

EXPLORING COMPUTER SCIENCE
NEW NAME: FUNDAMENTALS OF COMPUTING (2019-20)
COURSE CODE: 5023

502800CH (grade 7 for ½ high school credit)

502900CH (grade 8 for ½ high school credit)

COURSE DESCRIPTION: Fundamentals of Computing is designed to introduce students to the field of computer science through an exploration of engaging and accessible topics. Through creativity and innovation, students will use critical thinking and problem solving skills to implement projects that are relevant to students' lives. They will create a variety of computing artifacts while collaborating in teams. Students will gain a fundamental understanding of the history and operation of computers, programming, and web design. Students will also be introduced to computing careers and will examine societal and ethical issues of computing.

OBJECTIVE: Given the necessary equipment, software, supplies, and facilities, the student will be able to successfully complete the following core standards for courses that grant one unit of credit.

RECOMMENDED GRADE LEVELS: 9-12 (Preference 9-10)

COURSE CREDIT: 1 unit (120 hours)

COMPUTER REQUIREMENTS: One computer per student with Internet access

RESOURCES: See attached Resource List

A. SAFETY

Effective professionals know the academic subject matter, including safety as required for proficiency within their area. They will use this knowledge as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Review school safety policies and procedures.
2. Review classroom safety rules and procedures.
3. Review safety procedures for using equipment in the classroom.
4. Identify major causes of work-related accidents in office environments.
5. Demonstrate safety skills in an office/work environment.

B. STUDENT ORGANIZATIONS

Effective professionals know the academic subject matter, including professional development, required for proficiency within their area. They will use this knowledge

as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Identify the purpose and goals of a Career and Technology Student Organization (CTSO).
2. Explain how CTSOs are integral parts of specific clusters, majors, and/or courses.
3. Explain the benefits and responsibilities of being a member of a CTSO.
4. List leadership opportunities that are available to students through participation in CTSO conferences, competitions, community service, philanthropy, and other activities.
5. Explain how participation in CTSOs can promote lifelong benefits in other professional and civic organizations.

C. TECHNOLOGY KNOWLEDGE

Effective professionals know the academic subject matter, including the ethical use of technology as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Demonstrate proficiency and skills associated with the use of technologies that are common to a specific occupation (e.g., keying speed).
2. Identify proper netiquette when using e-mail, social media, and other technologies for communication purposes.
3. Identify potential abuse and unethical uses of laptops, tablets, computers, and/or networks.
4. Explain the consequences of social, illegal, and unethical uses of technology (e.g., cyberbullying, piracy; illegal downloading; licensing infringement; inappropriate uses of software, hardware, and mobile devices in the work environment).
5. Discuss legal issues and the terms of use related to copyright laws, fair use laws, and ethics pertaining to downloading of images, photographs, documents, video, sounds, music, trademarks, and other elements for personal use.
6. Describe ethical and legal practices of safeguarding the confidentiality of business-and personal-related information.
7. Describe possible threats to a laptop, tablet, computer, and/or network and methods of avoiding attacks.
8. Evaluate various solutions to common hardware and software problems.

D. PERSONAL QUALITIES AND EMPLOYABILITY SKILLS

Effective professionals know the academic subject matter, including positive work practices and interpersonal skills, as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Demonstrate punctuality.

2. Demonstrate self-representation.
3. Demonstrate work ethic.
4. Demonstrate respect.
5. Demonstrate time management.
6. Demonstrate integrity.
7. Demonstrate leadership.
8. Demonstrate teamwork and collaboration.
9. Demonstrate conflict resolution.
10. Demonstrate perseverance.
11. Demonstrate commitment.
12. Demonstrate a healthy view of competition.
13. Demonstrate a global perspective.
14. Demonstrate health and fitness.
15. Demonstrate self-direction.
16. Demonstrate lifelong learning.

