

NJ CCCS AREA: 21st-CENTURY LIFE AND CAREERS
NJ-CCSS AREA: MATHEMATICS

North Brunswick Township Public Schools

Introduction to Computer Science using JAVA

Acknowledgements

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Diane Galella, Supervisor of Mathematics & Science

Date: New_____

Revision April 2012

Board Adoption_____

Due to the nature of this course, both the NJ Common Core State Standards for Mathematics and the New Jersey Core Curriculum Content Standards of 21st - Century Life and Careers (2009) can be applied.

NJ CCCS for 21st Century Life and Careers and the CCSS for Mathematics

Unit : Getting Started with JAVA

Grade: 10-12

Date: May 2012

NJ CCCS and/or NJ-CCSS Strand and/or Domain Essential Questions		NJ CCCS and/or NJ-CCSS CPI and/or Cluster.Standard Standards for Mathematical Practice		
9.4 Information and Technology Career Cluster <ul style="list-style-type: none"> Why use the programming language of JAVA? How is a simple program in JAVA created 		9.4.12.K.68 Technical Skills: Demonstrate knowledge of the hardware components associated with information systems. 9.4.12.K.69 Technical Skills: Compare classes of software associated with the development and maintenance of information systems to develop software and maintain computer systems. 9.4.12.K.77 Technical Skills: Perform standard computer backup procedures to protect information 9.4.12.K.(4).1 Technical Skills: Identify and analyze customer software needs and requirements to guide programming and software development 9.4.12.K.(4).3 Technical Skills: Identify and analyze a system and software requirements to ensure maximum operating efficiency 9.4.12.K.(4).4 Technical Skills: Demonstrate the effective use of software development tools to develop software applications		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
Obj 0.1 Use BlueJ Obj1.2 Describe how hardware and software make up computer architecture Obj 1.4 Discuss the evolution of programming languages Obj 1.5 Describe the software development process	<ul style="list-style-type: none"> Create objects of circles, triangles and squares and apply their methods to create a picture Add a constructor to the Circle, Triangle and Square classes Use the Picture class to introduce the concept of inheritance and the interaction of classes Powerpoint/ discussion on historical perspective, software development cycle, 	<ul style="list-style-type: none"> Extended time Assignment modification Alternative assessments Group investigations Note taking guides Daily record-keeping assistance Previewing materials KWL strategies Mnemonics Highlighting/and 	Formative: <ul style="list-style-type: none"> In class practice problems Board work Class work Homework Problem solving activities Think and Discuss Open-ended questions 	3.5 weeks

<p>Obj 2.1 Discuss why Java is an important programming language</p> <p>Obj 2.4. Describe the structure of a simple Java program and write a simple program</p> <p>Obj 2.5 Edit, compile and run a program using a JAVA environment, format a program to give a pleasing, consistent appearance, understand compile-time errors</p>	<ul style="list-style-type: none"> • Use BlueJ to edit, compile, run HelloWorld program from handout • Use BlueJ to create, edit, compile, run “Why I took JAVA” program 	<p>underlining</p> <ul style="list-style-type: none"> • Simulations • Games and puzzles • Reward systems • Stations/centers • Small group instruction • Pair-share 	<ul style="list-style-type: none"> • Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Programming Assignments <p><u>Performance Assessment</u> -</p> <ul style="list-style-type: none"> • Test: BlueJ, Selected sections from Chapt 1 & 2 <p><u>Benchmark:</u></p> <ul style="list-style-type: none"> • Programming Lab 	
	<p><u>Materials/Technology/Resources:</u></p> <p>Fundamentals of JAVA 4th ed</p> <p>BlueJ</p> <p>JCreator</p>			

