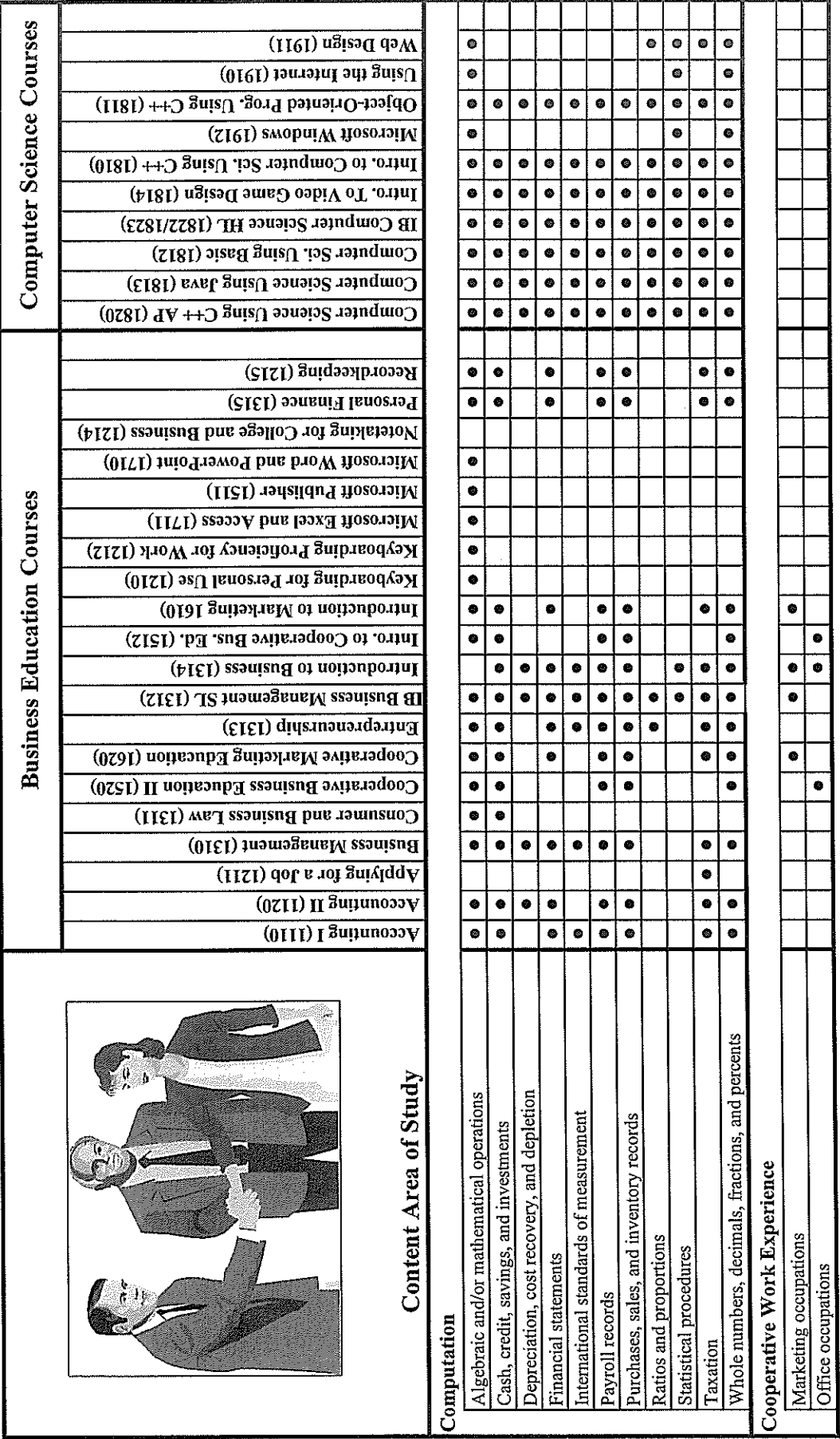
Formulate usable questions and hypotheses
Plan experiments, investigation, or research
Conduct systematic observations or collect data
Interpret and analyze data
Draw conclusions
Communicate results

