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.

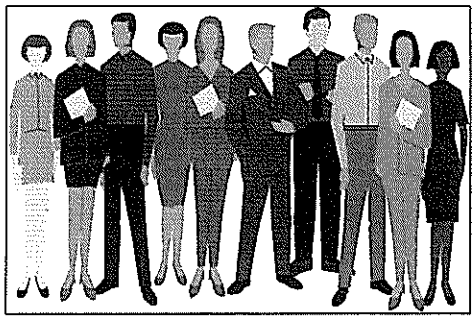
WE BELIEVE THAT education for and about business/computer science should be guided by a global vision recognizing business/computer science as an essential educational component involving all learners in real-life applications

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

III. PROGRAM SCOPE AND SEQUENCE

Business Education/Computer Science Department



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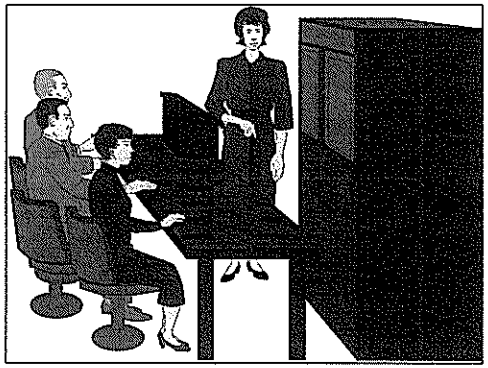
New Jersey Core Curriculum Cross-Content Workplace Readiness Standards																														
Career planning	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Critical-thinking skills	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Decision-making skills	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Problem-solving skills	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Safety principles	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Self-management skills	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Use information	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Use other tools	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Use technology	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Workplace-readiness skills	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
New Jersey Core Curriculum Language Arts and Literacy Standards																														
Listen actively	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Read various materials	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Speak formally and/or informally	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Use nontextual visual information	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Write clear, concise, organized language	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●



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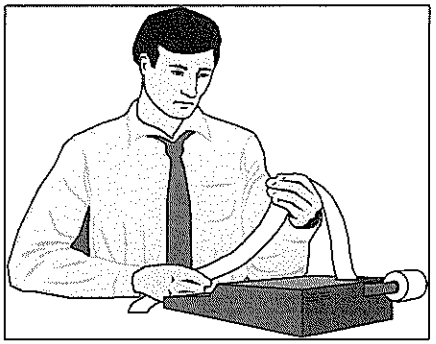
New Jersey Core Curriculum Mathematics Standards																																
Communicate mathematically	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●	●	●	●	●	●	●	●	●	●	
Connect mathematics to other learning	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Measurement	●	●		●	●	●	●	●	●	●	●	●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



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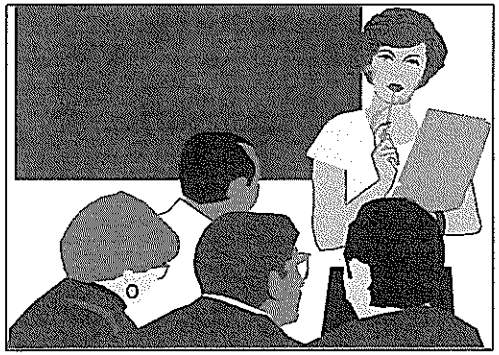
Accounting																																
Accounting cycle and/or principles	●	●					●	●	●	●		●							●	●												
Accounting-based decisions	●	●					●	●	●			●							●	●												
Financial statements	●	●		●		●	●	●	●		●	●							●	●												
Income taxation	●	●	●	●		●	●	●	●		●	●							●	●												
Managerial systems		●		●			●	●	●																							
Payroll	●	●	●	●		●	●	●	●		●	●							●	●												
Types of business activity and ownership	●	●		●		●	●	●	●		●	●							●	●												
Business Law																																
Agency and/or employment law			●	●	●	●	●	●	●	●	●	●																				
Bankruptcy				●	●		●	●	●	●		●							●													
Commercial paper and secured transactions				●	●			●	●	●		●							●													
Contract, sales, and consumer law				●	●		●	●	●	●		●							●													
Environmental law and energy regulation				●	●			●	●	●									●													
Ethics and sources of the law				●	●	●	●	●	●	●	●	●							●													
Insurance			●	●	●	●	●	●	●	●	●	●							●													
Marriage, divorce, and child custody					●														●													
Personal and real property				●	●			●	●	●									●													
Procedural and substantive law					●				●																							
Structure of the court system					●				●	●																						
Wills and trusts				●	●					●									●													



