

Shri Swami Vivekanand Shikshan Sanstha

VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)

Department of Computer Science

“IIT Bombay Spoken Tutorial MOOC Courses”

Vivekanand College, Kolhapur has been at the forefront of providing quality education and fostering a culture of continuous learning. In collaboration with IIT Bombay Spoken Tutorial, the college has been offering a diverse range of Massive Open Online Courses (MOOCs) to empower students with cutting-edge skills. These courses include Cell Designer, Web Development - HTML, Python 3.4.3, PHP, and MySQL etc.

Course Structure: The IIT Bombay Spoken Tutorial courses are designed to meet the evolving needs of the industry and equip students with practical skills. The courses cover a spectrum of topics, including the intricacies of Cell Designer, the fundamentals of web development using HTML, and proficiency in programming languages like Python 3.4.3, PHP, and MySQL.

Online Sessions: Conducted by experts from IIT Bombay, the online sessions offer an interactive and engaging learning experience. Students have the opportunity to interact with seasoned professionals, clarifying doubts and gaining insights into real-world applications of the concepts they are learning. The virtual format ensures flexibility, allowing students to access the sessions at their convenience, fostering a conducive learning environment.

Examinations at Vivekanand College, Kolhapur: One of the unique aspects of this collaboration is the provision for examinations conducted online at Vivekanand College, Kolhapur. This not only adds a layer of convenience for students but also ensures a seamless transition from online learning to the evaluation process. The examinations are designed to assess the practical application of the skills acquired during the course.

Benefits for Students:

- **Skill Enhancement:** The courses cater to the demands of contemporary industries, enhancing the employability of students by providing them with relevant skills.
- **Flexibility:** The online format allows students to balance their academic commitments while acquiring valuable skills.
- **Certification:** Successful completion of the courses results in certification from IIT Bombay, a testament to the students' proficiency in the respective domains.
- **Community Impact:** By establishing an IIT Bombay Spoken Tutorial Courses center, Vivekanand College has not only elevated the learning experience for its students but has also contributed to the larger goal of creating a skilled workforce. This initiative aligns with the national agenda of fostering digital literacy and technological proficiency.

The collaboration between Vivekanand College, Kolhapur and IIT Bombay Spoken Tutorial has proven to be a commendable effort in providing quality education to students. The combination of online learning and localized examinations ensures a holistic educational experience. As students continue to benefit from these courses, the college remains committed to its mission of nurturing well-rounded and skilled individuals ready to excel in the professional landscape.

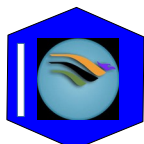
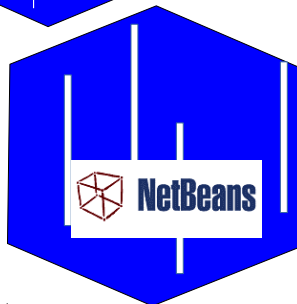
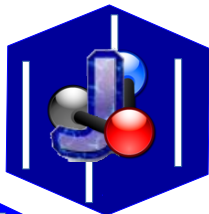
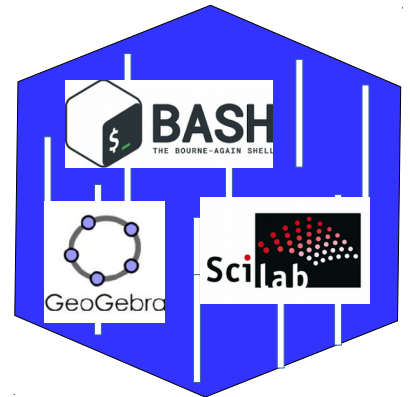


