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# **Java Programming**

# **General Course Information**

**Instructor:** Professor Sam Sultan

**Email:** [ssultan3@fordham.edu](mailto:ssultan3@fordham.edu)

**Course title/number:**  Java Programming – **CISC 3400**

**Semester/Year**: Spring 2024

**Class meeting/location:** Wednesdays 2:30pm-5:15pm, 1/17-5/1 (No class 3/27, Final exam 5/8)

# **Course Description:**

This course is a foundation course for learning software programming using the Java language. The course will introduce the student to programming concepts, programming techniques, and other software development fundamentals. Students will learn the concepts of Object Oriented programming using Java. The course will present an introductory coverage of the Java programming language including how to write, compile and run Java pgms.

The purpose of this course is to learn programming concept and Object Oriented fundamentals using Java. Students will receive a solid understanding of the Java language syntax and semantics including Java program structure, data types, program control flow, defining classes and instantiating objects, information hiding and encapsulations, inheritance, exception handling, input/output data streams, collection classes and generics, multi-threading, networking, java servlets and web services

# **Course Prerequisites:**

Foundation in computer programming skills in any language

# **Course Structure/Method:**

This course will be delivered onsite at Rose Hill campus. The class will encompass lectures, assignments, examples and demos, midterm and final exams. All class content and assignments will be made available online via Blackboard course website, as well as through <http://samsultan.com/fordham/java>

# **Course Learning Outcomes:**

By the end of this course, students will be able to:

# Understand the fundamental concept of Java “write once, run everywhere” strategy

# Understand and work with the various Java Data Types

# Obtain a solid understanding of how to use Java to control program flow

# Master the use of conditional processing, loops & iterations, and method creation and calls

# Learn about Java Strings and StringBuffers, and when to use each

# Learn about Java arrays and ArrayLists, and when to use each

# Gain knowledge of Objects and Classes

# Understand how and when to use static versus instance fields and methods

# Build class constructors

# Learn how abstraction, encapsulation, inheritance and polymorphism work

# Create method overriding and overloading to enhance your Object Oriented coding techniques

# Appreciate Java Exception handling mechanism

# Work with input and output files and streams

# Learn about data structures, and Java’s Collections classes supporting those data structures

# Learn about Java Generics

# Access database objects using Java

# Understand Java threads, and build a multi-threaded Java application

# Learn about networking, and use TCP and UDP to communicate to other computers

# Build web GUI screens and access Java Web Services

# **Communication Policy:**

Please email instructor using your Fordham University assigned email address. All email inquiries will be responded to within 24 hours during Monday through Friday 5pm. Email sent on Saturday or Sunday will not be responded to until Monday.

# **Course Expectation:**

Students are expected to participate in each class session by offering their understanding of the subject, sharing ideas or discussing/commenting on another students comment. In addition, students must complete and submit all assigned homeworks on time (within one week of assigned date). Students are also expected to take and pass a midterm exam and a final exam.

See full detail of expectation under “Assessment Strategy” next page

**Required & Recommended Material:**

* Java: The Complete Reference, Eleventh Edition
* **Authors** – Herbert Schildt
* **Publisher** – Oracle Press
* Instructor will also provide session by session content available online at class web site
* <http://samsultan.com/fordham/java>

**Additional Recommended Material**

* Murach’s Java Programming (5th Edition)
* **Authors** – Joel Murach
* **Publisher** – Murach.

**Assessment Strategy:**

Contributing factors for determining your course grade include:

* Class Attendance and Participation - **10%** *(Attendance is prerequisite to participation)*
* Homeworks - **40%** (*Homeworks assigned later in the semester will have more % values*)
* Midterm Exam - **25%**
* Final Exam - **25%**
* **Class Participation:** To receive full credit for the course, you should attend all classes since much of the learning occurs during class lecture, presentation and class discussions. Please contact the instructor if you anticipate missing any part of the class. Participation grades will be based on:
* Involvement in class discussions and activities. You must ask at least **one or more** question per session.
* Quality/quantity of providing effective feedback/answers to instructor and other students’ questions.
* Participation must demonstrate integration of reading, class work, relevance and application.
* Willingness to learn by accepting feedback, trying new skills and approaches, etc.
* Online students must have their cameras turned on (*unless previously discussed/agreed with instructor*)
* **Homework:** Homeworks must be submitted on time by due date often within 1 week of date assigned (unless otherwise instructed). Late submission will severely impact your homework grade, or may not be accepted altogether at instructor discretion. Homework must be uploaded into Blackboard with Java **code** and **sample output**. Homeworks assigned later in the semester will have more average grade weight than homeworks assigned early in the semester.
* **Midterm Exam:** There will be a midterm exam. The exam will be an open book, open notes/internet style exam. The exam will test the student's acquisition of topics, concepts and competencies learned in this class.
* **Final Exam:** There will be a final exam. The exam will be an open book, open notes/internet style exam. The exam will test the student's acquisition of topics, concepts and competencies learned in this class. The final exam will only include topics discussed/covered in the second half of the course.

# **Academic Integrity:**

Fordham University is a top level academic institution that takes academic integrity very seriously. All students suspected of violating this policy including cheating and/or plagiarism on assignments or exams will be severely penalized for their action.

