

Course: Java

Course Code: Java

Session: 2018-19

Duration: 4 Months

Assessment procedures: Proctored certification Exam (100%)

Curriculum of the Course:

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

1	Aastha Bubber
2	Aastha Mathur
3	Aayushi Choudhary
4	Abhishek Goyal
5	Abhishek Gupta
6	Abhishek Gupta
7	Aditya Umesh Acharya
8	Aikansh Gaur
9	Akanksha Agarwal
10	Alok Raj
11	Aman Jain
12	Anisha Jindal
13	Ankit Goyal
14	Ankit Goyal
15	Ankit Kumar
16	Anmol Gupta
17	Anshu Mulchandani
18	Anshul Kumar Garg
19	Apoorva Gupta
20	Ayushi Gupta
21	Ayushi Khandelwal
22	Bhawesh Singh

23	Charchit Sharma
24	Chirag Aggarwal
25	Deepak Kumar
26	Deepak Sharma
27	Devendra Jain
28	Dharmender Gurjar
29	Divyash Singh Hura
30	Ehaab Ahmad
31	Gaurav Khandelwal
32	Harshit Bhargava
33	Harshita Jain
34	Himanshu Satija
35	Himanshu Sharma
36	Isha Vyas
37	Ishanya Ashutosh Keshodhan
38	Karan Gopal Gaur
39	Karishma Khandelwal
40	Keshav Kumar Saxena
41	Keshav Mundra
42	Khushi Agrawal
43	Lakshay Bajargaan
44	Manish Kumar Bansal

45	Megha Bansal
46	Neetish Kumar
47	Nipun Kumar Jain
48	Nitesh Sharma
49	Nitisha Saini
50	Palash Patidar
51	Prachi Dubey
52	Prachi Yadav
53	Pramod Kumar
54	Punit Agarwal
55	Punit Kumar
56	Raghuveer Sharma
57	Rakesh Soni
58	Rishabh Kachhwaha
59	Rishav Chetan
60	Ritika Gupta
61	Riya Ritu
62	Sagar Goyal
63	Saharsh Anand Sharma
64	Saurabh Khandelwal
65	Shaily Jindal
66	Shivanshu Gupta
67	Shubham Bhargava
68	Siddharth Rawat
69	Simran Ajwani
70	Sonal Negi
71	Suchita Gaur
72	Sumit Singh
73	Sunil Suman
74	Surabhi Shrivastava
75	Swati Jain
76	Swati Priya
77	Tanushi Khandelwal
78	Urvashi Takuli
79	Vaibhav Pitliya
80	Vaishali Jain
81	Vikas Motiani
82	Vinay Pancholi
83	Vinod Sharma
84	Yash Bhardwaj
85	Yash Mangal
86	Yashika Singh
87	Kartik Arora
88	Krishan Veer Singh Chauhan
89	Piyush Jain
90	Aakanksha Dixit
91	Ajay Sharma
92	Akshita Khatri

93	Aman Mahnot
94	Amritanshu Singh Chauhan
95	Anika Kocher
96	Anjali Kumari
97	Deepansh Soni
98	Deepanshu Samdani
99	Harsh Pandya
100	Hemant Vikani
101	Himanshu Bartiya
102	Jayesh Nagar
103	Karan Raj Singh
104	Malay Garg
105	Mansi Sharma
106	Mayank Kaushik
107	Mitali Jangid
108	Neha Alwani
109	Nihal Soni
110	Nitin Agnihotri
111	Parag Jain
112	Peeyush Goyal
113	Pradeep Lakwal
114	Pradeep Pandey
115	Prakhar Chatter
116	Puneet Saxena
117	Punita Tiwari
118	Ram Mohan Jain
119	Rishabh Vyas
120	Ritika Somani
121	Sakshi Agrawal
122	Shradha Na
123	Shubham Singhvi
124	Simran Khandelwal
125	Sunil Sharma
126	Tushar Kumawat
127	Ayush Gupta
128	Prateek Surana
129	Aishwarya Soni
130	Asmita Purohit
131	Aviral Chaudhary
132	Geeta Arora
133	Ketan Soni
134	Kumari Sukanya
135	Lavish Sharma
136	Nupur Gupta
137	Pranjal Kaushik
138	Pranjul Gupta
139	Purvi Mehta
140	Aanchal Pareek