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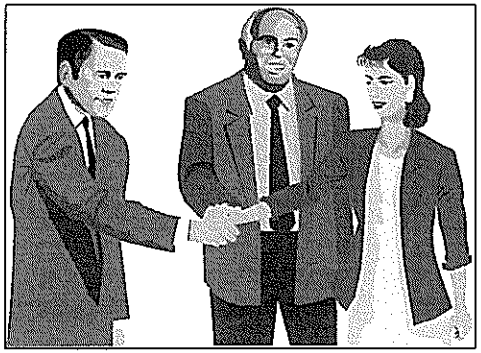
Career Development																																
Career resources, success, and lifelong learning	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Goals and an individual career path	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Personal strengths and weaknesses	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Strategies for transition from school to work	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Work ethic	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Workplace communication skills	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Workplace diversity and relationships	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Communications																																
Customer-service strategies	●	●		●		●	●	●	●	●	●	●																				
Forms of communication in pursuit of career	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Leadership and supervision techniques				●		●	●	●	●	●	●	●																				
Social communication skills	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Standards of personal ethics	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Technology to enhance effectiveness	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●	●	●	●	●	●	●	●	●	●	
Verbal communication skills	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Written communication skills	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	



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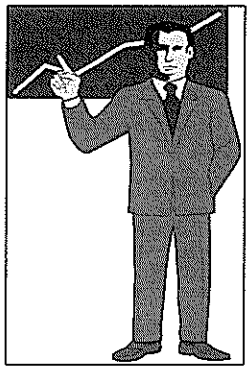
Computation																																
Algebraic and/or mathematical operations	●	●		●	●	●	●	●	●		●	●	●	●	●	●	●		●	●		●	●	●	●	●	●	●	●	●	●	
Cash, credit, savings, and investments	●	●		●	●	●	●	●	●	●	●	●							●	●		●	●	●	●	●	●		●			
Depreciation, cost recovery, and depletion		●		●					●	●												●	●	●	●	●	●		●			
Financial statements	●	●		●			●	●	●	●		●							●	●		●	●	●	●	●	●		●			
International standards of measurement	●			●				●	●	●												●	●	●	●	●	●		●			
Payroll records	●	●		●		●	●	●	●	●	●	●							●	●		●	●	●	●	●	●		●			
Purchases, sales, and inventory records	●	●		●		●	●	●	●	●	●	●							●	●		●	●	●	●	●	●		●			
Ratios and proportions								●	●													●	●	●	●	●	●		●		●	
Statistical procedures									●	●												●	●	●	●	●	●	●	●	●	●	
Taxation	●	●	●	●			●	●	●	●		●							●	●		●	●	●	●	●	●		●		●	
Whole numbers, decimals, fractions, and percents	●	●		●		●	●	●	●	●	●	●							●	●		●	●	●	●	●	●	●	●	●	●	
Cooperative Work Experience																																
Marketing occupations							●		●	●		●																				
Office occupations						●				●	●																					



