

Course: Java

Course Code: Java

Session: 2016-17

Duration: 4 months

Assessment procedures: Proctored certification Exam (100%)

Curriculum of the Course:

- 1 Introduction
 - 1.1 Basic Level
 - 1.2 Intermediate Level

Basic Level

Introduction to Java

1. Getting started with Java – installation
 - Install jdk from Synaptic Package Manager
 - Choose openjdk-6-jdk from the list of packages available
 - Mark it for installation
 - The installation will take a few seconds
 - Verify the installation
 - At the command prompt type `java -version`, so the version number of the jdk will be displayed
 - Run a simple java program and see if it works
 - Type `javac TestProgram.java` for compiling the code and `java TestProgram` for executing the code
2. Java - First program
 - write simple java program
 - print “My First Java Program!” on Console
 - save the file
 - file name given to the java file
 - compile the file
 - run the file
 - correct the errors
 - naming conventions for class
 - naming conventions for method
 - naming conventions for variable

Eclipse

3. Installing Eclipse

- Install Eclipse on Ubuntu on the Terminal
- Set up the proxy on the Terminal
- Then fetch the list of all the available softwares
- Type `sudo apt-get update`
- Then install eclipse on the Terminal
- Type `sudo apt-get install eclipse`
- Verify if Eclipse is installed on the system
- Installing Eclipse on Debian,Kubuntu,Xubuntu
- Installing Eclipse on Redhat
- Installing Eclipse on Fedora,centos and suse linux

4. Getting started with Eclipse

- Eclipse is an Integrated Development Environment
- It is a tool on which one can write, debug and run java programs easily
- Open Dash Home and type Eclipse in the search box.
- We get Workspace Launcher
- On clicking on Workbench we get the Eclipse IDE
- Go to File->New->Project and select Java Project
- Create a project named EclipseDemo and create a class inside DemoClass
- Learn about Package Explorer and Editor portlet

5. Hello World Program

- Open Eclipse
- Create a Java Project named DemoProject
- Create a class named DemoClass
- Class name and file name will be the same
- Eclipse suggests various possibilities as we type a command
- Eclipse also completes the parentheses by automatically adding the closing parentheses
- Include the statement that we want to print
- Eclipse also completes the quotes by adding the closing quote
- Compile and execute the program
- Change the code to print

6. Errors and Debugging

- When writing a Java Program, here is a list of typical errors:
- Missing semicolon(;)
- Missing double quotes(" ")
- Mis-match of filename and classname
- Typing the print statement in lower case
- The line which has the error will be indicated with a red cross mark on the left margin
- The list of errors is displayed by hovering the mouse over the cross mark
- Create a class ErrorFree with Errors, debug the code and run it
- Eclipse also offers intelligent fixes

7. Programming features of Eclipse

- Auto completion
- Sets the corresponding closing brace when we open the brace
- Provides a drop-down list of methods when you start typing the code.
- Syntax highlighting
- Classname is highlighted in pink color and method in blue color.
- Keyboard shortcuts
- F11 to debug a program and Ctrl plus H to search a specific file.
- Error highlighting
- Cross symbol in the program denotes errors
- Remove semicolon and error details are displayed when mouse is hovered over cross symbol.

Fundamental Programming Structures in Java

8. Numerical datatypes

- Define datatypes and numerical datatypes
- int
- float
- byte
- short
- long
- double
- range of each numerical datatypes

- declaration and initialization of numerical datatypes.
- valid and invalid declaration

9. Arithmetic Operations

- Define an operator
- Define arithmetic operators
- addition
- subtraction
- multiplication
- division
- modulo
- simple program to demonstrate arithmetic operators
- appropriate datatypes for appropriate values
- save, compile and run the program

10. Strings

- char datatype
- letter, digit, punctuation marks, **tab**, or a space are all characters.
- Program explaining the variable and the character data.
- Introduction to strings
- Creating string by Direct Initialization
- Creating string by using new operator
- String length()
- String concat()
- String toUpperCase()
- String toLowerCase()

11. Primitive type conversions

- define type conversion or type casting
- higher order integer to lower order integer- Explicit type casting
- program to show explicit type casting
- common mistake in explicit type casting.
- program to show common mistake in explicit type casting
- lower order integer to higher order integer – Implicit type casting
- program to show implicit type casting
- char to integer

- integer to char
- program to show char to int type casting.