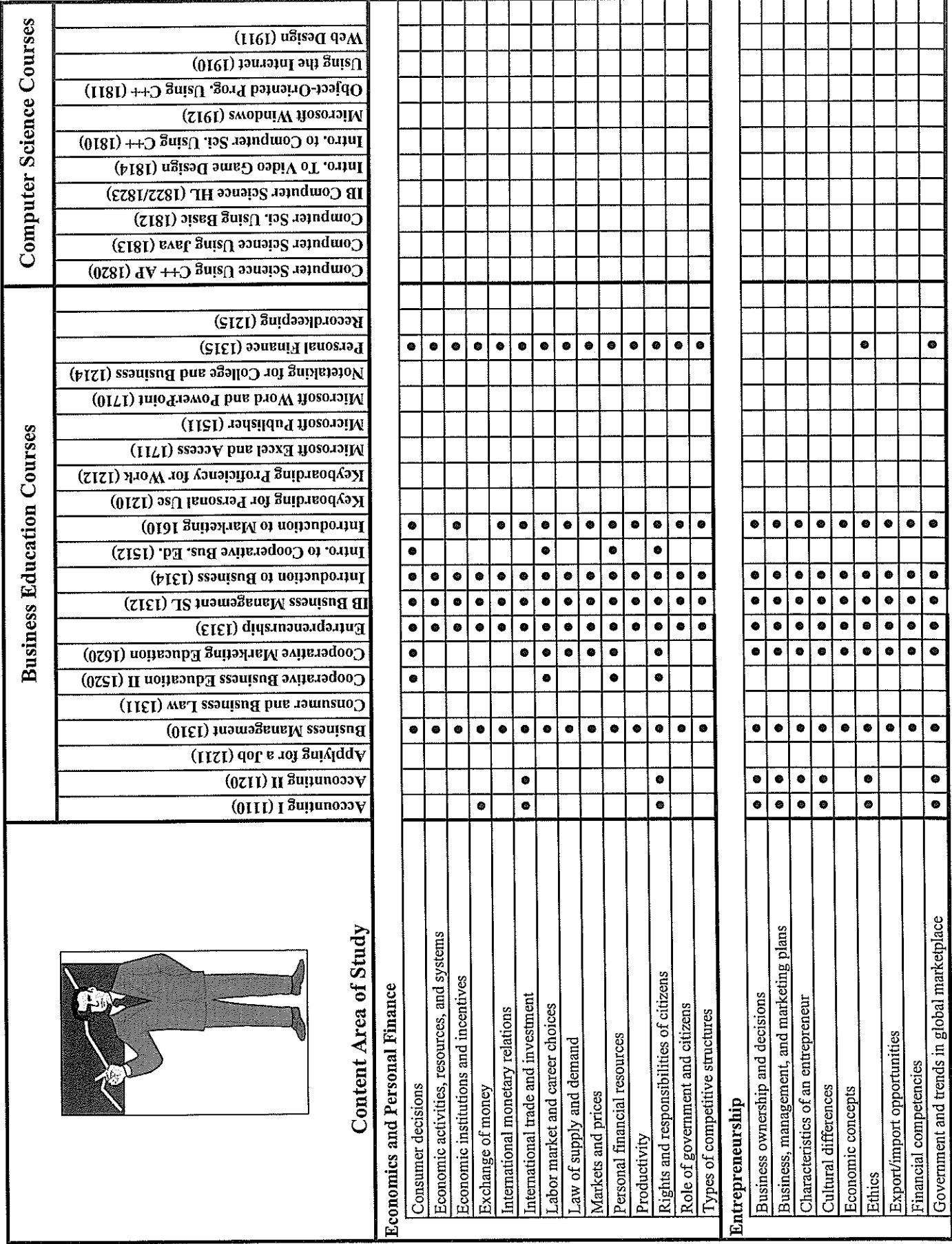
Accounting I (1110)
Accounting II (1120)
Applying for a Job (1211)
Business Management (1310)
Consumer and Business Law (1311)
Cooperative Business Education II (1520)
Cooperative Marketing Education (1620)
Entrepreneurship (1313)
IB Business Management SL (1312)
Introduction to Business (1314)
Intro. to Cooperative Bus. Ed. (1512)
Introduction to Marketing 1610)
Keyboarding for Personal Use (1210)
Keyboarding Proficiency for Work (1212)
Microsoft Excel and Access (1711)
Microsoft Publisher (1511)
Microsoft Word and PowerPoint (1710)
Notetaking for College and Business (1214)
Personal Finance (1315)
Recordkeeping (1215)

