Milton Area School District
C++ Programming Syllabus
Grade Level(s): 9-12

C++ Programming Description: The class will give the student as overview to the basic principles of programming and is recommended to any student wishing to seek a computer science degree in post-secondary school. To achieve this overview the instructor may make use of the following computer languages: C++ and HTML. Students will be expected to acquire a working knowledge of machinery and vocabulary. Career options, software, evaluation, and a historical overview will be presented throughout the semester. This course meets every day for one semester. (.5 credit)

C++ Programming Goals:

The **PA Department of Education Standards** for (PA 15.4:) Computer and Information Technologies –

- Standard - 15.4.12.A **Apply the creative and productive use of emerging technologies for educational and personal success.**
- Standard - 15.4.12.B **Evaluate the impact of social, legal, ethical, and safe behaviors on digital citizenship.**
- Standard - 15.4.12.C **Develop criteria for analyzing hardware options to meet defined needs.**
- Standard - 15.4.12.D **Evaluate emerging input technologies.**
- Standard - 15.4.12.E **Analyze the different operating systems and recommend the appropriate system for specific user needs.**
- Standard - 15.4.12.G **Create an advanced digital project using sophisticated design and appropriate software/applications.**
- Standard - 15.4.12.H **Use programming languages to develop logical thinking and problem solving skills.**
- Standard - 15.4.12.I **Compare and contrast programming languages; select most appropriate one to complete a specific task.**
- Standard - 15.4.12.J **Create a complex computer program to solve a problem.**
- Standard - 15.4.12.L **Find and use primary documentation; employ an accepted protocol for citation**
- Standard - 15.4.12.M **Evaluate the impact of emerging technologies on various career paths and provide examples of industry certifications within the field.**

Student Literacy Objectives for C++ Programming:

- Effective readers use appropriate strategies to construct meaning.
- Critical thinkers actively and skillfully interpret, analyze, evaluate, and synthesize information.
- Active listeners make meaning from what they hear by questioning, reflecting, responding, and evaluating.
- Effective speakers prepare and communicate messages to address the audience and purpose
- Effective research requires the use of varied resources to gain or expand knowledge.
- Audience and purpose influence a writer's choice of organizational pattern, language, concepts using appropriate literacy techniques.

- Language conventions support clarity of communications between writers/speakers and readers/listeners.
- An expanded vocabulary enhances one's ability to express ideas and information

C++ Programming Instructor Policies

C++ Programming Resources:
- C++ Compiler and web browser
- Computers, LCD Projectors, Compiler Software, Web Browsers and CMS.

C++ Programming Requirements:
- Complete all Programming assignments, complete all three exams, final and participate with classroom lead instructed projects.

C++ Programming Attendance Policy:
- See school policy in handbook/website

C++ Programming Grading Policy:

GRADING SYSTEM

- A.......................... 90-100
- B.......................... 80-89
- C.......................... 70-79
- D.......................... 65-69
- 64 & Below .... No credit (F)
- X.......................... Incomplete: No Credit, No Tutor

Course Content Schedule

Week (Sequence)	Unit Title	Focus/Concepts:	Unit Essential Question(s):	Related Academic Standards	Assignment/Artifact	Method(s) of Evaluation
1	C++ Programming	Show proper Programming **structure**	How is a program to be structured? How can a program be applied to solve a problem? Can you use the major programming structures?	Standard - 15.4.12.A **Apply the creative and productive use of emerging technologies for educational and personal success.** Standard - 15.4.12.B **Evaluate the impact of social, legal, ethical, and safe behaviors on digital citizenship.** Standard - 15.4.12.C **Develop criteria for analyzing hardware options to meet defined needs.**	Use proper programming structure when creating a program	Class discussion Student constructed program Student designed program aligned with rubric
2		Recall the **Data types** for the C++ Programming language			Construct data types for a program	Class discussion Student constructed program Student designed program aligned with rubric
3		Create an **output statement**		Standard - 15.4.12.D **Evaluate emerging input technologies.** Standard -	Apply output statements to a C++ program	Class discussion Student constructed program

						Student designed program aligned with rubric
4		Create **Input** statements		15.4.12.E **Analyze the different operating systems and recommend the appropriate system for specific user needs.** Standard - 15.4.12.G **Create an advanced digital project using sophisticated design and appropriate software/applications.** Standard - 15.4.12.H **Use programming languages to develop logical thinking and problem solving skills.** Standard - 15.4.12.I **Compare and contrast programming languages; select most**	Apply input statements to a C++ program	Class discussion Student constructed program Student designed program aligned with rubric
5		Recall the C++ **Operators**			Apply Operators in statements and algorithms	Class discussion Student constructed program Student designed program aligned with rubric
6		Construct an **If statements**			Apply an if statement to a program	Class discussion Student constructed program Student designed program aligned with rubric
7		Compare the **loop** types			Prove you have selected the correct loop type	Class discussion

