

STATE UNIVERSITY OF NEW YORK  
COLLEGE OF TECHNOLOGY  
CANTON, NEW YORK



## MASTER SYLLABUS

COURSE NUMBER – COURSE NAME  
CYBR 172 - COMPUTER FUNDAMENTALS

**CIP Code: 11.1003**

*For assistance determining CIP Code, please refer to this webpage*

*<https://nces.ed.gov/ipeds/cipcode/browse.aspx?v=55>*

*or reach out to Sarah Todd at [todds@canton.edu](mailto:todds@canton.edu)*

**Created by: Minhua Wang**

**Updated by:**

**School of Science, Health, and Criminal Justice**

**Department: Cybersecurity**

**Semester/Year: Fall 2024**

- A. TITLE: Computer Fundamentals
- B. COURSE NUMBER: CYBR 172
- C. CREDIT HOURS: (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)

# Credit Hours: 3  
 # Lecture Hours: 3 per week  
 # Lab Hours: per week  
 Other: per week

Course Length: 15 Weeks

- D. WRITING INTENSIVE COURSE: Yes  No

- E. GER CATEGORY: None:  Yes: GER  
*If course satisfies more than one:* GER

- F. SEMESTER(S) OFFERED: Fall  Spring  Fall & Spring

- G. COURSE DESCRIPTION:

A study of the terminology and concepts associated with computer systems hardware and software with significant Cybersecurity perspectives. Topics will include: system hardware components, memory organization and management, operating systems, troubleshooting fundamentals, hardware security and software security, etc.

- H. PRE-REQUISITES: None  Yes  If yes, list below:

CO-REQUISITES: None  Yes  If yes, list below:

- I. STUDENT LEARNING OUTCOMES: (*see key below*)

By the end of this course, the student will be able to:

<u>Course Student Learning Outcome</u> <u>[SLO]</u>	<u>Program Student Learning Outcome</u> <u>[PSLO]</u>	<u>GER</u> <i>[If Applicable]</i>	<u>ISLO &amp; SUBSETS</u>
a. Describe basic computer hardware architecture and hardware components	3. Use a variety of computer hardware and software and other technological		5-Ind, Prof, Disc, Know Skills ISLO ISLO Subsets Subsets Subsets Subsets

	tools appropriate and necessary for the performance of tasks			
b. Install and configure computer operating systems	3. Use a variety of computer hardware and software and other technological tools appropriate and necessary for the performance of tasks		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
c. Manage basic computer system assembly	3. Use a variety of computer hardware and software and other technological tools appropriate and necessary for the performance of tasks		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
d. Describe the function of typical computer peripherals	3. Use a variety of computer hardware and software and other technological tools appropriate and necessary for the performance of tasks		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
e. Use basic troubleshooting techniques to isolate faults in hardware/software	3. Use a variety of computer hardware and software and other technological tools appropriate and necessary for the performance of tasks		2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	CA Subsets Subsets Subsets
f. Specify hardware security and software security issues and solutions	5. Analyze and resolve Cybersecurity problems through the application of systematic approaches, and complete all work in compliance with relevant policies, practices, processes, and procedures		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets None None

KEY	<u>Institutional Student Learning Outcomes [ISLO 1 – 5]</u>
ISLO #	ISLO & Subsets
1	<b>Communication Skills</b> Oral [O], Written [W]
2	<b>Critical Thinking</b> <i>Critical Analysis [CA], Inquiry &amp; Analysis [IA], Problem Solving [PS]</i>
3	<b>Foundational Skills</b> <i>Information Management [IM], Quantitative Lit./Reasoning [QTR]</i>
4	<b>Social Responsibility</b> <i>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</i>
5	<b>Industry, Professional, Discipline Specific Knowledge and Skills</b>

\*Include program objectives if applicable. Please consult with Program Coordinator

J. APPLIED LEARNING COMPONENT: Yes  No

If YES, select one or more of the following categories:

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Classroom/Lab | <input type="checkbox"/> Civic Engagement              |
| <input type="checkbox"/> Internship               | <input type="checkbox"/> Creative Works/Senior Project |
| <input type="checkbox"/> Clinical Placement       | <input type="checkbox"/> Research                      |
| <input type="checkbox"/> Practicum                | <input type="checkbox"/> Entrepreneurship              |
| <input type="checkbox"/> Service Learning         | (program, class, project)                              |
| <input type="checkbox"/> Community Service        |  |

K. TEXTS:

A+ Essentials 220-701 & A+ Practical Application 220-702. Testout.

