

Student's Name/Initial:	/	Date:		Teacher's Initials:		Date:
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EXPLORING COMPUTER SCIENCE STUDENT PROFILE

COURSE CODE: 5023

Directions: Evaluate the student using the applicable rating scales below and check the appropriate box to indicate the degree of competency. The ratings 3, 2, 1, and N are not intended to represent the traditional school grading system of A, B, C, and D. The description associated with each of the ratings focuses on the level of student performance or cognition for each of the competencies listed below.

PERFORMANCE RATING

- 3 - Skilled--can perform task independently with no supervision
- 2 - Moderately skilled--can perform task completely with limited supervision
- 1 - Limitedly skilled--requires instruction and close supervision
- N - No exposure--has no experience or knowledge of this task

COGNITIVE RATING

- 3 - Knowledgeable--can apply the concept to solve problems
- 2 - Moderately knowledgeable--understands the concept
- 1 - Limitedly knowledgeable--requires additional instruction
- N - No exposure--has not received instruction in this area

A. SAFETY AND ETHICS

3 2 1 N

- ___ ___ ___ ___ 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

3 2 1 N

- ___ ___ ___ ___ 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

3 2 1 N

- ___ ___ ___ ___ 1. Demonstrate proficiency and skills associated with the use of technologies that are common to a specific occupation.
- ___ ___ ___ ___ 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., 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,

- ___ ___ ___ ___ 6. Describe ethical and legal practices of safeguarding the confidentiality of business-related information.
- ___ ___ ___ ___ 7. Describe possible threats to a laptop, tablet, computer, and/or network and methods of avoiding attacks.

D. PERSONAL QUALITIES AND EMPLOYABILITY SKILLS

3 2 1 N

- ___ ___ ___ ___ 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

3 2 1 N

- ___ __ __ 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. HUMAN COMPUTER INTERACTION

Unit Description

In this unit students are introduced to the concepts of computer and computing while investigating the major components of computers and the suitability of these components for particular applications. Students will experiment with internet search techniques, explore a variety of websites and web applications and discuss issues of privacy and security. Fundamental notions of Human Computer Interaction (HCI) and ergonomics are introduced. Students will learn that "intelligent" machine behavior is not "magic" but is based on algorithms applied to useful representations of information, including large data sets. Students will learn the characteristics that make certain tasks easy or difficult for computers, and how these differ from those that humans characteristically find easy or difficult. Students will gain an appreciation for the many ways in which computing-enabled innovation have had an impact on society, as well as for the many different fields in which they are used. Connections among social, economical and cultural contexts will be discussed

3 2 1 N

- ___ __ __ 1. Analyze the characteristics of hardware components to determine the applications for which they can be used.
- ___ __ __ 2. Use appropriate tools and methods to execute Internet searches which yield requested data.
- ___ __ __ 3. Evaluate the results of web searches and the reliability of information found on the Internet.
- ___ __ __ 4. Explain the differences between tasks that can and cannot be accomplished with a computer.
- ___ __ __ 5. Analyze the effects of computing on society within economic, social, and cultural contexts.
- ___ __ __ 6. Communicate legal and ethical concerns raised by computing innovation.
- ___ __ __ 7. Explain the implications of communication as data exchange.

G. PROBLEM SOLVING

Unit Description

This unit provides students with opportunities to become "computational thinkers" by applying a variety of problem-solving techniques as they create solutions to problems that are situated in a variety of contexts. The range of contexts motivates the need for students to think abstractly and apply known algorithms where appropriate, but also create new algorithms. Analysis of various solutions and algorithms will highlight problems that are not easily solved by computer and for which there are no known solutions. This unit also focuses on the connections between mathematics and computer science. Students will be introduced to selected topics in discrete mathematics including Boolean logic, functions, graphs and the binary number system. Students are also introduced to searching and sorting algorithms and graphs

3 2 1 N

- ___ __ __ 1. Name and explain the steps used in solving a problem.
- ___ __ __ 2. Solve a problem by applying appropriate problem-solving techniques.
- ___ __ __ 3. Express a solution using standard design tools.
- ___ __ __ 4. Determine if a given algorithm successfully solves a stated problem.

- ___ __ __ 5. Create algorithms that meet specified objectives.
- ___ __ __ 6. Explain the connections between binary numbers and computers.
- ___ __ __ 7. Summarize the behavior of an algorithm.
- ___ __ __ 8. Compare the tradeoffs between different algorithms for solving the same problem.
- ___ __ __ 9. Explain the characteristics of problems that cannot be solved by an algorithm.

H. WEB DESIGN

Unit Description

This section prepares students to take the role of a developer by expanding their knowledge of algorithms, abstraction, and web page design and applying it to the creation of web pages and documentation for users and equipment. Students will explore issues of social responsibility in web use. They will learn to plan and code their web pages using a variety of techniques and check their sites for usability. Students learn to create user-friendly websites. Students will apply fundamental notions of Human Computer Interaction (HCI) and ergonomics.