E. PROFESSIONAL KNOWLEDGE

Effective professionals know the academic subject matter, including positive work practices and interpersonal skills, as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Demonstrate effective speaking and listening skills.
2. Demonstrate effective reading and writing skills.
3. Demonstrate mathematical reasoning.
4. Demonstrate job-specific mathematics skills.
5. Demonstrate critical-thinking and problem-solving skills.
6. Demonstrate creativity and resourcefulness.
7. Demonstrate an understanding of business ethics.
8. Demonstrate confidentiality.
9. Demonstrate an understanding of workplace structures, organizations, systems, and climates.
10. Demonstrate diversity awareness.
11. Demonstrate job acquisition and advancement skills.
12. Demonstrate task management skills.
13. Demonstrate customer-service skills

F. EVOLUTION OF COMPUTING

Effective professionals demonstrate knowledge of computing, as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Define key computing terms (e.g. hardware, software, data, etc.).
2. Identify key individuals and their impact on the field of computing.
3. Discuss the progression of computing and explain its impact on society (e.g. hardware, programming languages, applications, Internet, emerging technologies, etc.).
4. Explain Moore's Law.

G. COMPUTING SYSTEMS

Effective professionals demonstrate knowledge of computing systems, as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Identify and define the key functional components (input devices, output devices, processor, operating system, software applications, memory, storage, etc.).
2. Understand the terms and units that are used to describe major hardware components (RAM, ROM, Peta-, Tera-, Giga-, Mega- Kilo-, Hz, Bit, Byte, Binary, etc.).
3. Describe how software and hardware interact.
4. Discuss how and why binary is used to represent data in a computer.
5. Describe how a picture, sound/song, and video are digitized and represented in a computer.
6. Compare and contrast operating systems (e.g., Mac, Windows, Linux, ChromeOS, iOS, Android).
7. Evaluate hardware and software configuration to meet situational and budgetary requirements (e.g. gaming, Internet browsing, student, graphic designer, etc.).
8. Make hardware and software recommendations to improve a computer system.

H. PROBLEM SOLVING AND COMPUTATIONAL THINKING (TO BE IMPLEMENTED THROUGHOUT THE COURSE)

Effective professionals demonstrate effective problem solving and computational thinking skills, as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Describe how computer programs and apps can be used to solve various problems (e.g., desktop, mobile, enterprise).
2. Solve a problem by applying appropriate problem solving techniques (understand the problem, plan the solution, carry out the plan, review and discuss).
3. Define algorithm (a set of clearly defined, logical steps to solve a problem).
4. Demonstrate an understanding of algorithms and their practical applications.
5. Create, evaluate, and adjust algorithms to solve a variety of problems.

I. FUNDAMENTALS OF PROGRAMMING

Effective professionals demonstrate skills in fundamental programming, as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Express the design of a program using representations such as flowcharts and pseudocode.
2. Analyze and explain how a particular program functions.
3. Solve problems of increasing complexity using visual block-based programming individually and collaboratively.
4. Write code that uses variables, events, functions, operators (i.e. arithmetic, relational, logical), conditional control structures (e.g., if, if-else) and repetition/iteration control structures (e.g., while, for).
5. Differentiate between text and numerical data.
6. Edit, compile/run, test, and debug a program.

J. FUNDAMENTALS OF WEB DESIGN

Effective professionals demonstrate skills in fundamental webpage design, as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Evaluate the results of Internet searches and the reliability of information found on Web sites.
2. Describe how Web sites are used to communicate and exchange data.
3. Plan a web page considering subject, devices, audience, layout, color, links and graphics.
4. Create a web page that contains a variety of HTML elements (e.g., hyperlinks, ordered and unordered lists, images, headings, paragraph) and CSS styles.

K. ETHICAL, LEGAL & SOCIAL ISSUES OF COMPUTING

Effective professionals demonstrate knowledge in ethical, legal, and social issues in computing, as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Examine the consequences resulting from issues involving ethics around security, privacy, copyright, fair use, intellectual property, social media and licensing.
2. Explain the importance of Acceptable Use Policies.
3. Explain the importance of data security and physical security.
4. Explain the concepts of confidentiality, integrity, and availability (CIA).
5. Identify computing threats (e.g., spyware, adware, malware, viruses, ransomware, phishing, hacking, software piracy, identity theft, etc.) and their potential impacts on society.
6. Explain the concept of encryption and how it is used on a daily basis.

L. COMPUTING CAREERS

Effective professionals demonstrate knowledge of computing careers found throughout various discipline, as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Compare and contrast the five disciplines of computing: computer science, software engineering, information technology, information systems, and computer engineering.
2. Compare and contrast careers in computing along with their education, training requirements, industry certifications and salary ranges.
3. Identify gender, diversity and geographic related issues in computing.
4. Describe how computing enhances other career fields.

[Course Materials and Resources](#)

[Course Academic Standards and Indicators](#)