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Formulate usable questions and hypotheses
Plan experiments, investigation, or research
Conduct systematic observations or collect data
Interpret and analyze data
Draw conclusions
Communicate results



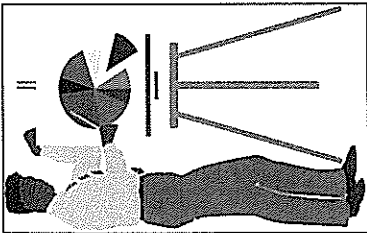


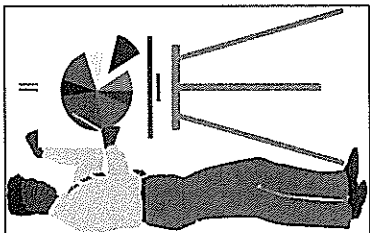


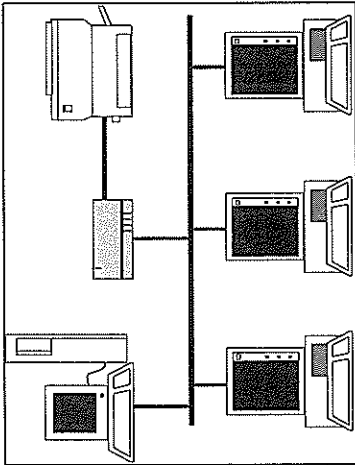
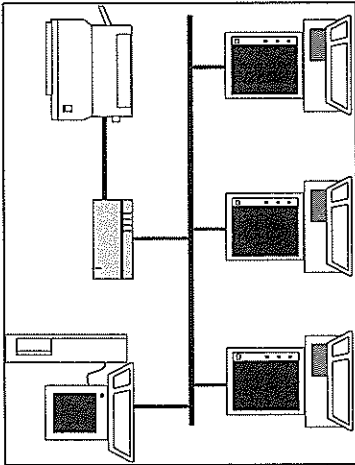


Content Area of Study

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	Content Area of Study		Business Education Courses															Computer Science Courses															
			Accounting I (1110)	Accounting II (1120)	Applying for a Job (1211)	Business Management (1310)	Consumer and Business Law (1311)	Cooperative Business Education II (1520)	Cooperative Marketing Education (1620)	Entrepreneurship (1313)	IB Business Management SL (1312)	Introduction to Business (1314)	Intro. to Cooperative Bus. Ed. (1512)	Introduction to Marketing 1610)	Keyboarding for Personal Use (1210)	Keyboarding Proficiency for Work (1212)	Microsoft Excel and Access (1711)	Microsoft Publisher (1511)	Microsoft Word and PowerPoint (1710)	Notetaking for College and Business (1214)	Personal Finance (1315)	Recordkeeping (1215)	Computer Science Using C++ AP (1820)	Computer Science Using Java (1813)	Computer Sci. Using Basic (1812)	IB Computer Science HL (1822/1823)	Intro. To Video Game Design (1814)	Intro. to Computer Sci. Using C++ (1810)	Microsoft Windows (1912)	Object-Oriented Prog. Using C++ (1811)	Using the Internet (1910)	Web Design (1911)	
Management			•			•	•	•	•	•	•	•	•	•	•	•																	
Code of ethics																																	
Community involvement																																	
Competitive advantage																																	
Functions of management																																	
Government regulations																																	
Human resources managers																																	
Management decisions																																	
Management principles																																	
Management theories																																	
Managerial skills																																	
Organizational structures																																	
Organized labor																																	
Marketing																																	
Distribution plans																																	
Forecasting principles																																	
Forms of marketing promotion																																	
Impact on individual, business, and society																																	
Marketing decisions																																	
Marketing plans																																	
Marketing research																																	
Marketing variables and strategies																																	
Roles of marketing																																	



