Object Oriented Programming with Java

Course Outline

**Class:** WA140 – Object Oriented Programming with Java

90 hours

**Instructor:**

**Text:**  Java Programming, 8th edition

Joyce Farrell

CENGAGE Learning

**Prerequisite:** WA100 - Introduction to Computer Science

**Equipment:** Each student shall be equipped with a desktop computer with the technical characteristics configured to run the programs used throughout the program:

* 20 desktop computers (including 24” monitors and mice) minimum
* Quad Core processor with Microsoft Windows 7, 8.x, or 10,
* Minimum 16 GB Ram
* Minimum 500 GB HD
* Internet access.

**Grading System:**

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|  | | **Grading Scale** | | |
| Classwork, Homework, Participation, Attendance | 10% | 90–100 | A | I - Incomplete |
| Exams/Quizzes | 50% | 80–89 | B | T - Transfer Credit |
| Presentation/Projects | 10% | 70–79 | C | E - Exempt |
| Final Exam | 30 % | 65–69 | D | W - Withdrew |
|  | **100%** | Below 65 | F | I - Incomplete |

**Course Description:**

This course introduces the beginning programmers to the power of Java through an engaging, hands-on approach. The students develop useful applications using Java Integrated Development Environment, while learning the basic principles of structured and object-oriented programming. The course uses the latest version of Java and meaningful real-world exercises.

The advanced topics of this course include the use of Java for enterprise application development. The students learn to build a full stack Java web application and explore the use of patterns to optimize the application design.

**Overview:** This class meets for a total of 90 hours. Day classes are six hours per day, Monday through Friday.

**Objectives:** Upon successful completion of this course, the student will be able to:

1. Create Java Programs
2. Use Data in Java Programs
3. Understand Object Oriented Programming with Java
4. Use Looping and Conditional Flow
5. Use Characters and Strings
6. Use Arrays
7. Use Inheritance
8. Apply Exception Handling
9. Understand File Input and Output
10. Develop Graphical User Interface with Swing
11. Understand the Model-View-Controller Pattern
12. Develop Servlets, Java Server Pages and Data Access Objects
13. Understand Patterns in Java

**Requirements:** 1. Meet attendance and academic criteria.

2. Completion of all assignments.

3. Completion of the final exam.

**Graded Work:** The test average and quiz average each comprise 50% of the final grade point average. Quiz grades are based upon completion of the assignment in the time allotted, ability to follow instructions, observance of safety rules and neatness of work area.

**Attendance:** Daily attendance is required. If you anticipate an absence, consult with your instructor.

Be aware that each absence will require an equal amount of make-up time. Each student is required to maintain a minimum attendance of 85% for each course:

* If you miss more than 15% of the total hours in any one course, you will be required to make-up enough missed hours to meet the minimum course attendance requirement of 85%.
* If at the end of the cycle your attendance is less than 85% you will receive an incomplete (I) for the course, and will have 5 business days immediately following the end of the cycle to make-up the hours missed, otherwise your grade will change from an incomplete to an F, and you will be required to retake the course.
* If you miss more than 30% of the total hours in any one course, you will receive a W (withdrawal) and will be required to retake the course.

**Make-up Work:** All missed work is required to be completed as soon as possible. If you need extra help, it is your responsibility to make an appointment with your instructor at a mutually agreeable time.

**Supplies:** Hunter Business School provides all the necessary supplies.

### **Lesson Plan**

##### Day 1 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Introduction to Java |
| **Subject Topics:** | Chapter 1: Creating Java Programs |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Define basic programming terminology * Compare procedural and object-oriented programming * Describe the features of the Java programming language * Analyze a Java application that produces console output * Compile a Java class and correct syntax errors * Run a Java application and correct logic errors * Add comments to a Java class * Create a Java application that produces GUI output |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Programming Terminology, slides 2-3 * Comparing Procedural and Object Oriented Programming Concepts, slides 4-5 * Introduction to Object Oriented Programming in Java, slides 6-16   10:45 AM – 11 AM   * Break   11 AM – 12 PM   * Understanding the “First” Java Application, slides 17-33   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Lab, slide 34 * Errors and Comments, slides 35-38 * Understanding the “First” Java GUI Application, slides 39-41 * Help and Summary, slides 42-46 * Lab, slide 47 |
| **Review / Assessment:** | 2 Lab assignments are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 2 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 2: Using Data |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Declare and use constants and variables * Use integer data types * Use the boolean data type * Use floating-point data types * Use the char data type * Use the Scanner class to accept keyboard input * Use the JOptionPane class to accept GUI input * Perform arithmetic * Understand type conversion |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Constants and Variables, slides 2-13 * Lab, slide 14-15   10:45 AM – 11 AM   * Break   11 AM – 12 PM   * Primitive data types: integer, boolean, floating-point and char, slides 16-23 * Scanner class, slides 24-27 * Lab, slide 28   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Dialog boxes, slides 29-35 * Arithmetic, slides 36-40 * Type conversion, slides 41-43 * Summary, slides 44-46 * Lab, slide 47 |
| **Review / Assessment:** | 3 Lab assignments are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 3 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 3: Using Methods, Classes and Objects |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Understand the use of method calls and placement * Identify the parts of a method * Add parameters to methods * Create methods that return values * Understand the use of classes and objects * Create a class * Create instance methods in a class * Declare objects and use their methods * Create constructors |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Understanding Methods, slides 2-27   10:45 AM – 11 AM   * Break   11 AM – 12 PM   * Lab, slide 28   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Understanding Classes and Objects, slides 29-50 * Summary, slides 51-52 * Lab, slide 53 |
| **Review / Assessment:** | 2 Lab assignments are planned to assess students understanding of the material |