Control flow

12. Relational Operations

- boolean datatype
- equal to and not equal to
- less than and less than or equal to
- greater than and greater than or equal to

13. Logical Operations

- use of logical operators
- and (&&) operator
- example to explain **and** operator
- program to demonstrate **and** operator
- or (||) operator
- example to explain **or** operator
- program to demonstrate **or** operator
- not (!) operator
- program to demonstrate **or** operator
- save, compile and run the programs

14. if else construct

- Conditional Statements and types of Conditional Statements
- Use of if statement
- Syntax for if statement
- Program using if statement
- Use of if else statement
- Syntax for if else statement
- Program using if else statement
- Use of if else if statement
- Syntax for if else if statement
- Program using if else if statement

15. nested if and ternary operator

- explain nested if
- nested if syntax
- program to demonstrate nested if
- explain the control flow of the program

- explain ternary operator
- syntax for ternary operator
- explain the syntax
- program to demonstrate ternary operator
- comparison between ternary operator and nested if
- save, compile and run the program

16. switch statement

- define switch case statement
- compare switch and nested if
- switch case syntax
- working of a switch case statement
- use of keyword switch
- valid and invalid use of keyword **case**
- use of keyword default
- use of keyword break
- program to demonstrate switch case statement
- save, compile and run the program to check the output

17. while loop

- Loop control statement
- types of loop control statements
- Introduction to while loop
- syntax of while loop
- Program using while loop
- Check the output.
- Introduction to infinite loop
- loop variable modification
- Check the output
- How to terminate the infinite loop

18. for loop

- syntax
- introduction to for loop
- for loop syntax
- loop variable
- loop condition
- loop variable increment or decrement
- loop block

- flow of loop
- advantage of using loop

19. do while loop

- define do while
- do while syntax
- working of do while loop
- example of do while loop
- explain the do while programming
- save, compile and run the program to check the output
- how different is it from the while loop
- program to demonstrate the differences

Arrays

20. Introduction to Arrays

- About Arrays
- Declare an Array
- Initialize an array
- Initialization using for loop
- Index of an array elements
- change values of an array
- print the value of an array
- Advantage of an array.

21. Array operations

- import java.util.Arrays
- use methods from class Arrays
- toString() method
- sort() method
- fill() method
- copyof() method
- copyofRange() method
- about parameters for each method.

Classes & Objects

22. Creating class

- Whatever we can see in this world are all objects
- Objects can be categorized into groups known as class
- This is class in real world

- Human Being is an example of class in real world
- Class in java is the blue print from which individual objects are created
- Class consists defines a set of properties called variables and a set of behaviors called methods
- Syntax for creating class
- Create a simple class Student using Eclipse
- The Student class can contain properties

23. Creating Object

- An object is an instance of a class
- Each object consist of state and behavior
- Object stores it state in fields or variables
- It exposes its behavior through methods
- Reference variables
- Create a class named TestStudent
- Create an object of the Student class
- Use new operator
- Check what the reference variable contains
- Create one more object of the Student class and check what the reference variable contains

24. Instance fields

- Also known as non-static fields
- Open the TestStudent class which we have created
- Access the fields roll_number and name using dot operator
- See the output
- Initialize the field and see the output
- Change the modifier of the fields to private
- Debug the error that you get
- Change the modifier to protected
- Each object of a class will have unique values
- Create two objects of the Student class

25. Methods

- method definition
- write simple method
- method returning value
- call a method in another method

- flow of the program
- call a static method
- call a method from another class
- method signature
- method body

Constructors

26. Default constructor

- what is a constructor?
- what is a default constructor?
- when is it called?
- define a constructor
- initialize the variables
- call the constructor
- difference between constructor and method

27. Parameterized constructors

- What is a parameterized constructor?
- create constructor without parameter
- create a constructor with parameter
- assign values to the variables in the constructor
- pass arguments during the constructor call
- working of parameterized constructor
- show common errors
- resolve the errors
- create another parameterized constructor
- why to use constructor?