Content Area of Study		Business Education Courses															Computer Science Courses																
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		Technology: Computer Science and Information Systems																															
		Algorithm design																															
		Careers and career paths																															
		Communications and networking systems																															
		Computer architecture																															
		Computer hardware																															
		Database software																															
		Desktop publishing software																															
		Display information and images (graphics)																															
		Functions and operation of computer systems																															
		Impact on society																															
		Limitations of computer systems																															
		Multimedia																															
		Operating system software																															
		Personal code of ethics																															
		Presentation graphics software																															
		Principles of designing/programming computer systems																															
		Programming languages																															
		Security plans																															
		Spreadsheet software																															
		Theoretical characteristics of computer systems																															
		Touch keyboarding																															
Word processing software																																	

Technology: Computer Science and Information Systems

IV. COURSE DESCRIPTION

Introduction to Computer Science Using C++

Prerequisite: None

Credits: 5

Grades: 9, 10, 11, 12

Introduction to Computer Science Using C++ introduces students to the fundamental concepts of computer science and structured programming using the C++ programming language. Topics covered include computer basics; how computers are programmed; entering, compiling, and running programs; variables and constants; math operations; strings and screen input and output; decision-making in programs; loops; functions; pointers; creating data types; structures; and data file basics. Hands-on activities representing realistic programs, problems, interdisciplinary projects, and case studies are integrated into the course content.

V. COURSE GOALS

Programming in a professional language like C++ is challenging. The rewards for facing these challenges are many. In today's world, the ability to program computers is a valuable skill that provides lucrative employment opportunities.

Even the student who does not plan to make a career of computer programming will realize benefits from the investment of time spent studying computer science. Learning to program computers develops the student's ability to solve many types of problems. Through the study of programming, students learn to break a problem into manageable parts and think in logical ways. Furthermore, programming allows the student to be creative.

At the conclusion of Introduction to Computer Science Using C++, all students will be able to:

- Explain computer basics: history, evolution, components, and internal operation.
- Explain how computers are programmed: modern programming languages, circuits for data and instructions, and five-step programming process.
- Explain and demonstrate entering code into a text editor, translating a program by using a compiler, and running an executable file.
- Explain and demonstrate the use of variables and constants in programs.
- Explain and demonstrate the use of mathematical operations in programs.
- Explain and demonstrate the use of strings and screen I/O in programs.
- Explain and demonstrate the use of decision making in programs.
- Explain and demonstrate the use of loops in programs.
- Explain and demonstrate the use of functions in programs.
- Explain and demonstrate the use of data files in programs.
- Write programs in the C++ language
- Edit programs in the C++ language
- Demonstrate how to "trace" a program to find the output

