

COMPUTER PROGRAMMING I

Computer Programming I covers fundamental concepts of programming are provided through explanations and effects of commands, and hands-on utilization of lab equipment to product correct output. This course introduces the structured techniques necessary for efficient solution of business-related computer programming logic problems and coding solutions into a high-level language. Includes program flowcharting, pseudo coding, and hierarchy charts as a means of solving these problems. The course covers creating file layouts, print charts, program narratives, user documentation, and system flowcharts for business problems. Reviews algorithm development, flowcharting, input/output techniques, looping, modules, selection structures, file handling, and control breaks. Offers students an opportunity to apply skills in a laboratory environment. Demonstrations of business problems and solutions techniques will be reviewed.

- DOE Code: 4534
- Recommended Grade Level: Grade 10-12
- Recommended Prerequisites: Information and Communications Technology
- Credits: 1-3 credits per semester, maximum of 2 semesters, maximum of 6 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas
- This course is aligned with postsecondary courses for Dual Credit:
 - Ivy Tech
 - CINS 113 Logic Design Programming
 - CINS 137 Visual Basic Programming
 - Vincennes University
 - TBD

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 Professional of America, DECA, or Future Business Leaders of America, the CTSOs for this area.

Content Standards

Domain – Problem Analysis

Core Standard 1 Students analyze a problem and develop a solution by creating a computer program.

Standards

- CP1-1.1 Identify how to use a computer program to solve a problem
- CP1-1.2 Construct interactive computer programs that accept various forms of input and produce various forms of output, as a solution to a computer programming problem
- CP1-1.3 Use print charts, file layouts, program narratives, hierarchy charts, and system flowcharts, which accurately depict the problem assigned and describe the solution
- CP1-1.4 Report the program schematics and usage
- CP1-1.5 Identify the standard program flowchart symbols and use them correctly within the context of the basic control structures of sequence, selection and looping

Domain – Software Tools

Core Standard 2 Students apply and adapt software tools to develop a computer program.

Standards

- CP1-2.1 Construct a program that processes information
- CP1-2.2 Identify programming languages as procedural or object oriented
- CP1-2.3 Develop programs using reusable modules (modularization)
- CP1-2.4 Use debugging techniques to correct and validate the computer program
- CP1-2.5 Construct the program in a high-level programming language based on a created design
- CP1-2.6 Construct a program that opens and closes a file

Domain – Algorithm

Core Standard 3 Students design a solution to the problem using algorithms.

Standards

- CP1-3.1 Develop algorithms to solve a computer programming problem(s)
- CP1-3.2 Assess the use of algorithms to provide a solution to a programming problem
- CP1-3.3 Use pseudo code to describe a solution to a programming problem
- CP1-3.4 Create a program flowchart and ANSI standard flowcharting symbols to define a solution to a programming problem
- CP1-3.5 Explain how the algorithm can be used to solve a problem

Domain – Program Development

Core Standard 4 Students create a functional computer program.

Standards

- CP1-4.1 Define the process of programming.
- CP1-4.2 Create a computer program that corresponds to an algorithm or proposed solution
- CP1-4.3 Define programming structures
- CP1-4.4 Recognize data variables and constants
- CP1-4.5 Recognize local scope and global scope
- CP1-4.6 Use conditionals (IF statements)
- CP1-4.7 Use loops (while statements, for statements)
- CP1-4.8 Define single and multidimensional Arrays
- CP1-4.9 Use functions and methods to break down the program logic and support reuse
- CP1-4.10 Define the graphical user interface
- CP1-4.11 Identify the parts of the programming platform

- CP1-4.12 Identify different types of errors and handle them programmatically
- CP1-4.13 Use the order of operations when using calculations

Domain – Program Verification and Debugging

Core Standard 5 Students prove a computer program solution works by using verification and debugging techniques.

Standards

- CP1-5.1 Predict and explain output
- CP1-5.2 Identify cause/effect for input/output
- CP1-5.3 Perform input validation
- CP1-5.4 Scrutinize peers code for errors

Domain – Documentation

Core Standard 6 Students connect an associated task with the code by providing documentation.

- CP1-6.1 Describe the function of a computer program
- CP1-6.2 Identify the purposes of a computer program
- CP1-6.3 Explain concepts related to a computer program
- CP1-6.4 Describe how to use a computer program
- CP1-6.5 Identify cause/effect by explaining input and output
- CP1-6.6 Interpret input/output

Process Standards

Common Core Literacy Standards for Technical Subjects

Reading Standards for Literacy in Technical Subjects 11-12

The standards below begin at grade 11 and define what students should understand and be able to do by the end of grade 12. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations – the former providing broad standards, the latter providing additional specificity.

Key Ideas and Details

- 11-12.RT.1 Cite specific textual evidence to support analysis of technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- 11-12.RT.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- 11-12.RT.3 Follow precisely a complex multistep procedure when performing technical tasks; analyze the specific results based on explanations in the text.

Craft and Structure

- 11-12.RT.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific context relevant to *grades 11-12 texts and topics*.
- 11-12.RT.5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

- 11-12.RT.6 Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

Integration of Knowledge and Idea

- 11-12.RT.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
- 11-12.RT.8 Evaluate the hypotheses, data, analysis, and conclusions in a technical subject, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- 11-12.RT.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Range of Reading and Level of Text Complexity

- 11-12.RT.10 By the end of grade 12, read and comprehend technical texts in the grades 11-CCR text complexity band independently and proficiently.

Writing Standards for Literacy in Technical Subjects 11-12

The standards below begin at grade 11 and define what students should understand and be able to do by the end of grade 12. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations – the former providing broad standards, the latter providing additional specificity.

Text Types and Purposes

- 11-12.WT.1 Write arguments focused on *discipline-specific content*.
- 11-12.WT.2 Write informative/explanatory texts, including technical processes.
- 11-12.WT.3 Students will not write narratives in technical subjects. *Note: Students’ narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In technical, students must be able to write precise enough descriptions of the step-by-step procedures they use in their technical work that others can replicate them and (possibly) reach the same results.*

Production and Distribution of Writing

- 11-12.WT.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- 11-12.WT.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
- 11-12.WT.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

- 11-12.WT.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

11-12.WT.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation

11-12.WT.9 Draw evidence from informational texts to support analysis, reflection, and research.

Range of Writing

11-12.WT.10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

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