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##### Day 4 of 15

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| **Name:** |  |
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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 4: More Object Concepts |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Understand blocks and scope * Overload a method * Avoid ambiguity * Create and call constructors with parameters * Use the this reference * Use static fields * Use automatically imported, prewritten constants and methods * Use composition and nest classes |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Understanding Blocks and Scope, slides 2-7 * Overloading a Method, slides 8-12 * Lab, slide 13   10:45 AM – 11 AM   * Break   11 AM – 12 PM   * Constructors, slides 14-24 * Lab, slide 25   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Static and Constant fields, slides 26-28 * Imported and Nested classes, slides 29-40 * Summary, slides 41-42 * Lab, slide 43 |
| **Review / Assessment:** | 3 Lab assignments are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 5 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 5: Making Decisions  Chapter 6: Looping |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Plan decision-making logic * Make decisions with the if and if…else statements * Use multiple statements in if and if…else clauses * Nest if and if…else statements * Use AND and OR operators * Make accurate and efficient decisions * Use the switch statement * Use the conditional and NOT operators * Assess operator precedence * Add decisions and constructors to instance methods * Create while loops * Use shortcut arithmetic operators * Create for loops * Create do…while loops * Nest loops * Improve loop performance |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Decision-making logic and conditional statements, slides 2-19 * Lab, slide 20   10:45 AM – 11 AM   * Break   11 AM – 12 PM   * The switch statement and operator precedence, slides 21-31 * Lab, slide 32   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Loops, slides 33-68 * Summary, slides 69-71 * Lab, slide 72 |
| **Review / Assessment:** | 3 Lab assignments are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 6 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 7: Characters, Strings, and the StringBuilder |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Identify string data problems * Use Character class methods * Declare and compare String objects * Use other String methods * Use the StringBuilder and StringBuffer classes |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * String and Character objects, String comparison, slides 2-24   10:45 AM – 11 AM   * Break   11 AM – 12 PM   * Lab, slide 25   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * StringBuilder and StringBuffer objects, slides 26-33 * Lab, slide 34 * Summary, slides 35-37 * Lab, slides 38-39 |
| **Review / Assessment:** | 3 Lab assignments are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 7 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 8: Arrays  Chapter 9: Advanced Array Concepts |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Declare arrays * Initialize an array * Use variable subscripts with an array * Declare and use arrays of objects * Search an array and use parallel arrays * Pass arrays to and return arrays from methods * Sort array elements using the bubble sort algorithm * Sort array elements using the insertion sort algorithm * Use two-dimensional and other multidimensional arrays * Use the Arrays class * Use the ArrayList class * Create enumerations |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Declaring, Initializing and Using Arrays, slides 2-19 * Lab, slide 20   10:45 AM – 11 AM   * Break   11 AM – 12 PM   * Sorting Arrays, slides 21-25 * Lab, slide 26   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Multidimensional Arrays, slides 27-32 * Array class and ArrayList class, slides 33-38 * Enumerations, slides 39-44 * Summary, slides 45-47 * Lab, slide 48 |
| **Review / Assessment:** | 3 Lab assignments are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 8 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 10: Introduction to Inheritance |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Understand the concept of inheritance * Extend classes * Override superclass methods * Call constructors during inheritance * Access superclass methods * Employ information hiding * Understand which methods you cannot override |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Inheritance, slides 2-8 * Polymorphism, slides 9-18   10:45 AM – 11:00 AM   * Break   11 AM – 12 PM   * Lab, slide 19   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Encapsulation, slides 20-30 * Summary, slides 31-32 * Quiz, slide 33 * Lab, slide 34 |
| **Review / Assessment:** | 3 Lab assignments and a quiz are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 9 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 11: Advanced Inheritance Concepts |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Create and use abstract classes * Use dynamic method binding * Create arrays of subclass objects * Use the Object class and its methods * Use inheritance to achieve good software design * Create and use interfaces * Create and use packages |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Abstract Classes, slides 2-10 * Lab, slide 11   10:45 AM – 11:00 AM   * Break   11 AM – 12 PM   * Java.lang.Object, slides 12-19 * Lab, slide 20   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Interfaces, slides 21-25 * Packages, slides 26-29 * Summary, slides 30-32 * Quiz, slide 33 * Lab, slide 34 * Homework, slide 35 |
| **Review / Assessment:** | 3 Lab assignments, a quiz and a homework assignment are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 10 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 12: Exception Handling |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Understand Java exceptions handling * Try code and catch exceptions * Throw and catch multiple exceptions * Use the finally block * Understand the advantages of exception handling * Specify the exceptions that a method can throw * Trace exceptions through the call stack * Create Exception classes * Use an assertion |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Java Exceptions, “try” and “catch” blocks, slides 2-19 * Lab, slide 20   10:45 AM – 11:00 AM   * Break   11 AM – 12:30 PM   * The “finally” block, slides 21-23 * Advantages of exception handling, tracing exceptions and creating exception classes, slides 24-33 * Lab, slide 34   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Assertions, slides 35-36 * Virtual keyboard, slides 37-39 * Summary, slides 40-42 * Lab, slide 43 |
| **Review / Assessment:** | 3 Lab assignments are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 11 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 13: File Input and Output |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Use the Path and Files class * Learn about file organization, streams, and buffers * Use Java’s IO classes to write to and read from a file * Create and use sequential data files * Learn about random access files * Write records to a random access data file * Read records from a random access data file |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Understanding computer files, and Java Path and File classes, slides 2-12 * Lab, slide 13   10:45 AM – 11:00 AM   * Break   11 AM – 12:00 PM   * File organization, Streams and Buffers, slides 14-17 * Java IO classes, slides 18-26   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Labs, slides 27-29 * Random access files, slides 30-39 * Summary, slides 40-41 * Lab, slide 42 |
| **Review / Assessment:** | 5 Lab assignments are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 12 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 14: Introduction to Swing Components |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Understand Swing components * Use the JFrame class * Use the JLabel class * Use a layout manager * Extend the JFrame class * Add JTextFields, JButtons, and tool tips to a JFrame * Use event-driven programming * Understand Swing event listeners * Use the JCheckBox, ButtonGroup, and JComboBox classes |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:30 AM   * Swing components, slides 2-21   10:30 AM – 10:45 AM   * Break   10:45 AM – 12:00 PM   * Event driven programming, slides 22-43   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Summary, slides 44-46 * Labs, slides 47-48 |
| **Review / Assessment:** | 2 Lab assignments are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 13 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 15: Advanced GUI Topics |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Use content panes * Use color * Learn more about layout managers * Use JPanels to increase layout options * Create JScrollPanes * Understand events and event handling more thoroughly * Use the AWTEvent class methods * Handle mouse events * Use menus |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Content Pane, Colors, Layout Managers, slides 2-19 * JScroll Pane, slides 20-21   10:45 AM – 11:00 AM   * Break   11:00 AM – 12:00 PM   * Lab, slide 22   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * Events and Event Handling, slides 23-38 * Menus, slides 39-42 * Summary, slides 43-45 * Lab, slide 46 |
| **Review / Assessment:** | 2 Lab assignments are planned to assess students understanding of the material |

