

Course: Java

Course Code: Java

Session: 2019-20

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	AAKRITI SAMBYAL
2	ABHAY JAIN
3	ABHINAV SHARMA
4	AJAY SHARMA
5	AKSHITA SUTHAR
6	ANAND SAMANTNANI
7	ANANT SHARMA
8	ANCHAL JAIN
9	ANIRUDH KOOLWAL
10	ANISH GUPTA
11	ANJALI HINDUJA
12	ANKIT AGRAWAL
13	ANKIT DHARENDRA

14	ANKIT KUMAR
15	ANSHUL SIMLOTE
16	ANUBHAV JAIN
17	ANUJA DADHEECH
18	ASHOK CHOUDHARY
19	ASTHA KHANDELWAL
20	AVISH DHIRAWAT
21	AYUSH AGRAWAL
22	CHANDESHWAR KUMAR
23	CHETAN JAIN
24	CHIRAG MISRA
25	DEEPAK GUPTA
26	DEEPANSHU AGRAWAL
27	DEEPENDRA NAMA

28	DEVBRAT DEVBRAT
29	DHRUV UPADHYAY
30	DILKHUSH SHARMA
31	GARV KUMAR
32	GAURAV VAISHNAV
33	GIRISH KARWASARA
34	HARDIK SOMANI
35	HARSHIT JAIN
36	HARSHUL GUPTA
37	ANKUSH UPADHYAY
38	ESHAAN CHAUHAN
39	HIMANSHU JAIN
40	HIMANSHU SHARMA
41	HRIDYANGAM GARG
42	ISHAN GOYAL
43	JAHNAVI SACHDEVA
44	JALADH SINGHAL
45	JAY PATEL
46	JEET PATEL
47	JEETENDRA KUMAR
48	JEEVAN SINGH
49	KAUSHAL SARASWAT
50	KAUSTUBH SHARMA
51	KAVISH GUPTA
52	KESHAV BHANDARI
53	KHUSHI MITTAL
54	KHYATI GUPTA
55	KRIKA SINGHAL
56	KUSHAGRA MEHTA
57	LOKESH JAIN
58	MANPREET LALA
59	MANSI GUPTA
60	MANTHAN ROHIL
61	MAYANK MISHRA
62	MEGHA PATHAK
63	MEHUL SHARMA
64	MOHIT BATRA
65	MOHIT KUMAR
66	MUKUL SINGHAL
67	NAYAN AGRAWAL
68	NIDHI KHANDELWAL
69	NILANSHI MITTAL
70	NIMIT GOGORYA
71	NITESH GARG
72	PALAK WADHWA
73	PARMANAND SARASWAT
74	PIYUSH SARAF

75	PIYUSH SHARMA
76	PRACHI JAIN
77	PRADEEP YADAV
78	PRAGATI JAIN
79	PRAKHAR MANAK BOHARA
80	PRATEEK AGRAWAL
81	PRATYUSH KHANDELWAL
82	PRINCE JAIN
83	PRIYANSH GUPTA
84	PUNEET MANGHWANI
85	PUNIT JAIN
86	PUSHPANK HARPLANI
87	RAGHAV AGRAWAL
88	RAGHAV PALIWAL
89	RAHUL SHARMA
90	RAHUL SHARMA
91	RAHUL SINGH
92	RAHUL TAK
93	RAJESH SOHU
94	RAJNEESH RAJNEESH
95	RITESH PORWAL
96	RITIK AGARWAL
97	ROHIT JAIN
98	SACHIN KUMAR
99	SATYAM LAHOTY
100	SAURABH YADAV
101	SHAILESH GOYAL
102	SHARAD PAREEK
103	SHASHANK JINDAL
104	SHASHANK MEEL
105	SHIV MODI
106	SHIVAM SHARMA
107	SHIVANI KUMAWAT
108	SHORYA UPADHAYAY
109	SHUBHAM SHARMA
110	SIDDHARTH GUPTA
111	SOUMYA KHARWAS
112	SUHANI MAHESHWARI
113	SURENDRA KUMAR
114	TANISHQUE JAIN
115	TARUN SHARMA
116	TARUN TAMBOLI
117	TARUNN BISHNOI
118	TUSAR CHOUDHARY
119	TUSHAR KATARA
120	TUSHAR VERMA
121	UMANG VANAWAT