VI. COURSE CURRICULUM CHART - Introduction to Computer Science Using C++

UNIT/ TOPIC	OBJECTIVES	STANDARD	RESOURCE
<u>Chapter 1</u> The C++ Language	• Explain the history of computers and how they evolved into today's powerful desktop computers • Explain the components that make up a typical desktop computer • Explain the basics of microcomputer architecture • Describe the role of operating system • Describe how to select a programming language • Explain the process to enter, compile, link, and run a C++ program • Modify source code • Describe how a computer gets instructions	3.1 F, G 3.3 A, B 3.4 A, B 4.1B 4.5B 8.1A&B 8.2A-C 9.1A&B 9.2A-F	See "Resources" page
<u>Chapter 2</u> Variables and Constants	• Explain the different variable types used in C++ and how they differ from constants • Declare, name, and initialize variables in programs • Use constants in programs • User character variables • Explain the different floating-point types and use variables of those types • Describe Boolean variables	3.1 F, G 3.3 A, B 3.4 A, B 4.1B 4.5B 8.1A&B 8.2A-C 9.1A&B 9.2A-F	
<u>Chapter 3</u> Math Operations	• Use the arithmetic and assignment operators in programs • Use operators in output statements • Explain dividing by zero • Increment and decrement variables in programs • Explain and demonstrate the order of operations in programs • Use mixed data types in programs • Avoid overflow, underflow, and floating-point errors in programs • Trace through programs to find output	3.1 F, G 3.3 A, B 3.4 A, B 4.1B 4.5B 8.1A&B 8.2A-C 9.1A&B 9.2A-F	

UNIT/ TOPIC	OBJECTIVES	STANDARD	RESOURCE
<u>Chapter 4</u> Strings and Screen I/O	• Define strings and literals • Explain classes and objects • Use the string class to store strings in your programs • Perform basic string operations • Use cin and cout • Use special characters • Format output • Accept characters and strings as input • Write and edit simple programs	3.1 F, G 3.3 A, B 3.4 A, B 4.1B 4.5B 8.1A&B 8.2A-C 9.1A&B 9.2A-F	See "Resources" page
<u>Chapter 5</u> Decision Making	• Describe how decisions are made in programs • Describe how true and false are represented in C++ • Use relational operators • Use logical operators • Describe short-circuit evaluation • Describe selection structures • Use the if structure • Use the if/else structure • Use nested if structures • Use the switch structure	3.1 F, G 3.3 A, B 3.4 A, B 4.1B 4.5B 8.1A&B 8.2A-C 9.1A&B 9.2A-F	
<u>Chapter 6</u> Loops	• Describe the purpose of loops • Use for loops • Use while loops • Use do while loops • Use the break and continue statements • Nest loops • Write and edit more complex programs • Trace through more complex programs	3.1 F, G 3.3 A, B 3.4 A, B 4.1B 4.5B 8.1A&B 8.2A-C 9.1A&B 9.2A-F	

UNIT/ TOPIC	OBJECTIVES	STANDARD	RESOURCE
<u>Chapter 7</u> Functions	• Build structured programs that are divided into functions • Describe the flow of execution in a program with multiple functions • Describe what is meant by the phrase "scope of variable." • Pass data to functions • Get values from functions using return • Describe and use library functions • Use common math functions • Use character manipulation functions	3.1 F, G 3.3 A, B 3.4 A, B 4.1B 4.5B 8.1A&B 8.2A-C 9.1A&B 9.2A-F	See "Resources" page
<u>Chapter 8</u> Data File Basics	• Understand concepts of sequential access and random access files • Open and close sequential files • Write data to sequential file • Read data from sequential files • Use other sequential file techniques	3.1 F, G 3.3 A, B 3.4 A, B 4.1B 4.5B 8.1A&B 8.2A-C 9.1A&B 9.2A-F	
Safety Principles	• Explain common hazards in the computer laboratory and how to eliminate them • Explain common injuries that could occur in the computer laboratory • Identify laws established to promote safety and health in environments like the computer laboratory • Explain safety procedures for hands-on activities in the computer laboratory • Explain safe physical movement in the computer laboratory • Identify safety and protective devices in the computer laboratory • Explain the use of tools and equipment in the computer laboratory	3.1 F, G 3.3 A, B 3.4 A, B 8.1A&B 8.2A-C 9.1A&B 9.2A-F	

UNIT/ TOPIC	OBJECTIVES	STANDARD	RESOURCE
Careers and Career Paths	• Explain career resources, success, and lifelong learning in computer science • Explain goals and an individual career path in computer science • Identify personal strengths and weaknesses as they relate to computer science • Explain strategies for transition from school to work in computer science • Explain work ethic as it relates to computer science • Explain workplace communication skills as they relate to computer science • Explain workplace diversity and relationships as they relate to computer science	3.1 F, G 3.3 A, B 3.4 A, B 8.1A&B 8.2A-C 9.1A&B 9.2A-F	See "Resources" page

VII. EVALUATION

During the Introduction to Computer Science Using C++ course, students are involved in a variety of learning activities: reading material, attending classes, answering questions, completing programming hands-on exercises and problems, developing a computer science vocabulary, completing programming projects, and analyzing case studies.