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### **Lesson Plan**

##### Day 14 of 15

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| **Name:** |  |
| **Date:** |  | **Department:** |  |

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| **Subject:** | Java Programming Language |
| **Subject Topics:** | Chapter 16: Graphics |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | After completion of the lesson, students will be able to:   * Draw strings * Draw lines and shapes * Learn more about fonts * Draw with Java 2D graphics |
| **Technology:** | * Overhead projector |
| **Materials:** | * PowerPoint presentation |
| **Teacher/Student Input:** | * Question and Answer interactions * Class exercises |
| **Lesson Plan** | 9 AM – 10:45 AM   * Rendering methods, slides 2-4 * Lab, slide 5 * Drawing Strings, Lines and Rectangles, slides 6-15   10:45 AM – 11:00 AM   * Break   11:00 AM – 12:00 PM   * Drawing Ovals, Arcs and Polygons, slides 16-23 * Discovering Screen Statistics, slides 24-30   12 PM – 12:30 PM   * Lunch break   12:30 PM – 3 PM   * 2D Graphics, slides 31-40 * Summary, slides 41-42 * Lab, slide 43 |
| **Review / Assessment:** | 2 Lab assignments are planned to assess students understanding of the material |

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Completion Date of Lesson Teacher Signature

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Date Lesson was reviewed by Dept. Chair Department Chair Signature

### **Lesson Plan**

##### Day 15 of 15

|  |  |
| --- | --- |
| **Name:** |  |
| **Date:** |  | **Department:** |  |

|  |  |
| --- | --- |
| **Subject:** | Java Programming Language |
| **Subject Topics:** | Final Test |
| **# of Students in the Class:** |  |
| **Previous Requirements:** | WA100 – Introduction to Computer Science |
| **Aim / Objective:** | Comprehensive evaluation of the student’s understanding of concepts covered in the WA140 course. |
| **Technology:** | * N/A |
| **Materials:** | * Test print-outs |
| **Teacher/Student Input:** | * N/A |
| **Lesson Plan** | 9 AM – 9:45 AM   * Review of the concepts covered in the WA140 course * Q&A   09:45 AM – 10:00 AM   * Break   10 AM – 2:00 PM   * Final WA140 Test |
| **Review / Assessment:** | N/A |

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Completion Date of Lesson Teacher Signature

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Date Lesson was reviewed by Dept. Chair Department Chair Signature