28. Using this keyword

- this is a reference to the current object
- helps to avoid name conflicts
- we can use this keyword inside a constructor to call another one
- the constructors must be in the same class
- explicit constructor invocation
- Explain it using the parameterized constructor code
- Make this statement the last one in the constructor
- You will get an error

- this statement should be the first one inside a constructor

29. Non-static block

- Non-static block
- Any code written between two curly brackets
- Executed for each object that is created
- Executes before constructor's execution
- can initialize instance member variables of the class
- create a class named NonStaticTest
- Create a non-static block and a constructor inside it
- Check the output
- Include multiple non-static blocks
- they will be executed in the sequence in which they appear in the class
- Check the output
- Non-static block is not a substitute for constructor

30. Constructor Overloading

- define multiple constructor
- what is constructor overloading?
- constructor with different number of parameters.
- parameters with different datatypes.
- how is constructor overloaded?
- flow of overloading process.
- advantage of constructor overloading.

31. Method Overloading

- define multiple methods.
- methods with same name.
- methods with different number of parameters.
- methods with different datatypes of parameter.
- what is method overloading?
- example for overloading method
- how to overload method?
- advantage of method overloading.
- error in method overloading.

32. Taking user input in Java

- What is BufferedReader?
- Importing three classes from Java.io package

- How to take the input from the user?
- Syntax to implement BufferedReader
- What is InputStreamReader?
- Create object of InputStreamReader
- Create object of BufferedReader
- About IOException
- About throws keyword
- Typecasting

Intermediate Level

1. Subclassing and Method Overriding

- Definition of subclassing
- Demo of subclassing using an Employee and Manager class
- Single inheritance
- Use of extends keyword
- Private members in a super class
- Definition of method overriding
- Annotation
- @Override Annotation

2. Calling methods of the superclass

- super keyword
- Call methods of the super class
- Constructor of the super class
- Demo of super keyword using an Employee and Manager class
- Single inheritance
- Use of extends keyword
- Private members in a super class

3. Using final keyword

- final keyword
- What is final keyword and its application?
- Where final keyword can be declared?
- final variable
- final static variables
- static block
- final variable as parameter
- final method

- private final method
- final class

4. Polymorphism

- Polymorphism in Java
- Run-time polymorphism
- Virtual Method Invocation
- Compile-time polymorphism
- Role of JVM
- IS-A test
- Static binding
- Dynamic binding

5. Abstract Classes

- Abstract Classes in Java
- What are Abstract Methods
- What are Concrete Methods
- Properties of Abstract Methods and Abstract Classes
- How to use Abstract Methods

6. Java Interfaces

- Java Interfaces
- Implementing Interface
- Implementation Classes
- Interfaces Vs Abstract classes
- Implementing Multiple Interfaces
- Usage of Interfaces with an example

7. Static Variables

- What is Static Variable in Java?
- Usage of Static Variables with Example
- Static Variables Vs Instance Variables
- Final Static Constants

8. Static Methods

- What is static method in Java?
- Static methods Vs Instance methods
- Usage of static method with example
- Passing object variables in a static method

9. Static Blocks

- What is a static block

- Declaring and defining a static block
- How static blocks are invoked and executed

10. Exception Handling

- What is an Exception
- Types of Exceptions
 - Checked Exceptions
 - Unchecked Exceptions
- Explaining *ArrayIndexOutOfBoundsException*
- Demonstrating Checked Exceptions with example
- Handling Exceptions using try-catch blocks
- Explaining *ArithmeticException*
- Demonstrating Unchecked Exceptions with example
- Explaining *FileNotFoundException*
- Usage of finally block
- Explaining *NullPointerException*

11. Custom Exceptions

- What is a Custom Exception
- Demonstration of custom exception
- Custom exception example - "InvalidMarkException"
- Usage of "throw" keyword
- How to resolve errors in custom exceptions
- Resolve error using "Add throws declaration" option
- Usage of "throws" keyword
- Example for "FileNotFoundException"
- How to handle multiple exceptions
- How to use "surround with try/catch" option

List of Students Enrolled

#	Name of Student
1	SAGAR JANGID
2	AALEKH RAVI
3	ABHINAV KUMAWAT
4	ABHISHEK KHANDELWAL
5	ABHISHEK VERMA
6	ADITYA JUNEJA
7	AMAN SAINI
8	AMIT KILANIYA

