

Unit (Weeks)	Topics & Student Objectives	Resources, Assessments & Strategies
<p style="text-align: center;">1 (2-3 days)</p>	<p>Topics:</p> <ul style="list-style-type: none"> • History of Java • Similarities to C++ • Advantages of JAVA vs, C++ and other languages • Waterfall vs. Top Down Development • Robustness of a program • DeMorgan's Law <p>Objectives:</p> <ul style="list-style-type: none"> • Understand the evolution from earlier programming languages to JAVA • Be able to break down tasks (methods) to more refined behaviors • Recall Logic topics from 10th grade math including Conjunctions, Disjunctions, Conditionals, and DeMorgan's Law 	<p>Resources and Strategies:</p> <ul style="list-style-type: none"> • Lecture/notes from teacher <p>Assessments:</p> <ul style="list-style-type: none"> • Part I type multiple choice questions on program designs and Logic

<p style="text-align: center;">2 (2-3 days)</p>	<p>Topics:</p> <ul style="list-style-type: none"> • Primitive Data Types • Constants • Math functions • Order of Operations • Assignment operators • Increment/Decrement Operators • Relational operators • Typecasting • Output /Inputting Data • Formatting Numbers • Categorize Errors <p>Objectives:</p> <ul style="list-style-type: none"> • Review data types, etc. from last semester • Understand different compile time errors, runtime errors, and logical errors • Use output with System.out using print and println and format output • Use Dialog Boxes for input and output 	<p>Resources and Strategies:</p> <ul style="list-style-type: none"> • West & Stephenson • Lecture (teacher centered) based lesson with students taking notes <p>Assessments:</p> <ul style="list-style-type: none"> • Look at Part I type questions regarding order of operations, errors, etc. • <i>Quiz #1:</i> Variables & Expressions • <i>Lab #1:</i> Students will write an application that inputs the radius of a circle and prints the circle's diameter, area, and circumference • <i>Lab # 2:</i> Students will write an application that reads the miles from the users and converts miles to kilometers
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<p>3 (1 week)</p>	<p>Control Structures: Decision Making</p> <p>Topics:</p> <ul style="list-style-type: none"> • If statements • Logical Operators • If..else structures • Switch structures • Nested if/else statements • Conditional Operator ?: • Short Circuit Evaluation <p>Objectives:</p> <ul style="list-style-type: none"> • Define the flow of control through a program • Review and reinforce selection statements from last semester's course work 	<p>Resources:</p> <ul style="list-style-type: none"> • Schram,Leon • Lewis, Loftus, & Cocking <p>Assessments:</p> <ul style="list-style-type: none"> • Part I Homework questions • <i>Lab #3:</i> Customer Credit Limit • <i>Lab #4:</i> Calculate Sales and Commission
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<p>4 (1 week)</p>	<p>Control Structures: Iteration</p> <p>Topics:</p> <ul style="list-style-type: none"> • For Loops • While Loops • Do/While Loops • Break/Continue • Sentinel/Counter Controlled Loops • Nested Loops <p>Objectives:</p> <ul style="list-style-type: none"> • Understand control structures, counter loop, infinite loops, nested loops, logical operators, etc. • Understand the different errors that can occur with loops and possible ways for debugging techniques such as hand tracing and extra print statements to try to trace the flow of the program • Be able to read through a loop and determine the output and/or value of a variable 	<p>Resources and Strategies:</p> <ul style="list-style-type: none"> • Litvin, Maria • Review from last semester course and as a class work on Part I practice type problems <p>Assessments:</p> <ul style="list-style-type: none"> • <i>Lab #5:</i> Find largest value from a series of inputs • <i>Lab #6:</i> Find the two largest values from a series of inputs • <i>Lab # 7:</i> Interest • <i>Lab #8:</i> Total Retail Value by user inputting product number and quantity sold (Must use switch structure and sentinel-controlled loop • <i>Lab # 9:</i> Calculating pi • <i>Lab #10:</i> Finding Pythagorean Triples using nested loops • <i>Quiz #2:</i> Selection Structures and Iteration (Multiple choice) • TEST I