141	Aanshi Mehta
142	Aayushi Khandelwal
143	Abhay Mishra
144	Abhinav Vijay
145	Abhiraj Tak
146	Abhishek Choudhary
147	Akanksha Khurana
148	Akshaya Khandelwal
149	Akshaya Rathi
150	Aman Singh Shekhawat
151	Amanpreet Singh Bagga
152	Amresh Kumar
153	Ankit Gupta
154	Ankit Jhakal
155	Anmol Singhal
156	Anshul Jain
157	Anurag Chaturvedi
158	Apoorva Sapra
159	Daksh Jajpura
160	Archita Batra
161	Arnav Dudani
162	Asish Kumar
163	Astha Bhargava
164	Avinash Nagar
165	Ayushi Midha
166	Bhanu Pratap Singh
167	Bhavesh Mittal
168	Bhavya Kashyap
169	Chaitanya Sharma
170	Deepak Nehra
171	Devansh Sharma
172	Dipesh Kalal
173	Divya Shanker Acharya
174	Gaurav Mittal
175	Harish Pradhan
176	Harmukh Wattal
177	Harsh Khandelwal
178	Harsh Maheshwari
179	Harsh Rawat
180	Harshit Khandelwal
181	Harshit Singh
182	Himanshu Yadav
183	Hritik Samaria
184	Isha Gupta
185	Kalpita Jain
186	Kapil Bhagchandani
187	Kishan Sharma
188	Lakshya Dosi

189	Madhav Dixit
190	Mahima Jain
191	Mahima Soni
192	Manthan Jain
193	Martand Kankar
194	Mayank Devnani
195	Mohit Sinwer
196	Monit Ranjan
197	Mridul Sharma
198	Nikhil Jain
199	Nikhil Kumawat
200	Niranjan Khandelwal
201	Palak Munet
202	Parul Singh
203	Piyush Jain
204	Pooja Khandelwal
205	Prabhat Jain
206	Pradeep Saini
207	Prakhar Katariya
208	Pranav Dixit
209	Prateek Agrawal
210	Prateek Talesara
211	Pravesh Chahar
212	Zuber Mohammed
213	Mihir Shah
214	Pushpak Gupta
215	Rahul Kumawat
216	Rajat Saini
217	Sakshi Gupta
218	Shashank Runthala
219	Shaurya Sisodia
220	Shefali Arora
221	Shikhar Agarwal
222	Shivam Gupta
223	Shubham Tak
224	Siddharth Jain
225	Smriti Bagga
226	Tushar Mathur
227	Ujjwal Bansal
228	Vaibhav Lodha
229	Vaibhav Sharma
230	Vibhu Jain
231	Yash Dagur
232	Vinayak Mangal
233	Pankaj Jain
234	Prachi Keswani
235	Pranjal Sharma
236	Prateek Bhatt

237	Pratik Bansal
238	Rahul Kumar
239	Riyansh Khandelwal
240	Sahil Agarwal
241	Shriyansh Sharma
242	Wasim Khan
243	Yash Laddha
244	Yash Sharma
245	Zubin Mehta
246	Amandeep Gangwar
247	Anshul Gakkhar
248	Arpit Mathur
249	Bhavyam Jain
250	Dehul Parashar
251	Garima Singhal
252	Gaurav Kumawat
253	Harshvardhan Singh Khidiya
254	Himanshu Modi
255	Jitendra Chatwani
256	Jitendra Yadav
257	Kishan Kumar
258	Mamta Siyak
259	Mohit Soni
260	Saksham Kumar
261	Nilay Maheshwari
262	Nitesh Gupta
263	Pawan Sharma
264	Puneet Sharma
265	Rakesh Kumar
266	Riya Sagar
267	Sagar Mochi
268	Saksham Jain
269	Shagun Agarwal
270	Shiwanshu Mani
271	Siddhant Sharma
272	Talib Hussain
273	Tanvi Garg
274	Tarun Bhambhani
275	Toshit Jain
276	Vivek Kumar Gupta
277	Aman Sharma
278	Anisha Mittal
279	Shivam Soni
280	Kaushal Kishor Agrawal
281	Neha Mathur
282	Aakriti Jain
283	Aayush Garg
284	Aayush Paliwal