#		Topic		Standard	Objective	Assessment
				appropriate one to complete a specific task. Standard - 15.4.12.J **Create a complex computer program to solve a problem.**	to solve the programming problem	Student constructed program Student designed program aligned with rubric
8		Use **Formatting** codes		Standard - 15.4.12.L **Find and use primary documentation; employ an accepted protocol for citation**	Apply formatting codes in a program	Class discussion Student constructed program Student designed program aligned with rubric
9		Analyze **Case statements**		Standard - 15.4.12.M **Evaluate the impact of emerging technologies on various career paths and provide examples of industry certifications within the field.**	Create a case statement in a program	Class discussion Student constructed program Student designed program aligned with rubric
10		Define **Arrays**			Create an array in a program	Class discussion Student constructed program

						Student designed program aligned with rubric
11		Compare **Functions** to the main			Design a function in a program	Class discussion Student constructed program Student designed program aligned with rubric

General types of assessments or evaluation (define based on pg. 3)	Performance or demonstration for a real audience? (yes or no)	Does this measure proficiency of basic skills?	Is the student producing information or developing a product/service?	Are students contributing to the evaluation process: developing assessments and self-reflection?	Are varied student learning styles accounted for?
Tests					
Multiple Choice		Yes			
Applied Learning Practice		Yes	Yes		
Rubrics					
Progressive Demonstrative Learning Projects	Yes	Yes	Yes	Yes	Yes
Applied Learning Unit Projects		Yes	Yes		Yes

Appendix A
Student and Teacher Roles with a Defined Focus on Literacy

Students will:

1. **Work independently in their learning to:**

- Comprehend and evaluate complex situations, be a critical consumer of *{your course}* text, produce; research and gather evidence, communicate effectively, listen actively to engage in a range of conversations, to analyze and synthesize idea and positions, and to evaluate accuracy in order to learn, reflect, and respond.

2. **Construct content-meaning for self-efficacy and the efficacy all learners:**

- Build personal engagement in *{your course}* literacy (RWSL), take and share power for learning, self-assess, monitor and reflect on. Set goals for extending math skills, use text-based evidence to establish clear relationships among claims, explore *{your course}* concepts beyond the classroom and search to discover global perspectives

3. **Develop a Classroom Learning Community of respectful collaborative, collective dynamics:**

- Contribute and collaborate in a community of *{your course}* learners, provide multiple perspectives to solve problems toward shared understanding, value, represent, and respect diverse opinions and perspectives.
- Tasks or assignments are completed on time in support of a shared responsibility
- Self-monitoring for preparation and understanding is encouraged to promote contribution and respect for equity of time

4. **Participate in the assessment process:**

- Set goals and self-monitoring their progress with an expectation for fulfilling assessment requirements
- Produce and complete tasks and assignments according to the parameters and expectations of the learning process and the instructor's timeline.
- Seek help in understanding and clarifying confusions is an expectation to foster student independence and confidence as a life-long learner.

5. **Use of technology to support their learning:**

- Explore creative and innovative uses of technology to enhance and express their learning.
- Participate as a 21st Century student to make connections to the global learning environment
- Use and evaluate research available resources for validity and reliability

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Instructor will:

1. **Conduct the learning environment that promotes a student-centered community of learners.**

- Conceptualizes instruction to include students as part of the learning community; students formally collaborate on important learning tasks
- Share learning experience to bring multiple perspectives to solve problems such that each perspective contributes to shared understanding for all; goes beyond brainstorming
- Set up the learning environment and experiences for valuing diversity, multiple perspectives, and strengths of the student.
- Foster and encourage development of new ideas and understanding in conversations and work with others
- Arrange groups to support collaboration and inquiry; students work independently, in pairs, in small groups and as a class dependent on the task.

2. **Represent themselves as a facilitator, a guide for learning, a co-learner, or as an investigator.**

- Engage in negotiation, stimulates and monitors discussion and project work but does not control
- Help students to construct their own meaning by modeling, mediating, explaining when needed, redirecting focus, providing options
- Considers themselves as self- learner; willing to take risks to explore areas outside his or her expertise; collaborates with other experts and practicing professionals

3. **Design the instructional model and learning context driven by standards and researched-based best practices.**

- Identify the specific PACCS standards addressed in all lessons and units.
- Provide students with an understanding of PACCS standard guiding the instruction and the relationship to the student learning goals.

