

## COMPUTER SCIENCE II: INFORMATICS

*Computer Science II: Informatics* introduces the student to terminology, concepts, theory, and fundamental skills used to implement information systems and functions in a wide variety of applications from small businesses to large enterprise organizations. Topics include the history of and trends in computing, operating systems, security, cloud implementations, and other concepts associated with applying the principles of good information management to the organization.

- DOE Code: 5251
- Recommended Grade Level: 11, 12
- Required Prerequisite: Computer Science I
- Credits: 2 semester course, 2 semesters required, 1-3 credits per semester, 6 credits maximum
- Counts as a Directed Elective or Elective for all diplomas

### Dual Credit

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

### Application of Content and Multiple Hour Offerings

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

### Career and Technical Student Organizations (CTSOs)

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in Business Professionals of America, DECA, or Future Business Leaders of America, the CTSOs for this area.

## Content Standards

### Domain – History of Informatics

**Core Standard 1** Students connect the history and development of informatics.

#### Standards

- CS2I-1.1 Discuss the history of informatics as an academic discipline
- CS2I-1.2 Recognize the relationships between computer science, information systems, information technology, and statistics as these relate to informatics
- CS2I-1.3 Recall the role, components, and scope of Internet computing

## **Domain – Trends in Computing**

**Core Standard 2** Students identify emerging trends in computing.

### **Standards**

- CS2I-2.1 Predict future trends based on emerging technologies
- CS2I-2.2 Explore virtual and augmented reality for functionality, reliability, ease of use, affordability and availability
- CS2I-2.3 Estimate the potential of items being connected to a network, both local and on the Internet due to increasing speed capabilities
- CS2I-2.4 Discuss nonvolatile memory and the impact of storing data
- CS2I-2.5 Distinguish between Cyber Physical Systems (CPS) and the impact on smart grids, air transportation, intelligent transportation systems, smart medical technologies, smart buildings, and smart manufacturing
- CS2I-2.6 Describe how capability-based security can be a defense against computing attacks
- CS2I-2.7 Explain advanced machine learning and construction of algorithms that can learn from and make predictions on data
- CS2I-2.8 Recognize Network Function Virtualization (NFV) as an emerging technology that provides virtualized infrastructure on which next generation cloud services depend
- CS2I-2.9 Summarize how containers allow companies to develop and deliver applications faster and more efficiently
- CS2I-2.10 Discuss the concept of storage as it applies locally, in the cloud, and employing the use of storage area network technology
- CS2I-2.11 Summarize how informatics can support the organization, including general management, operations, human resources, and financial management
- CS2I-2.12 Discuss the importance of security within informatics, including the application in various aspects of the computing disciplines

## **Domain – Operating Systems**

**Core Standard 3** Students understand operating system components.

### **Standards**

- CS2I-3.1 Discuss how the operating system supports sharing and protection
- CS2I-3.2 Understand why 64-bit architecture is necessary in today's computing
- CS2I-3.3 Summarize the various operating systems from the past and present
- CS2I-3.4 Compare the user mode versus kernel mode
- CS2I-3.5 Define interrupt, exception, and trap related to exception handling and protection
- CS2I-3.6 Identify major OS components such as processor, memory, I/O, secondary storage, file systems, protection, shells (command interpreter or OS UI), GUI, networking

## **Domain – Database Design and Management**

**Core Standard 4** Students explore design and management of databases.

### **Standards**

- CS2I-4.1 Identify types and nature of databases in a business setting
- CS2I-4.2 Understand and apply terminology of database usage
- CS2I-4.3 Evaluate data and performance needed to inform decision making in a business setting

- CS2I-4.4 Describe the differences among relational, hierarchical, and network database structures
- CS2I-4.5 Compare structured versus unstructured data using database management systems
- CS2I-4.6 Describe general structure and organization of a relational database and explain the functions of the basic relational operators
- CS2I-4.7 Apply normalization techniques to the design of databases, and define and describe the 1NF, 2NF, 3NF, and BCNF
- CS2I-4.8 Analyze the impact of database size and performance on technology
- CS2I-4.9 Explain how defining and creating database files affects computer space and performance
- CS2I-4.10 Plan, design, create and modify a database using objects and elements
- CS2I-4.11 Describe, define, and use basic data types
- CS2I-4.12 Create stored procedures and functions
- CS2I-4.13 Describe database field names, field types, relationships among tables, and create and entity-relationship diagram (ERD)
- CS2I-4.14 Create database objects, retrieve, and manipulate data using SQL commands
- CS2I-4.15 Identify data integrity and security requirements
- CS2I-4.16 Discuss the concepts and use of BIG data, data warehousing, and data mining
- CS2I-4.17 Explain the fundamental concepts of an information system, including the life cycle, components, and flow of information within an organization
- CS2I-4.18 Discuss the basic use of statistics and reporting within an organization

**Domain – Human Computer Interaction**

**Core Standard 5** Students relate the human computer interaction and the effect on society.

**Standards**

- CS2I-5.1 Discuss various aspects of the nature of information from a human and mechanical point of view
- CS2I-5.2 Compare global information ethics and how regional users are affected
- CS2I-5.3 Describe and evaluate various global, digital environments
- CS2I-5.4 Identify and investigate world-wide political situations that have affected the utilization of digital technologies
- CS2I-5.5 Describe how digital mechanization has affected the global labor force
- CS2I-5.6 Investigate the historical computer/human interaction and effect upon society
- CS2I-5.7 Explore popular and controversial uses of technology
- CS2I-5.8 Interpret the current, relevant legal structures/frameworks developed/associated around computer technology
- CS2I-5.9 Compare global information ethics

**Domain – Informatics Career Pathway**

**Core Standard 6** Students investigate career pathways related to informatics.

**Standards**

- CS2I-6.1 Analyze career trends, options and opportunities (outlook) for employment and entrepreneurial endeavors

- CS21-6.2 Evaluate selected careers and pathways for roles and responsibilities, education requirements, working conditions, benefits, and opportunities for growth and change
- CS21-6.3 Use appropriate technology and resources to research and organize information about careers
- CS21-6.4 Demonstrate understanding of postsecondary educational options including technical certificate programs, apprenticeship, military and two- and four-year college programs