L. REFERENCES:

Internet resources selected by the instructor

M. EQUIPMENT: None  Needed: Computer lab classroom

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

**Exams/Quizzes/Assignments**

P. DETAILED COURSE OUTLINE:

**I. How Computers Work - An Overview**

- A. Basic Computer Concepts**
- B. Interaction between Hardware and Software**

## **II. An Introduction to Hardware**

- A. Introduction to Digital Circuits**
  - 1. Number systems: decimal, binary, hexadecimal, conversions**
  - 2. Basic digital circuit elements**
  - 3. Basic digital logic gates**
- B. Computer Architecture**
  - 1. CPU and chipset**
  - 2. BIOS**
  - 3. Memory systems**
  - 4. Permanent storage systems**
  - 5. Common I/O ports**
  - 6. Peripherals**
  - 7. Buses**

## **III. How Hardware and Software Work Together**

- A. Software Fundamentals**
  - 1. What is software; its role in a computer system**
  - 2. Types of software – system and application**
  - 3. Operating systems – history, functions, tools**
- B. Boot Up Sequence**
  - 1. Role of hardware**
  - 2. Role of BIOS**
  - 3. Role of operating system**
- C. System Resources**
  - 1. How an Operating System uses system resources**
  - 2. How system resources are assigned**

## **IV. PC Maintenance and Repair Fundamentals**

- A. Hardware and Software Tools**
- B. Preventive Maintenance Plan**
- C. Safety Procedures**
- D. Troubleshooting Approaches**

## **V. Electricity and Power Supplies**

- A. Basic electrical concepts and devices**
- B. Description and preventions of electricity-based damages**
- C. Form factors**
- D. Energy conservation – Energy Star standards**
- E. Troubleshooting PC power supply problems**

## **VI. Processors and Chipsets**

- A. Processor Types and Performance Evaluation Criteria**
- B. How Processors Work**
- C. Chipsets and How They Work**
- D. Maintaining Processor Performance and Integrity – Cooling Systems**
- E. Processor Installation and Upgrade**

## **VII. Motherboards**

- A. Components on a Motherboard**

- B. Installing or Replacing**
- C. Configuring, Supporting, and Troubleshooting**
- D. Buses and Bus Architectures**

## **VIII. Managing Memory**

- A. Types of Memory and How Each Works**
- B. Error Checking**
- C. Measuring Memory Speed**
- D. Upgrading**
- E. Troubleshooting**

## **IX. Hard Drives**

- A. Floppy Drives Organization**
- B. Hard Drives – Physical and Logical Organization**
- C. Hard Drives Technologies**
- D. Communication between PC and HD**
- E. Installation and Troubleshooting**
- F. Maintenance, Optimization and Protection**

## **X. I/O Devices**

- A. Types of I/O Devices**
- B. Principles of Installation and Support**
- C. Using ports and expansion slots for add-on devices**
- D. Multimedia Devices**

## **XI. Operating Systems**

- A. The Role and Architecture of an Operating System**
- B. Common Operating Systems for PCs – MS Windows Family**
- C. Other Operating Systems**
- D. Windows Operating System**
  - 1. Installation**
  - 2. Maintenance and Support**
  - 3. Troubleshooting**
- E. UNIX like Operating Systems (Linux)**
  - 1. Installation**
  - 2. Maintenance and Support**
  - 3. Troubleshooting**

## **XII. Purchasing a PC or Building Your Own**

## **XIII. Hardware Security and Software Security Issues and Solutions**

Q. LABORATORY OUTLINE: None  Yes