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<p style="text-align: center;">5 (2 weeks)</p>	<p>Methods</p> <p>Topics:</p> <ul style="list-style-type: none"> • Method definition • Java API methods • Writing own methods • Header/method call • Argument Promotion • Method Overloading • Recursion • Scope vs. Lifetime • Private vs. public modifiers <p>Objectives:</p> <ul style="list-style-type: none"> • Explore the details of method declarations • Review method invocation and parameter passing • Explain, use, and identify method overloading • Learn to divide complicated methods into simpler, supporting methods • Understand the underlying ideas of recursion • Examine recursive methods and processing steps • Discuss infinite recursion and ways to avoid it • Use recursion to solve problems • Discuss when a variable, etc. can be accessed and/or when it exists 	<p>Resources and Strategies:</p> <ul style="list-style-type: none"> • Schram, Leon • Lewis, Loftus, & Cocking • West & Stephenson • Lecture on Methods and Recursion • Go through Part I type examples using “box” method to read Recursive methods <p>Assessments:</p> <ul style="list-style-type: none"> • Homework on Part I type questions • <i>Lab #11</i> Determine if second integer is a multiple of first integer...using a method • <i>Lab #12</i> Takes an integer and reverses its digits...using a method • <i>Lab #13</i> Recursive method that takes a base and exponent from the user and determines value • <i>Lab #14</i> Displays a solid square given size of square and character...using a method call • <i>Lab #15</i> Guess a number...using a method call • <i>Quiz</i> : Methods & Recursion
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<p>6 (3 1/2 weeks)</p>	<p>Arrays</p> <p>Topics:</p> <ul style="list-style-type: none"> • Declaring and allocation one dimensional arrays • • Two-dimensional arrays • Transversals • Insertions & Deletions • Searching algorithms: Linear & Binary Searches • Sorting algorithms: Selection, Insertion (Bubble), Mergesort • Arrays as parameters <p>Objectives:</p> <ul style="list-style-type: none"> • Define and use arrays • Describe how arrays and array elements are passed as parameters • Manipulate arrays with loops 	<p>Resources & Strategies:</p> <ul style="list-style-type: none"> • Lewis, Loftus, & Cocking • Schram, Leon • Litvin, Maria • Lecture and notes on Arrays • Discussion on Searching and Sorting algorithms determining the advantages, disadvantages of each • Show Part I example questions on Arrays • As a class, work on a Part II Arrays question <p>Assessments:</p> <ul style="list-style-type: none"> • Homework: Part I questions on Arrays • 2 Homework assignments on Part II type Array questions • <i>Array Quiz:</i> Multiple Choice • <i>Array Quiz #2:</i> Part II • <i>Lab #16:</i> Airline Reservations (using Arrays) • <i>Lab #17:</i> Craps (dice game) using Arrays • <i>Lab #18:</i> Sieve of Eratosthenes • <i>Maze Lab:</i> Extra Credit...Two dimensional array • <i>TEST II:</i> Methods & Arrays
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<p style="text-align: center;">7 (4 weeks)</p>	<p>Objects:</p> <p>Topics:</p> <ul style="list-style-type: none"> • Introduction • Class Scope • Controlling Access to Members • Data Abstraction and Encapsulation • Initializing Class Objects: Constructors • Overloaded Constructors • Composition • Keywords: new and this • Driver Programs • Set/Get Methods • Static class members • Encapsulation & Visibility modifiers • Array of Objects • Passing Objects as Parameters <p>Objectives:</p> <ul style="list-style-type: none"> • Create objects and use them • Demonstrate how objects are created and manipulated using methods • Understand information hiding • Be able to write and read code using an Array of Objects (Part II) 	<p>Resources and Strategies:</p> <ul style="list-style-type: none"> • West & Stephenson • Lewis, Loftus, & Cocking • Litvin, Maria • Beginning unit lectures with examples of Part I type questions • Use Coin example to demonstrate simple objects • Write some Part II type questions as a class <p>Assessments:</p> <ul style="list-style-type: none"> • Lab #19: Rational Numbers • Lab #20: Complex Numbers • Quiz : Objects • Quiz : Part II • TEST III