The teaching strategies employed by the teacher are as varied as the learning experiences: lecture, one-to-one interaction with students, question/answer sessions, discussions encouraging students to explain procedures, class recitation, board work by teacher and students, use of visual aids, use of models and simulations, guided exploration and practice on the computer, assignment of homework problems and class review, programming projects and case studies requiring cumulative knowledge (individual or team efforts), quizzes, and tests.

Through the above learning activities and teaching strategies, an evaluation process occurs. Performance averages will be calculated for four grading periods. The student's performance on quizzes, tests, homework, and programming projects will determine the grading period average. Students will be judged on the quality of performance. Such factors as preparedness, attention to detail, completeness of assignments and adherence to instructions and standards will be considered.

Students are expected to attend class daily; excessive absences as outlined in the student handbook will have a detrimental effect on the student's performance and evaluation.

A final examination will be administered at the conclusion of the course.

The course grade reflecting the student's overall performance will consist of five parts: four grading period averages and the final examination grade.

VIII. RESOURCES

Student Instructional Materials

- **Textbook:** Knowlton, Todd. *Introduction to Computer Science Using C++*. Cincinnati, Ohio: South-Western Educational Publishing. 1998.
- Meyenn, Andrew and Richard Jones. *Computer Science*.
- Brookshear, J. Glen. *Computer Science- An Overview*.
 - **Workbook:** includes additional questions, problems, coding and debugging exercises, and vocabulary reinforcement.
 - **Template Disk:** includes the source code and data files necessary to complete the exercises in the textbook.
 - **Internet Web Site:** <http://www.ProgramCPP.com> (devoted entirely to supplementing this textbook and providing up-to-date information, additional case studies, and links to important resources on the Internet).
 - **AP Study Guide:** provides summaries of AP topics and questions similar to those on the AP exam.
 - **Instructor's Manual:** provides scheduling help, teaching suggestions, chapter tests, and solutions to questions and problems from the student textbook and workbook.
- **Compiler:** *Microsoft Visual C++, Version 5*.

Student Instructional Videos

- *Business Detail Careers*
- *Business Ethics*
- *Good Work: Business and Computers*
- *Good Work: Technology, Part 1*
- *Good Work: Technology, Part 2*
- *How Computers Work: A Journey Through the Walk-Through Computer*
- *National Treasure Parts 1 and 2*
- *Pirates of Silicon Valley*
- *So . . . You Want a Career in Computer Science/Data Processing*
- *Ten Basics of Business Etiquette*
- *The Net*
- *Work, The Inside Story: Leaving School*
- *Workplace: The Changing Workworld*
- *Welcome to Macintosh*

Extra Resources

Brain Builder Exercise book

<http://www.makeuseof.com/tag/top-10-professional-sample-code-websites-for-programmers/>

<http://www.cplusplus.com/>

"Digital Fortress"

Guest speakers from the computer field

Guest speakers from Devry University

Teacher Instructional Reference Materials

- Heller, Steve. *The C++ Training Guide*. London, England: Academic Press. 1996.
- Litvin, Maria and Gary Litvin. *C++ for You++*. AP Edition. Andover, Massachusetts: Skylight Publishing. 1998.

Program and Course Development Reference Materials

- National Business Education Association. *Curriculum Forum*. <http://www.nbea.org/nbea.html>. 1998.
- New Jersey Department of Education. *New Jersey Core Curriculum Content Standards*. <http://www.injersey.com/Education/NJDOE/index.html>. 1996.