NJ CCCS and/or NJ-CCSS Strand and/or Domain Essential Questions		NJ CCCS and/or NJ-CCSS CPI and/or Cluster.Standard Standards for Mathematical Practice		
<p>A-CED Creating Equations A-SSE Seeing Structure in Expressions F-FB Building Functions 9.4 Information and Technology Career Cluster</p> <ul style="list-style-type: none"> How do you define a variable? What are the protocols for variable names? What are the differences in writing an arithmetic expression in math class vs computer code? How do you concatenate strings? When do you use comments in a program? What do the different types of errors and when they occur mean? How do you get rid of the errors in a program? 		<p>A-CED.3 Create equations that describe numbers or relationships. Represent constraints by equations or inequalities, and by systems of equations and or inequalities and interpret solutions as viable or non-viable options in a modeling context A-SSE.2 Interpret the structure of expressions. Use the structure of an expression to identify ways to rewrite it. F-BF.1.b Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Combine standard function types using arithmetic operators</p> <p>9.4.12.K.77 Technical Skills Perform standard computer backup procedures to protect information 9.4.12.K.(4).2 Technical Skills Create and use information technology strategies and project plans when solving specific problems to deliver a product that meets customer specification. 9.4.12.K.(4).4 Technical Skills Demonstrate the effective use of software development tools to develop software applications 9.4.12.K.(4).5 Technical Skills Use the software development process to design a software application and deliver it to the customer 9.4.12.K.(4).6 Technical Skills Produce a computer application, in code, to demonstrate proficiency in developing an application using the appropriate programming language</p> <p>SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics SMP.5 Use appropriate tools strategically SMP.6 Attend to precision SMP.7 Look for and make use of structure</p>		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj.3.1 Construct and use numeric and string literals</p> <p>Obj 3.2 Name and use variables and constants</p> <p>Obj 3.3 Create arithmetic expressions</p>	<ul style="list-style-type: none"> Define variables as int, double or String Implement the Scanner class to allow keyboard data entry Powerpoint/discussion on order of operations, string concatenation, comments <p>Create programs to implement constants (such as Sales Tax), Strings (such as NameAddress), integers (such as converting minutes to days, hours, minutes), double (such as calculating salary of an employee given hourly wage, hours worked (include overtime pay)</p>	<ul style="list-style-type: none"> Extended time Assignment modification Alternative assessments Group investigations Note taking guides Daily record-keeping assistance Previewing materials 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Class work Homework Problem solving activities 	4 weeks

<p>Obj 3.4 Understand the precedence of different arithmetic operators</p> <p>Obj 3.5 Concatenate two strings or a number and a string</p> <p>Obj 3.6 Know how and when to use comments in a program</p> <p>Obj 3.7 Tell the difference between syntax errors, run-time errors and logic errors</p> <p>Obj 3.8 Insert output statements to debug a program</p>	<p><u>Materials/Technology/Resources:</u></p> <p>Fundamentals of JAVA 4th ed</p> <p>Powerpoint presentations</p> <p>BlueJ</p> <p>JCreator</p>	<ul style="list-style-type: none"> ● KWL strategies ● Mnemonics ● Highlighting/and underlining ● Simulations ● Games and puzzles ● Reward systems ● Stations/centers ● Small group instruction Pair-share 	<ul style="list-style-type: none"> ● Think and Discuss ● Open-ended questions ● Exit prompts ● <u>Summative:</u> ● Programming Assignments ● <u>Performance Assessment</u> - ● <u>Test:</u> Chapt 3 ● <u>Benchmark:</u> Programming Lab 	
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NJ CCCS and/or NJ-CCSS Strand and/or Domain Essential Questions		NJ CCCS and/or NJ-CCSS CPI and/or Cluster.Standard Standards for Mathematical Practice		
<p>A-CED Creating Equations A-SSE Seeing Structure in Expressions F-FB Building Functions 9.4 Information and Technology Career Cluster</p> <ul style="list-style-type: none"> • How do you increase/decrease by one? • How do you find the square root, absolute value etc of an expression? • How do you have your program make a decision of whether lines of code should be executed or not? • How do you have statements repeat themselves a finite number of time or based on a specific condition? • How do you prevent an infinite loop from occurring? 		<p>A-CED.3 Create equations that describe numbers or relationships. Represent constraints by equations or inequalities, and by systems of equations and or inequalities and interpret solutions as viable or non-viable options in a modeling context A-SSE.2 Interpret the structure of expressions. Use the structure of an expression to identify ways to rewrite it. F-BF.1.b Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Combine standard function types using arithmetic operators.</p> <p>9.4.12.K.77 Technical Skills Perform standard computer backup procedures to protect information 9.4.12.K.(4).2 Technical Skills Create and use information technology strategies and project plans when solving specific problems to deliver a product that meets customer specification. 9.4.12.K.(4).4 Technical Skills Demonstrate the effective use of software development tools to develop software applications 9.4.12.K.(4).5 Technical Skills Use the software development process to design a software application and deliver it to the customer 9.4.12.K.(4).6 Technical Skills Produce a computer application, in code, to demonstrate proficiency in developing an application using the appropriate programming language 9.4.12.K.(4).7 Technical Skills Implement software testing procedures to ensure quality products 9.4.12.K.(4).8 Technical Skills Perform quality assurance tasks to produce quality products</p> <p>SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics SMP.5 Use appropriate tools strategically SMP.6 Attend to precision SMP.7 Look for and make use of structure</p>		
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<p>Obj 4.1 use the increment and decrement operators</p> <p>Obj 4.2 Use standard math methods</p>	<ul style="list-style-type: none"> • Implement the x++ and x—operators to increment/decrement by one, discuss the frequency of use of having to increment/decrement by one • Implement via a program that finds the hypotenuse of a right triangle given the two sides and a program that finds the roots of a 	<ul style="list-style-type: none"> • Extended time • Assignment modification • Alternative assessments • Group investigations • Note taking guides 	<p>Formative:</p> <ul style="list-style-type: none"> • In class practice problems • Board work • Class work • Homework 	5 weeks

