ADVANCED COMPUTER PROGRAMMING
COURSE CODE: 5376

COURSE DESCRIPTION: Advanced Computer Programming is the capstone course in the Programming and Software Development program. Students are expected to use advanced skills and knowledge from Introduction and Intermediate Computer Programming. The purpose of the course is to allow students to develop a project that demonstrates accumulated skills in time-management, research, problem-solving, human interaction, organization, and public-speaking as related to computer science and that has a meaningful impact on industry and community stakeholders.

RECOMMENDED PREREQUISITES: Introduction to Computer Programming, Intermediate Computer Programming or equivalent courses completed with grades of C (70%) or better

RECOMMENDED GRADE LEVELS:	11-12
COURSE CREDIT:	1 (120 hours)
COMPUTER REQUIRED:	1 Computer per student with Internet access
RECOMMENDED SOFTWARE:	See Materials/Resources List
RECOMMENDED ENROLLMENT:	15-20
RESOURCES:	S.C. Instructional Materials Link

A. SAFETY

Proficient 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

Proficient 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

Proficient 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.
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; cyberbullying; 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, Creative Commons, fair use laws, and ethics pertaining to downloading of images, photographs, Creative Commons, documents, video, sounds, music, trademarks, and other elements for personal use.
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

Proficient 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 creativity and innovation.
2. Demonstrate critical thinking and problem-solving skills.
3. Demonstrate initiative and self-direction.
4. Demonstrate integrity.
5. Demonstrate work ethic.
6. Demonstrate conflict resolution skills.
7. Demonstrate listening and speaking skills.
8. Demonstrate respect for diversity.
9. Demonstrate customer service orientation.
10. Demonstrate teamwork.

E. PROFESSIONAL KNOWLEDGE

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

1. Demonstrate global or "big picture" thinking.
2. Demonstrate career and life management skills and goal-making.
3. Demonstrate continuous learning and adaptability skills to changing job requirements.
4. Demonstrate time and resource management skills.
5. Demonstrates information literacy skills.
6. Demonstrates information security skills.
7. Demonstrates information technology skills.
8. Demonstrates knowledge and use of job-specific tools and technologies.
9. Demonstrate job-specific mathematics skills.
10. Demonstrates professionalism in the workplace.
11. Demonstrates reading and writing skills.
12. Demonstrates workplace safety.

F. PROJECT MANAGEMENT

Computer programming professionals demonstrate appropriate knowledge and skills in project management as needed in their role. The following accountability criteria are considered essential for students in the Programming and Software Development program of study.

1. Implement the phases of the project management process.
2. List the requirements needed for each stage of project, including involved stakeholders,

tools and supplementary materials
3. Develop a project scope statement considering factors such as customer requirements, internal goals, and timelines.
4. Determine the risks, assumptions, resources, and constraints that will impact the success of a project.
5. Estimate and document the time needed to successfully complete a project, considering factors such as milestones, activities, and tasks including dependencies.
6. Defend program development and project trade-offs made through decision matrices.
7. Apply project management documentation tools (i.e. Trello, Gantt Chart, etc.)

G. CAREER DEVELOPMENT

Computer programming professionals demonstrate and apply the knowledge and skills contained in the Programming and Software Development standards and indicators in classroom, laboratory, and workplace settings.

1. Utilize work-based/workplace learning experiences to demonstrate and expand upon knowledge and skills gained during classroom instruction and laboratory practices.
2. Demonstrate proficiency in a career area that leads to certification, licensure, and/or continued learning at the postsecondary level.
3. Enhance the portfolio, or similar collection of work, that offers evidence of knowledge competency.

H. SPECIALIZED PROJECTS / CAPSTONE

Computer programming professionals demonstrate and apply the knowledge and skills contained in the Programming and Software Development standards and indicators in classroom, laboratory, and workplace settings.

1. Brainstorm, design and construct a culminating real-world project effectively in a capstone course.
    a. Use methods and techniques for employing all computer science concepts appropriately.
    b. Apply conventional computer science processes and procedures accurately and appropriately.
    c. Apply the knowledge learned in the study of computer science to provide solutions to human and societal problems in an ethical and legal manner.
    d. Apply computer science core concepts and practices to the development of plans, processes and projects that address real-world problems.
    e. Apply computer science core concepts and practices to provide results, answers and algorithms for real-world and technological activities.
    f. Collect and analyze results from project-based activities and communicate with the various stakeholders.
2. Demonstrate entrepreneurship skills and knowledge of self-employment options and innovative ventures (e.g., cost analysis, market research, packaging, etc.).

Additional Course Materials and Resources

Academic Standards and Indicators

Computer Science Academic Standards and Indicators