9	ARPIT GARG
10	ARPIT KHANDELWAL
11	AYUSH SHARMA
12	AYUSHI SOMANI
13	CHARUL JAIN
14	DIVYA PRATAPSINGH
15	HARSH CHATURVEDI
16	JAI JAIN
17	JYOTISH TIWARI

18	KHUSHAHAL JOSHI
19	KUMAR SHASI BINDU
20	KUSUM WADHWANI
21	MAHIP SINGH CHARAN
22	MANISH BISHT
23	MANISH NEBHNANI
24	MANJINDER SINGH
25	MATHUR AAYUSH NEERAJ
26	MAYANK BALANI
27	MUDITA JAIN
28	NEHA ARUN
29	NIKITA GUPTA
30	NITIN ROHRA
31	PIYUSH YADAV
32	PIYUSHI BHARGAVA
33	PRACHI SHARMA
34	PRASHANT AGARWAL
35	PRIYA CHUGH
36	RAHUL KUMAR
37	RAVI ROSHAN
38	RIDDHIMA MAHESHWARI
39	ROHAN SAINI
40	SAKSHAM JANGID
41	SAKSHI KUMARI
42	SAKSHI MAHESHWARI
43	SAUMYA SRIVASTAVA
44	SHRESHTHA TIWARI
45	SHREY JARADI
46	SHREYANSHEE GATTANI
47	SHUBHAM KISHORPURIA
48	SMRITI KHANDELWAL
49	SOURABH GUPTA
50	SUHANI JOSHI
51	SUMIT SOMNANI
52	SUPRIYA SINGH
53	SURBHI GARG
54	SWAPNIL SINGH
55	SWASTIK SOMANI
56	TARUN SHARMA
57	TEJENDRA JAROLI
58	TUSHAR SHARMA
59	UJJWAL MADAWAT
60	VALLABH JAIN

61	YASH GEEL
62	YASH VIJAY
63	RAMJILAL CHOUDHARY
64	PARAG DOSHI
65	RITU KANWAR RAJAWAT
66	AASHUTOSH SHARMA
67	AAYUSH SHARMA
68	AAYUSHI BENIWAL
69	ACHAL JAIN
70	ADITYA SHARMA
71	AISHWARY JOHRI
72	AKSHAY KATARE
73	AMANDEEP WALIA
74	AMRIT KUMAR
75	ANISH GARG
76	ANKIT PAREEK
77	ANUBHAV SHRIMAL
78	AYUSH CHHAWAL
79	AYUSH VASHISHTH
80	BHARAT SINGH NATHAWAT
81	CHANDAN CHOUBISA
82	DEEPAK SHARMA
83	DHAIRYA BHARDWAJ
84	DINESH SOLANKI
85	DIVYA ARORA
86	DIVYANSH PANDEY
87	GARIMA MANGAL
88	GAURAV SHARMA
89	HARI SINGH
90	HARPREET SETHI
91	HARSH MANDAN
92	HARSHIT JAIN
93	HARSHIT SINGH LODHA
94	HARSHITA MAHESHWARI
95	HITENDRA SINGH RATHORE
96	JITENDRA BUDIYA
97	KAPIL AGRAWAL
98	KARAN MAKVANA
99	KASHISH TANEJA
100	KSHITIJ MAHESHWARI
101	KUSHAGRA KHANDELWAL
102	LAKSHMAN RAJPUROHIT

103	MAHIMA DOSHI
104	MANISH DHAYAL
105	MD SALMAN HUSSAIN
106	MEGHNA BHATTACHARYA
107	MOHIT SINGH BAGHEL
108	NAVEEN KUMAR SHARMA
109	NEELESH MALPANI
110	PEEYUSH PANT
111	PRANAY BHARDWAJ
112	PRANSHU RASTOGI
113	PRERANA GUPTA
114	PULKIT SHARMA
115	PUSHPENDER KUMAR
116	RAHUL DUBEY
117	RAHUL YADAV
118	RAUNAK AGARWAL
119	RISHAV RANJAN
120	RITIK PATNI
121	RITVIK JAIN
122	RIYA MITTAL
123	ROHAN SHARMA
124	ROHIT PACHAURI
125	ROHIT TAMRA
126	ROOPESH JOSHI
127	RUCHI SINGHAL
128	SACHIN PRATAP SINGH CHAUHAN
129	SAGAR KALRA
130	SAURABH BHARGAVA
131	SHASHWAT SHARMA
132	SHUBHAM PUROHIT
133	SHUBHANGI GOVIL
134	SIMRAN DUTT SHARMA
135	SMRITI GUPTA
136	SOHAIL MANSOORY
137	SONAM SAINI
138	SONIYA YADAV
139	SUMIT KUMAR
140	SURBHI KHANDELWAL
141	SURYAVEER SINGH
142	SWATI JINDAL
143	TANU MITTAL
144	TWINKLE GARG
145	TWINKLE SHARMA