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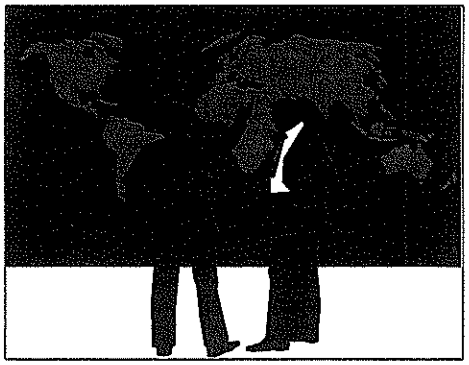
Economics and Personal Finance																																
Consumer decisions				●		●	●	●	●	●	●	●							●													
Economic activities, resources, and systems				●				●	●	●									●													
Economic institutions and incentives				●				●	●	●		●							●													
Exchange of money	●			●				●	●	●									●													
International monetary relations				●				●	●	●		●							●													
International trade and investment	●	●		●			●	●	●	●		●							●													
Labor market and career choices				●		●	●	●	●	●	●	●							●													
Law of supply and demand				●			●	●	●	●		●							●													
Markets and prices				●			●	●	●	●		●							●													
Personal financial resources				●		●	●	●	●	●	●	●							●													
Productivity				●				●	●	●		●							●													
Rights and responsibilities of citizens	●	●		●		●	●	●	●	●	●	●							●													
Role of government and citizens				●				●	●	●		●							●													
Types of competitive structures				●				●	●	●		●							●													
Entrepreneurship																																
Business ownership and decisions	●	●		●			●	●	●	●		●																				
Business, management, and marketing plans	●	●		●			●	●	●	●		●																				
Characteristics of an entrepreneur	●	●		●			●	●	●	●		●																				
Cultural differences	●	●		●			●	●	●	●		●																				
Economic concepts				●			●	●	●	●		●																				
Ethics	●	●		●			●	●	●	●		●							●													
Export/import opportunities				●			●	●	●	●		●																				
Financial competencies				●			●	●	●	●		●																				
Government and trends in global marketplace	●	●		●			●	●	●	●		●							●													



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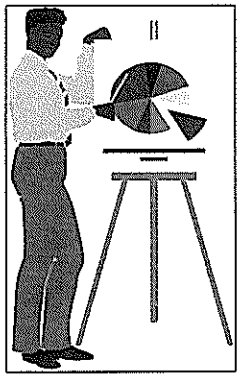
International Business																																
Balance of trade				●				●	●	●		●																				
Communication strategies				●	●			●	●	●		●																				
Cultural factors	●	●		●	●			●	●	●		●																				
Economic factors				●	●			●	●	●		●																				
Entrepreneurial opportunities	●	●		●				●	●	●		●																				
Ethical behavior and environmental factors	●	●		●	●			●	●	●		●																				
Forms of business ownership	●	●		●				●	●	●		●																				
Human resources				●				●	●	●		●																				
Impact on careers				●				●	●	●		●																				
Import/export process				●					●	●		●																				
International finance				●					●	●		●																				
Legal factors				●	●			●	●	●		●																				
Local, state, national, and international levels				●	●			●	●	●		●																				
Marketing concepts				●	●			●	●	●		●																				
Political factors				●	●			●	●	●		●																				
Role of international business				●				●	●	●		●																				
Social factors				●	●			●	●	●		●																				
Interrelationships of Business Functions																																
Finance	●	●		●			●	●	●	●		●																				
Marketing				●			●	●	●	●		●																				
Production				●			●	●	●	●		●																				



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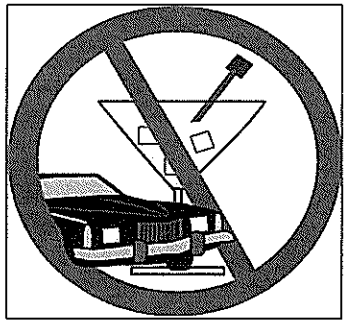
Management																																
Code of ethics	●	●		●	●		●	●	●	●		●																				
Community involvement				●	●			●	●	●		●																				
Competitive advantage				●				●	●	●		●																				
Functions of management				●			●	●	●	●		●																				
Government regulations			●	●	●			●	●	●		●																				
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				●			●		●	●		●																				