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<p>8 (3-4 weeks)</p>	<p>Inheritance:</p> <p>Topics:</p> <ul style="list-style-type: none"> • “Has A” vs. “Is A” Relationship • Superclasses and Subclasses • Overridden Methods • Polymorphism • Abstract Classes and Methods • Final Classes and Methods • Interfaces • Object Class (Universal Superclass) • Constructors and finalizers in Subclasses • Keyword super <p>Objectives:</p> <ul style="list-style-type: none"> • Demonstrate inheritance by extending a class • Understand polymorphism and know when to override a method in a super class • Create and extend an abstract class • Implement an interface • Create and extend a class given class specifications 	<p>Resources and Strategies:</p> <ul style="list-style-type: none"> • Lewis, Loftus, & Cocking • Litvin, Maria • Use Employee example to show inheritance and keywords (super, extends, abstract, final, etc.) • Work through Part I’s and Part II type questions together <p>Assessments:</p> <ul style="list-style-type: none"> • <i>Lab #21:</i> Get/Set Methods • <i>Lab # 22:</i> Quadrilateral (Inheritance) • Homework on Part I Inheritance • Homeworks on Part II’s • Quiz on Inheritance • TEST IV on Inheritance
<p>9 (1 week)</p>	<p>Topics:</p> <ul style="list-style-type: none"> • Wrapper Classes...Integer and Double Classes • Wrapping and unwrapping primitive data types • String Class and methods 	<p>Strategies:</p> <ul style="list-style-type: none"> • Lecture and Part I type questions as examples • Classwork: Part II on Strings <p>Assessments:</p> <ul style="list-style-type: none"> • Part II Take Home Quiz on Strings
<p>10 (1 week)</p>	<p>Midterm Review and Midterm</p>	<p>Assessment:</p> <ul style="list-style-type: none"> • Day 1: Part I Multiple Choice • Day 2: Part II (Array of Objects)

<p>11 (2weeks)</p>	<p>ArrayLists</p> <p>Topics:</p> <ul style="list-style-type: none"> • Using ArrayList class • Advantages/Disadvantages of using ArrayLists vs. Arrays • Typecasting each object in ArrayList • Methods of the ArrayList class <p>Objectives:</p> <ul style="list-style-type: none"> • Use methods in the ArrayList class • Write code using ArrayLists • Understand what happens to the ArrayList when methods such as add, get, and set are called 	<p>Resources & Strategies:</p> <ul style="list-style-type: none"> • West & Stephenson • Lewis, Loftus, & Cocking • Litvin, Maria • Teacher centered lecture • Part I and Part II examples as a class discussion <p>Assessments:</p> <ul style="list-style-type: none"> • Homework on Part II ArrayList • Take Home Quiz on ArrayLists
<p>12 (1 week)</p>	<p>Topics:</p> <ul style="list-style-type: none"> • Throwing Exceptions • Review Robustness of Program • Computer Hardware • Programming Ethics • Review Types of Errors • Random Class <p>Objectives:</p> <ul style="list-style-type: none"> • Understand different types of errors • Identify basic computer hardware and explain what it does • Explain how computer system executes programs and manages data • Create Random Objects and generate random numbers with these objects 	<p>Resources & Strategies:</p> <ul style="list-style-type: none"> • Lewis, Loftus, & Cocking • Lecture <p>Assessments:</p> <ul style="list-style-type: none"> • Part I examples • Random Lab: Telephone Number

<p>13 (4 weeks)</p>	<p>GridWorld Case Study</p> <p>Topics:</p> <ul style="list-style-type: none"> • GridWorld Role Play • Using and modifying classes <p>Objectives:</p> <ul style="list-style-type: none"> • Run the case study and analyze output • Understand Bug class, Runner class, Grid Interface • Design your own classes by extending from existing class (Bug) in the case study • Understand the development of such a large program 	<p>Resources & Strategies:</p> <ul style="list-style-type: none"> • Grid World Case Study • Read the manual for the case study thoroughly <p>Assessments:</p> <ul style="list-style-type: none"> • Exercises in the chapters of the case study • Design your own class (Part II) • Part I type questions
<p>14 (3-4 weeks)</p>	<p>Review for AP Exam</p>	<p>Resources/Strategies:</p> <ul style="list-style-type: none"> • Lewis, Loftus, & Cocking • Litvin, Maria • Review topics with class discussions • Practice Exams • Previous free-response questions from AP Central
<p>15 (1 week)</p>	<p>AP Exam</p>	
<p>16 (3 weeks)</p>	<p>Group Project & Presentations</p>	<ul style="list-style-type: none"> • Project must include inheritance, objects, graphics (unit from last year's course)