4. **Develop authentic tasks to engage all learners with relevance to transfer knowledge to outside world situations**.

- Pertains to real world, meaningful intellectual work; may be addressed to personal interest
- Challenge and engage students with tasks with different levels of difficulty, enough to be interesting but not totally frustrating, and sustainable.
- Involves integrating disciplines to solve problems and address issues in context
- Engage students with rigorous course content to prepare them for College and Career readiness.
- Construct processes that engage students through cognitive application as an intentional principle of instruction.

5. **Motivate and intentionally organize classroom instructional structure.**

- Direct students to set goals, self-assess their progress to produce quality products and determine next steps
- Integrate the Literacy skills of Reading, Writing, Speaking and Listening that is discipline specific
- Activate and develop students' repertoire of thinking/learning strategies for changeable and complex knowledge building**.**
- Promote intrinsic learning with a passion for exploring and solving problems.
- Use data-driven instruction to plan for individual and group learning situations.

6. **Assess students with a multitude and variety of formative, performance-based, generative, and summative assessments to address the needs and levels of all learners**.

- Create assessments with meaning for the learner to produce product, performance, or service
- Make assessments transparent and integral to instruction; students learn during/through challenging meaningful activities
- Evaluate students fairly and equitably based upon student individual needs and achievement level.
- Use the most appropriate and effective technology available to enhance tasks and the evidence on learning

7. **Utilized discipline-specific digital literacy and processes to engage and connect students in furthering 21st century teaching and learning.**

- Use the most appropriate and effective technology available to allow for interaction by communicating and collaborating in diverse ways
- Use the most appropriate and effective technology available to access simulations, goals-based learning and real-world productivity tools.
- Use the most appropriate and effective technology available to complete and access task, locate data, and learning opportunities that stimulate thought and inquiry.
- Build awareness of and where possible, access media technologies to keep pace with the ever-changing technological devices to further educational possibilities.

Appendix B
Engaged Learning Framework for Course Content Reflection and Review

Indicators of Engaged Learning		Indicator Definition
Evaluation		
Tasks	• Authentic • Challenging • Multidisciplinary	• Pertains to real world, meaningful intellectual work; may be addressed to personal interest • Difficult enough to be interesting but not totally frustrating, usually sustained • Involves integrating disciplines to solve problems and address issues in context
Assessment	• Performance-based • Generative • Seamless and ongoing • Equitable	• Involving a performance or demonstration, usually for a 'real' audience and addressing a useful purpose • Assessments having meaning for learner; may produce information, product, service • Assessment is transparent and integral; students learn during/through challenging and meaningful activities • Assessment is culture fair
Process		
Instructional Model	• Interactive • Generative	• Instruction actively engages learners through meaningful context and construction of knowledge; encourages, supports and responds to student contributions, needs, requests for clarification, etc. • Instruction oriented to constructing meaning; providing meaningful activities/experiences
Learning Context	• Collaborative • Knowledge-building • Empathetic	• Instruction conceptualizes students as part of learning community; students formally collaborate on important learning tasks • Learning experiences set up to bring multiple perspectives to solve problems such that each perspective contributes to shared understanding for all; goes beyond brainstorming • Learning environment and experiences set up for valuing diversity, multiple perspectives, strengths
Grouping	• Heterogeneous • Equitable • Flexible/agile	• Small groups with persons with different skill sets, backgrounds, interests • Groups sized and organized so that over time all students have challenging learning tasks/experiences • Different groups organized for different instructional purposes; supports collaboration across multiple contributors
Roles		
Instructor Role	• Facilitator • Guide • Co-learner/co-investigator	• Engages in negotiation, stimulates and monitors discussion and project work but does not control • Helps students to construct their own meaning by modeling, mediating, explaining when needed, redirecting focus, providing options • Instructor considers self as learner; willing to take risks to explore areas outside his or her expertise; collaborates with other experts and practicing professionals
Student Role	• Explorer • Cognitive Apprentice • Teacher • Producer	• Students have opportunities to explore new ideas/tools; push the envelope in ideas and research • Learning is situated in relationship with mentor who coaches students to develop ideas and skills that simulate the role of practicing professionals (i.e., engage in real research) • Students encouraged to teach others in formal and informal contexts • Students develop products of real use to themselves and others; demonstrated learning
Resources		
Technology	• Interconnectivity • Access to challenging tasks • Enables learning by doing • Media Use	• Technology allows interaction by communicating and collaborating in diverse ways • Technology offers or allows access to tasks, data, and learning opportunities that stimulate thought and inquiry • Technology offers access to simulations, goals-based learning, and real-world problems and productivity tools • Technology provides opportunities to use media technologies

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