146	VAIBHAV VIJAY
147	VARUN JAIN
148	VATSAL LODHA
149	VIJAY KAUSHIK
150	VIKASH KUMAR JANGID
151	VINEET BAJ
152	VIRENDRA SINGAL
153	PANKAJ AGRAWAL
154	AKSHIKA PATNI
155	SHIVANI BIJARNIA
156	VAIBHAV GAUTAM
157	RASHMI KUMARI
158	EKANSH PARNAMI
159	MOHITA HARSH
160	RAHUL JANGID
161	ABHINAV DHAKA
162	ABHISHEK AGARWAL
163	ABHISHEK JAIN
164	ABHISHEK KALA
165	ABHISHEK KUMAR SINGH
166	AJIT MERATWAL
167	AKANKSHA TIWARI
168	AKSHAY MISHRA
169	ANMOL MADAAN
170	ANSHI AGARWAL
171	ANUBHUTI AGRAWAL
172	AYUSH DIDWANIYA
173	AYUSH JAIN
174	DEEPAK LAHOTY
175	DEEPALI SAXENA
176	DIVYANSH DHAMANIYA
177	HARSH KUMAWAT
178	HARSH MANWANI
179	HARSH VARDHAN RAJPUROHIT
180	HIMANSHU BANSAL
181	HRIDAYESH SHARMA
182	KAUSHAL DUBEY
183	KIRTI MITTAL
184	LAKSHYA SANADHYA
185	MALAY SINGH
186	MAYANK CHITTORA
187	MILIND SHARMA
188	NANDITA KHEMNANI

189	NILISHA BANSAL
190	PRATEEK TIWARI
191	PRINCE JAIN
192	REETIKA SINGH
193	ROHAN GARG
194	RONAK JAIN
195	SAAD SIDDIQUI
196	SANGEETA GURJAR
197	SAURABH SONI
198	SHREYA GUPTA
199	SHUBHAM JAIN
200	SONA KUMAR
201	SONAL KHANNA
202	SONALI SINHA
203	SUDHANSHU INDORIA
204	SUNAINA LALWANI
205	VAIBHAV GANDHI
206	VIVEK SINGHAL
207	YASH ARORA
208	RAMANDEEP KOUR
209	SAURABH CHATURVEDI
210	MANOJ SHARMA
211	ADITI
212	ADITYA KAUL
213	ALZAIB KHAN
214	APURWA
215	MEENAL SHARMA
216	NILESH KUMAR
217	PAYAL
218	PIYUSH JAIN
219	RITIKA JAIN

220	SAGAR GARG
221	SANCHARI DEY
222	SANJU JANU
223	SHIVANI GUPTA
224	SHIVANI GUPTA
225	SHUBHENDU MAL
226	TANU SHRI PANT
227	TRIPTI JAIN
228	YAASHI AGGARWAL
229	YASHIKA GUPTA
230	PAYAL KHANDELWAL
231	MANU GOYAL
232	DIVYANSHA GUPTA
233	DISHA AGARWAL
234	SAGAR CHOUDHARY
235	SAKSHI SHARMA
236	SHIVANSHI SHARMA
237	KABEER CHATURVEDI
238	JIGYASA GOYAL
239	SHIPRA KHANDELWAL
240	KHUSH VYAS
241	KUSUM SANKHALA
242	DEEPIKA KANWAR
243	TULIKA SINGH
244	PRAMOD SHARMA
245	RAHUL YADAV
246	VIPASHA CHOUDHARY
247	AAKANKSHA SHARMA
248	ADITYA RAJ
249	SHUBHAM KUMAR