122	UTKARSH SINGH
123	UTSAV JAYASWAL
124	V SUBHASHINI
125	VAIBHAV AMARNANI
126	VIKAS JAIN
127	VINAY SHARMA
128	VINIT SWAMI
129	VISHNU JANGID
130	YASH SHARMA
131	YOSHIT MATHUR
132	AAYUSH SUHALKA
133	ABHISHEK GOYAL
134	AKSHITA GOYAL
135	AMAN BAHETI
136	APURV AGARWAL
137	ARCHIT SHARMA
138	ARYAN BHARGAVA
139	AYUSH DEV
140	DEEPAK YADAV
141	DEEPANK JAIN
142	DEVENDRA SHARMA
143	DHAIRYA SHARMA
144	GAGAN GUPTA
145	GAURAV BIYANI
146	HARSH AGRAWAL
147	HARSHIT JHALANI
148	HIMANSHU SOMANI
149	ISHANK JAIN
150	JAHANVI JAIN
151	JAIKISHAN DIDWANIA
152	KAUSHAL SHARMA
153	KHUSHI GOYAL
154	KHUSHI JAIN
155	KRITIK SHARMA
156	NIKHIL VASWANI
157	NIPUN GOYAL
158	PRACHI PORWAL
159	PRATEEK SALUJA
160	PRIYANSHI SUWALKA
161	PUSHPENDRA JAIN
162	RISHITA MAROO
163	SALONI MATHUR
164	SAMARTH CHATURVEDI
165	SAMRIDH RAGHAV
166	SETU CHANDWAR
167	SHIVAM JHA
168	SHREYA SINGH PARIHAR

169	SHREYANSH DEEP
170	SHUBHA SHARMA
171	SIMRAN KOOLWAL
172	VAIBHAV GEHANI
173	VINAY SHARMA
174	VISHAL SHARMA
175	VISHAVADEEP SHEKHAWAT
176	VIVEK JAIN
177	YATI SHEKHAWAT
178	ANANYA BISHT
179	DIKSHITA SAMDANI
180	MANVI ASIJA
181	SAURAV RANJAN
182	ZEHRA KHAN
183	ANUKRITI GARG
184	PARAS JAIN
185	AAKARSH RAJ
186	AASTHA GUPTA
187	ABHISHEK AGARWAL
188	AMIT SINGH RAWAT
189	ANIRUDH SHARMA
190	ANUSHKA MUKHERJEE
191	ARCHITA VIJAY
192	ARIHANT JAIN
193	ARYAN SAINI
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205	KISHITA GUPTA
206	MIHIR JAIN
207	NEERAJ JAIN
208	NIKHIL KHANDELWAL
209	PIYUSH SONI
210	PRAGYA KUMARI
211	PRIYANSH AJMERA
212	PULKIT GARHWAL
213	PULKIT VERMA
214	RAHUL KHATIK
215	RAJAT BALOTIA

216	RISHABH KHANDELWAL
217	ROHIT AGARWAL
218	ROHIT KALWANI
219	ROOPAL YADAV
220	RUPESH PRASAD
221	SAKSHAM SHARMA
222	SANYAM AUDHICHYA
223	SHANTANU DONGRE
224	SIDDHESH DOSI
225	SNEHA MATHUR
226	SURAJ SHRIVASTAVA
227	SUSHANT SINGH
228	SWATI PANCHOLI
229	TUSHAR THANVI
230	UJJWAL GARG
231	VARSHA YADAV
232	VIKAS MAURYA
233	YASH SAXENA
234	YATHARTH CHOUBISA
235	YOGESH KUMAR
236	YOGESH SAINI
237	SINGH POURNIMA YOGENDRA
238	SRISHTY ARORA
239	KRISHNESH KHALORA
240	RITWICK JOSHI
241	ANUJ SHARMA
242	KAVYA PRASANNAN

243	ASHISH CHAURSIYA
244	PRIYA GOCHER
245	PRAJJWAL SHARMA
246	SHUBHAM GUPTA
247	NIKHIL SHARMA
248	SANYOG SHARMA
249	SARTHAK ARORA
250	SUMITRA JHANWAR
251	ANKIT SAINI
252	VIDHI KULSHRESTHA
253	PRIYAL GOYAL
254	DARSHAN MOHAN TAK
255	SARTHAK JOSHI
256	ROHIT KUCHERIA
257	MUSKAAN JOSHI
258	LIPI SINGH PARIHAR
259	PUNEET SHARMA
260	SHUBHAM SHARMA
261	SHREY BHARGAVA
262	TANYA AGARWAL
263	ATUL SHARMA
264	ASHISH MEENA
265	SALONI JAIN
266	YASH ADITYA WADHWA
267	RAHUL VARLANI
268	DISHI BHATT
269	DHRUVA CHHIPA
270	NENSI JAIN