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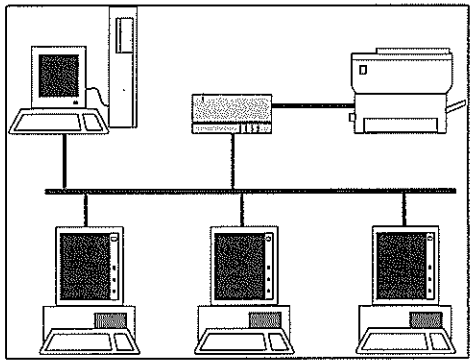
Safety Principles																															
Basic first aid and safety precautions	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	
Common hazards and elimination	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	
Common injuries	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	
Injury prevention program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	
Laws to promote safety and health	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	
Procedures for hands-on activities	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	
Safe physical movement	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	
Safety and protective devices	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	
Use of tools and equipment	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	



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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			●			●	●		●	●	●	●	●	●	●	●	●															

IV. COURSE DESCRIPTION

Object-Oriented Programming Using C++

Prerequisite:	Introduction to Computer Science Using C++
Credits:	5
Grades:	10, 11, 12

Object-Oriented Programming Using C++ introduces students to object-oriented programming methodology using the C++ programming language. Topics covered include object-oriented programming, string functions, using string classes, arrays, templates, vectors, multi-dimensional arrays, matrices, linked lists, stacks, queues, trees recursion, searching, and sorting. 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 Object-Oriented Programming 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.

VI. COURSE CURRICULUM CHART - *Object-Oriented Programming Using C++*

UNIT/ TOPIC	OBJECTIVES	STANDARD	RESOURCE
Overview of Microcomputer System and Programming	• 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 • Understand the terminology used in object-oriented programming languages • Understand sequence, selection, and repetition structures • Demonstrate sequence, selection, and repetition structures	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
Problem Solving in Object Oriented Programming	• Explain the six problem-solving steps used to create a program • Explain an IPO chart • Complete an IPO chart • Discuss and explain algorithms • Plan an algorithm using pseudocode and flowcharts • Desk-check algorithms • Differentiate between source and object code • Code algorithms	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	
Variables and Constants	• Select appropriate name, data type and initial value for a variable • Create and initialize variables • Explain and demonstrate how to perform a type conversion • Create constants • Explain and demonstrate assignment statements • Use getline and strcpy functions correctly • Use type conversions in equations • Create console applications	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
Math and Void Functions	• Use the built-in math functions • Review math.h file and how to interpret • Create and invoke void functions • Pass by value and reference • Understand and properly use local variables • Create functions that return values • Format numeric output	4.1B 4.5B 8.1A&B 8.2A-C 9.1A&B 9.2A-F	See "Resources" page
Selection Structures	• Write pseudocode for selection structures • Create flowcharts • Use if and if/else structures properly • Use relational and logical operators in functions • Write nested structures • Include character and strings in comparisons of functions • Generate random numbers for srand, rand, and time functions • Explain and demonstrate stubs in 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	
Classes	• Create a class • Discuss the difference between public and private classes • Use public members of a class to manipulate the private members • Create an object from a programmer-defined class • Create a constructor function • Explain how to use value-returning functions in classes	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
Pointers and Arrays	• Explain the importance of pointers in OOP • Create and initialize pointers • Assign addresses to pointers • Use a pointer variable to access a value stored • Demonstrate how to pass pointers • Explain arrays and initialize • Enter data into arrays • Learn to search arrays for data	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
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	
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	

VII. EVALUATION

During the Object-Oriented Programming 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.
  Zak, Diane. *An Introduction to Computer Science Using C++.* Cambridge, Massachusetts: Course Technology, 1998.
  - **Workbook:** includes the source code and data files necessary to complete the exercises in the textbook.
  - **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).
  - **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

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