285	Abhijit Kumar Jha
286	Aditya Upneja
287	Akshay Kumar Sharma
288	Aniriudh Sethi
289	Anjali Poddar
290	Ankita Jha
291	Anurag Sharma
292	Ashutosh Pareek
293	Ayush Gupta
294	Ayush Kothari
295	Bhavesht Kumar
296	Digvijay Singh Shekhawat
297	Hardik Sharma
298	Harshit Mehra
299	Hemang Joshi
300	Himanshu Sharma
301	Keyur Jain
302	Kriyanshu Saraswat
303	Namit Patni
304	Pawan Kumar
305	Saumya Singh
306	Abhinav Singh
307	Abhishek Kumawat
308	Archit Khandelwal
309	Ashwin Royal
310	Bhanwar Singh
311	Bhumika Pandey
312	Harsh Choudhary
313	Harshit Gupta
314	Hitendra Hada
315	Hitesh Agarwal
316	Kartikeya Tiwari
317	Kashish Bhateja
318	Keshav Sharma
319	Kinjal Agrawal
320	Mayank Agarwal
321	Milanpreet Singh
322	Mrinali Mathur
323	Mukul Goyal
324	Naveen Sharma
325	Nishant Nishu
326	Nishchal Shah
327	Nivedita Shanker
328	Piyush Patodi
329	Poonam Suthar
330	Prashi Agrawal
331	Prateek Navalakha
332	Priyal Jain

333	Raksha Choudhary
334	Ritika Goyal
335	Samridhi Prasad
336	Shrestha Bansal
337	Shubhankar Srivastava
338	Sita Choudhary
339	Sumit Maindoliya
340	Tapesh Kumar
341	Tarun Gupta
342	Uma Kumari
343	Umang Poddar
344	Varun Gandhi
345	Varun Mahirchandani
346	Vatsal Bhatt
347	Vikas Prajapat
348	Vinayak Vashishtha
349	Vishnu Kumawat
350	Yash Mishra
351	Yovan Jain
352	Abhinav Sharma
353	Abhishek Singhal
354	Akshita Bhatnagar
355	Ashima Gupta
356	Bhavik Bansal
357	Harsh Sanchawat
358	Harshal Jain
359	Harshdeep Walia
360	Himanshu Garg
361	Hitakshi Malhotra
362	Kashish Wadhwa
363	Kunal Mahatma
364	Naman Kinger
365	Pranjali Maheshwari
366	Saurav Kumar
367	Shashank Pant
368	Aradhana Bharti
369	Arpit Sachan
370	Ayush Mehta
371	Deepankar Sharma
372	Harshit Gupta
373	Heena Vasdani
374	Hitesh Goyal
375	Huzaifa Siddiqui

376	Isha Soni
377	Jai Khandelwal
378	Medha Shukla
379	Minal Jain
380	Nalin Uniyal
381	Nimesh Vijay
382	Noopur Rathore
383	Pallavi Jain
384	Pranshu Sharma
385	Pulkit Totla
386	Shefali Goyal
387	Tamanna Sharma
388	Vaibhav Paliwal
389	Vanisha Arora
390	Yash Goyal
391	Yashita Jain
392	Yasir Kadri
393	Pranjal Agrawal
394	Kapil Soni
395	Akash Sharma
396	Anjali Agrawal
397	Sonali Pandey
398	Ankit Kumar Jangir
399	Hritvik Patidar
400	Yashshavi Kashayp
401	Navya Solanki
402	Charu Sharma
403	Ayush Pandey
404	Vishal Tulsani
405	Kunal Kaushik
406	Kavyani Jain
407	Piyush Tayal
408	Bheru Sahu
409	Shrey Maheshwari
410	Harshita Sinari
411	Sakshi Dayani
412	Komal Mishra
413	Nimit Goyal
414	Sharon Thomas
415	Bhanu Pratap
416	Kanika Goyal
417	Sandeep Singh