### **Course Outline:**

**Session 1a – Introduction to Programming and Computer Science**

* What is a Programming Language
* Common/popular current languages
* Computer languages throughout the years
* Bits and Bytes
* Decimal, Binary, Octal, Hexadecimal
* The ASCII character set, Unicode character set
* Compiled vs. Interpreted Languages
* Programming Constructs & Fundamentals
* Software Development as Layers concept
* Example of code in various computer languages

**Reading:** Online Reading and Professor Notes

**Session 1a – Introduction to Programming in Java**

* The History of Java
* The Java Environment
* 2 Steps - Compiler then Interpreter
* The JVM virtual Machine
* Downloading and Installing the JDK
* What is Path and Classpath
* Compiling a Java Program
* Running a Java Program
* The Java Language Keywords
* Object Oriented Concepts
* Objects and Classes

**Reading:** Chapters 1 and 2

**Session 1b – Java Data Types**

* Declaring Variables
* Java Primitive Data Types
* Variable Assignment
* Casting to another Data Type
* Automatic Data Type Promotion
* Mathematical Operators
* Operator Precedence
* Comments and Documentation

**Reading:** Chapter 3 (pages 39-54), and chapter 4

**Session 2 – Program Logic**

* Logic and Program Control
* Making Decisions
* The if statement, and the switch statement
* Loops and Iterations
* The for and while statements
* Boolean Expressions
* Logical Operators
* Conditional Operators
* Variable Scope
* Creating and Using Methods

**Reading:** Chapter 5

**Session 3 – Java Strings**

* The String class
* Creating String Objects
* Mutable vs. Immutable
* String and Substring Operations
* Comparing Strings for equality and inequality
* The StringBuffer Class

**Reading:** Chapter 17

**Session 4 – Java Arrays**

* What is an Array
* Declaring Arrays
* Array of Arrays (Multi-dimensional arrays)
* Iterating through arrays
* Sorting Arrays
* Introduction to Java ArrayLists

**Reading:** Chapter 3 (pages 55-65)

**Session 5-6 – Object Oriented Concepts and Programming**

* Object Oriented Concepts
* Defining Classes
* Defining Variables and Methods in a Class
* Instantiating Objects
* Defining Constructors
* Method Overloading
* Packages
* Access Control to Class Members
* Abstraction and Encapsulation

**Reading:** Chapters 6 and 7

**Session 7a – Midterm Exam**

**Session 7-8 – Extending Classes and Inheritance**

* Extending Classes
* What is a Superclass, what is a Subclass
* Class Inheritance
* Abstract Classes
* Interfaces
* Polymorphism
* The Final keyword
* The Universal Superclass
* The toString( ) Method
* Determining the type of an Object

**Reading:** Chapters 8 and 9

**Session 9a – Java Exceptions**

* What are Exceptions
* Type of Exceptions
* Handling Exceptions
* The try/catch Block
* Define and Throw your own Exception

**Reading:** Chapter 10

**Session 9b – File Input and Output**

* Input and Output Streams
* Using Readers, using Writers
* Working with the File Object
* Testing for Files and Directories
* File Input and Output
* Dealing with Buffers
* Reading from Files, writing to Files

**Reading:** Chapters 13 (pages 315-329), and chapter 21

**Session 10 – Collection Classes and Generics**

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| --- |
| * Collection Classes * Differences between Arrays & Collection classes * Types of Data Structures * Java <Generics> * Lists: ArrayList, Vector, LinkedList * Stacks and Queues * Sets: HashSet, TreeSet * Maps (key/value pairs): HashMap, TreeMap * Iterators   **Reading:** Chapters 14 and 19 |

**Session 11 – Using Java with Databases**

* Using Databases with Java
* The SQL Language
* Reading data from databases
* Inserting, Updating and Deleting Data
* Creating database tables and indexes
* Connecting Java to a database using JDBC
* Working with a ResultSet

**Reading:** Online and class website notes

**Session 12 – Web Services**

* Java Servlets, JSP and Web Services
* Dynamic web output
* Tomcat and other JSP/Servlet Containers
* Java Server Pages
* The HTTP protocol
* Java Request/Response Objects
* The GET and POST methods
* Java Web Services
* Client Side Request
* Server Side Response

**Reading:** chapter 35

**Session 13 – Java Threads**

* Understanding Java Threads
* Multi-Threading vs. Multi-Processing
* Lifecycle and States of a Java Thread
* The Thread Class & the Runnable Interface
* Creating Threads
* User vs. Daemon Threads
* Interrupting/Terminating Threads
* Making Threads Safe with Synchronization
* Communicating Between Threads
* Preventing Threads Deadlocks

**Reading:** Chapters 11

**Session 14 – Java Networking**

* What is Networking?
* The Internet IP Address
* Domain Name Server (DNS)
* Port Numbers - standard, non-standard
* Network Sockets
* The Java socket Classes
* The InetAddress Class
* TCP/IP Communication Protocol
* The ServerSocket Class and Socket Class
* UDP/IP Communication Protocol
* The DatagramPacket Class and DatagramSocket Class
* Building Client/Server Applications

**Reading:** chapter 23

**Session 14b – Final Exam**