<p>Obj 4.3 Use if and if-else statements to make choices</p> <p>Obj 4.4 Use while and for loops to repeat a process</p> <p>Obj 4.5 Construct appropriate conditions for control statements using relational operators</p> <p>Obj 4.6 Detect and correct common errors involving loops</p> <p>Obj 4.7 Read data from a file</p>	<p>quadratic using the quadratic formula, the Math class and specific methods such as sqrt, pow, abs (integer and double – discuss overloading a method name), min, max.</p> <ul style="list-style-type: none"> • Discuss/implement the structure of an if and if/else statement. Implement in the quadratic formula program when finding the imaginary roots. • Use a single inequality for comparisons in an if statement (for example with a menu and making a choice) • Use a for loop to determine the factorial of a number • Use a while loop in a menu situation as an example of a task controlled loop. • Use a single inequality for comparison in a for statement • Discuss/compare/contrast the use of > or < when incrementing/decrementing and what would lead to an infinite loop, as well as other loop errors. • Use appropriate test data to test all parts of the program. • Create a text file, have a program read data from the file and manipulate the data (example student name and several grades, determine the average). 	<ul style="list-style-type: none"> • Daily record-keeping assistance • Previewing materials • KWL strategies • Mnemonics • Highlighting/and underlining • Simulations • Games and puzzles • Reward systems • Stations/centers • Small group instruction • Pair-share 	<ul style="list-style-type: none"> • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Programming Assignments <p><u>Performance Assessment</u> -</p> <ul style="list-style-type: none"> • <u>Test:</u> Chapt 7 <p><u>Benchmark:</u></p> <ul style="list-style-type: none"> • Programming Lab 	
<p><u>Materials/Technology/Resources:</u></p> <p>Fundamentals of JAVA 4th ed.</p> <p>Powerpoint presentations</p> <p>BlueJ</p> <p>JCreator</p>				