3 2 1 N

- ___ __ __ 1. Create web pages to address specified objectives.
- ___ __ __ 2. Create web pages with a practical, personal, and/or societal purpose.
- ___ __ __ 3. Select appropriate techniques when creating web pages.
- ___ __ __ 4. Use abstraction to separate style from content in web page design and development.
- ___ __ __ 5. Describe the use of a website with appropriate documentation.

I. INTRODUCTION TO PROGRAMMING

Unit Description

Students are introduced to some basic issues associated with program design and development. Students design algorithms and create programming solutions to a variety of computational problems using an iterative development process in Scratch. Programming problems include mathematical and logical concepts and a variety of programming constructs.

3 2 1 N

- ___ __ __ 1. Use appropriate algorithms to solve a

- _____ 2. Design, code, test, and execute a program that corresponds to a set of specifications.
- _____ 3. Select appropriate programming structures
- _____ 4. Locate and correct errors in a program.
- _____ 5. Explain how a particular program functions.
- _____ 6. Justify the correctness of a program.
- _____ 7. Create programs with practical, personal, and/or societal intent.

J. COMPUTING AND DATA ANALYSIS

Unit Description

In this unit students explore how computing has facilitated new methods of managing and interpreting data. Students will use computers to translate, process and visualize data in order to find patterns and test hypotheses. Students will work with a variety of large data sets that illustrate how widespread access to data and information facilitates identification of problems. Students will collect and generate their own data related to local community issues and discuss appropriate methods for data collection and aggregation of data necessary to support making a case or facilitating a discovery.

- 3 2 1 N
- _____ 1. Describe the features of appropriate data sets for specific problems.
- _____ 2. Apply a variety of analysis techniques to large data sets.
- _____ 3. Use computers to find patterns in data and test hypotheses about data.
- _____ 4. Compare different analysis techniques and discuss the tradeoffs among them.
- _____ 5. Justify conclusions drawn from data analysis.

COMPLETE ONE OF THE FOLLOWING UNITS (REQUIRED)

K. ROBOTICS

Unit Description

This unit introduces robotics as an advanced application of computer science that can be used to solve problems in a variety of settings from business to healthcare and how robotics enables innovation by automating processes that may be dangerous or otherwise problematic for humans.

Students explore how to integrate hardware and software in order to solve problems. Students will see the effect of software and hardware design on the resulting product. Students will apply previously learned topics to the study of robotics.

- 3 2 1 N
- _____ 1. Identify the criteria that describe a robot and determine if something is a robot.
- _____ 2. Match the actions of the robot to the corresponding parts of the program.
- _____ 3. Build, code, and test a robot that solves a stated problem.
- _____ 4. Explain ways in which different hardware designs affect the function of a machine.
- _____ 5. Describe the tradeoffs among multiple ways to program a robot to achieve a goal.

L. MOBILE COMPUTING

- 3 2 1 N
- _____ 1. Describe mobile applications and the constraints of mobile devices.
- _____ 2. Design a user interface/screen layout for a mobile application.
- _____ 3. Identify and implement the use of maps and location awareness in mobile applications.
- _____ 4. Identify and implement the use of multimedia (audio, video, etc.) in mobile applications.
- _____ 5. Identify and implement the use of device-based sensors and actuators in mobile applications
- _____ 6. Identify and implement the use of information applications (e.g., address book, calendar) in mobile applications.
- _____ 7. Code and test a mobile application that solves a stated problem.

M. DATABASE DESIGN AND PROGRAMMING

- 3 2 1 N
- _____ 1. Relate the importance of databases to everyday life.
- _____ 2. Distinguish between data and information and give examples of each.
- _____ 3. Define and use database design terms

(entities, attributes, relationships, UIDs, etc.).

- _____ 4. Define database table terms, including row, column, field, primary key, and foreign key.
- _____ 5. Create, modify, and query database tables using SQL.
- _____ 6. Identify and use basic data types.
- _____ 7. Design, create, modify, and query a simple relational database.

N. NETWORKING SYSTEMS

- 3 2 1 N
- _____ 1. Demonstrate knowledge of basic components of computer networks such as network media and devices.
- _____ 2. Demonstrate knowledge of the issues involved in connecting a computer to a network.
- _____ 3. Demonstrate an understanding of key issues in data transmission.
- _____ 4. Explain the current networking trends and issues impacting companies.

O. CYBER SECURITY

- 3 2 1 N
- _____ 1. Explain the importance of securing data.
- _____ 2. Explain the concepts of confidentiality, integrity, and availability (CIA).
- _____ 3. Describe current events on breaches; focus on particular Information Assurance (IA) areas that were compromised.
- _____ 4. Explain the importance of physical security.