NJ CCCS and/or NJ-CCSS Strand and/or Domain Essential Questions		NJ CCCS and/or NJ-CCSS CPI and/or Cluster.Standard Standards for Mathematical Practice		
<p>A-CED Creating Equations A-SSE Seeing Structure in Expressions F-FB Building Functions 9.4 Information and Technology Career Cluster</p> <ul style="list-style-type: none"> Why do we need complex Boolean expressions and how does it relate to math class? How do you write a complex Boolean expression Why do we need to construct a truth table for Boolean expressions How do we make sure all parts of our program are working correctly? What are nested if statements and loops used for? How do you create a nested if statements and loops 		<p>A-CED.3 Create equations that describe numbers or relationships. Represent constraints by equations or inequalities, and by systems of equations and or inequalities and interpret solutions as viable or non-viable options in a modeling context A-SSE.2 Interpret the structure of expressions. Use the structure of an expression to identify ways to rewrite it. F-BF.1.b Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Combine standard function types using arithmetic operators.</p> <p>9.4.12.K.77 Technical Skills Perform standard computer backup procedures to protect information 9.4.12.K.(4).2 Technical Skills Create and use information technology strategies and project plans when solving specific problems to deliver a product that meets customer specification. 9.4.12.K.(4).4 Technical Skills Demonstrate the effective use of software development tools to develop software applications 9.4.12.K.(4).5 Technical Skills Use the software development process to design a software application and deliver it to the customer 9.4.12.K.(4).6 Technical Skills Produce a computer application, in code, to demonstrate proficiency in developing an application using the appropriate programming language 9.4.12.K.(4).7 Technical Skills Implement software testing procedures to ensure quality products 9.4.12.K.(4).8 Technical Skills Perform quality assurance tasks to produce quality products</p> <p>SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics SMP.5 Use appropriate tools strategically SMP.6 Attend to precision SMP.7 Look for and make use of structure</p>		
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<p>Obj 7.1 Construct complex Boolean expressions using the logical operators &&(and), (or) and !(not)</p> <p>Obj 7.2 Construct truth tables for Boolean expressions</p>	<ul style="list-style-type: none"> Evaluate complex Boolean expressions using the logical operators &&(and), (or) and !(not) as being true or false Apply the logic of Boolean expressions in nested IF statements and extended IF statements in a program such as determining if a student is accepted to college based on verbal & math SAT scores and GPA. 	<ul style="list-style-type: none"> Extended time Assignment modification Alternative assessments Group investigations Note taking guides 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Class work Homework 	5 weeks

<p>Obj 7.3 Understand the logic of nested if statements and extended if statements</p> <p>Obj 7.4 Test if statements in a comprehensive manner</p> <p>Obj 7.5 Construct nested loops</p> <p>Obj 7.6 Create appropriate test cases for if statements and loops</p>	<ul style="list-style-type: none"> • Create appropriate test data for complete code coverage – testing boundry conditions as well as extreme conditions • Use nested loops to create a times table and to determine all possible combinations of pennies, nickels, dimes and quarters that would make up a specific amount (that could be given in change). • Apply all topics discussed to write a program that determines the amount of federal income tax (simple method) with gross salary as input <p><u>Materials/Technology/Resources:</u> Fundamentals of JAVA 4th ed BlueJ JCreator</p>	<ul style="list-style-type: none"> • Daily record-keeping assistance • Previewing materials • KWL strategies • Mnemonics • Highlighting/and underlining • Simulations • Games and puzzles • Reward systems • Stations/centers • Small group instruction • Pair-share 	<ul style="list-style-type: none"> • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts <p><u>Summative:</u> • Programming Assignments <u>Performance Assessment</u> - • <u>Test:</u> Chapt 7</p> <p><u>Benchmark:</u> • Programming Lab</p>	
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(2534) Intro To Computer Science Programming Using Java

Grades: 10,11,12

Introduction to Computer Science is a semester course that provides students with an introduction to formal programming. Students will be encouraged to develop good programming habits using the Java programming language chosen by the College Board for the Advanced Placement Computer Science Course.

Proficiencies:

At the completion of this course, the student will be able to:

1. understand the difference between compiled and interpreted programs
2. understand/apply the basic concepts of object oriented programming (OOP) to write “short programs”.
3. use simple input and output statements
4. define/use variable types according to use, as well as constants
5. employ the fundamental math operators
6. apply control structures simple and nested: branching and looping.
7. define classes, and methods within those classes
8. read and manipulate data from files
9. use JAVA library math class
10. use appropriate data to test a program

Course Requirements:

1. Students will be expected to bring to class daily those items used for the days lesson: text, notebooks etc.
2. Students will be expected to complete all assignments, both programming and nonprogramming, on time.
3. Students will be expected to successfully complete all tests, and projects on time
4. Students who are absent are expected to arrange with the teacher times for making up assignments, labs, and tests.
5. Students are expected to keep the computer lab tidy - PLEASE RECYCLE!!! THERE WILL BE NO FOOD OR DRINK IN THE LAB!!!!
6. Students may share ideas, however each program must contain some originality. Students who are found “sharing the work” will result in a zero grade for both students.
7. Any student found to be mistreating the equipment, tampering with software or using the equipment in a non-educational fashion will face disciplinary actions

Marking period grades will be determined by the following percentages:

	1 st	2 nd
Assessments	55	50
Programs/Projects	25	30
Homework/Classwork	20	20