Spoken Tutorial

Learn Free and Open Source Software through Spoken Tutorial at Very Low Cost



IIT Bombay



E-Brochure

Arduino QCad
 Advanced DWSIM Drupal
 Python C++ Ruby Scilab eSim
 Ngspace Blender HTML PERL Tux
 Linux AWK Koha Typing
 GIMP Libreoffice
 Linux OpenFOAM Bio
 Inkscape BASH C/C++ Latex Python
 Java
 OpenModelica GIT Jmol Application Xfig
 GeoGebra ExpEYES Avogadro
 Moodle NetBeans GChemPaint
 Cell Designer PHP & MySQL

Basic Computer Skills & Office Automation

Software / FOSS name	Applications / Skills & Employability
Introduction to Computers	How to use computers for day-today activities.
LibreOffice – Writer, Calc, Impress, Base, Draw, Math	Office Automation system – Documentation, Spreadsheet, Slide making.
Linux, Linux AWK, Ubuntu, BOSS	Free and Open source operating system. Actively being taken up by E-Governance programs and SMEs.
Firefox	Web browser. Used for all internet browsing purposes.
Tux Typing	Teaches 10 Finger typing.

Programming Languages / Information Technology

C / C++, Advance C++, Java, Java Business Application, Netbeans	C is the most popular language worldwide. Java is also popular with ability to run the same program on different systems relevant to World Wide Web <i>software</i> . NetBeans is an open-source integrated development environment (IDE). Smooth JavaScript editor, Templates profiler & GUI Design tool. JBA is used to create business applications and provide domain expertise.
Ruby	Ruby is an object oriented scripting language use widely for developing web applications.
GIT	GIT is a version-control system for tracking changes in computer files and coordinating work on those files among multiple people.
Android App using Kotlin	Learn to architect and develop Android apps in the Kotlin programming language. With these techniques you'll create apps in less time, writing less code, and with fewer errors.
HTML	Hypertext Markup Language is the standard markup language for documents designed to be displayed in a web browser.

Modelling and Simulation

DWSIM	DWSIM is a software for modeling, simulation, and optimization of steady-state chemical processes, Use in Chemical industry.
OpenModelica	OpenModelica is used for Simulating, Optimising, Analysing complex dynamic systems. Eg. In power plant, water treatment, automotive processes optimization.

Mathematics / Statistics

GeoGebra	Dynamic Mathematics Software (DMS) for teaching and learning mathematics from middle school through college level.
R (like SPSS)	Programming language used for statistical computing and graphics.
Biopython	Tool for Computational Biology and Bioinformatics.

Multimedia / Drawing

GIMP (like Photoshop)	GIMP is a graphics editor used for image retouching and editing, free-form drawing etc.
Inkscape (like Corel Draw)	Inkscape designs and creates a wide variety of graphics such as illustrations, icons, logos, diagrams, maps and web graphics.
Blender (like Maya 3D)	Blender is a 3D computer graphics software toolset used for creating animated films, visual effects, art, 3D printed models, games.
QCad	QCAD is used to create technical drawings such as plans for buildings, interiors, mechanical parts or schematics and diagrams.
Synfig	Synfig Studio eliminates the need to create animation frame-by frame, allowing you to produce 2D animation of a higher quality with fewer people and resources.

Scripting Languages / Web Development

Python	Used for web programming eg. Django, Zope, Google App Engine, Desktop applications, Web Development sites eg. Facebook, Google search, Wikipedia.
PERL	Perl is a general-purpose programming language useful as a Glue language for tying together systems – hence invaluable to System Administrators and for Web Development.
PHP & MySQL	Used as Web development and Database Management Systems package.
Drupal	Drupal is a content management system (CMS) written in PHP and distributed under the GNU General Public License. Useful for website-building and web applications.

Mechanical / Civil / Electrical – Engineering disciplines

Open Foam	Data processing and visualisation. Aerodynamics, Building constructions.
Oscad (eSim)	Tool for circuit design, simulation, analysis and PCB design.
QGIS	QGIS is an application that supports viewing, editing, and analysis of geospatial data. It allows users to analyse and edit spatial information, in addition to composing and exporting graphical maps.

Chemistry / Bio-Chemistry

Avogadro	Avogadro is a molecule editor and visualizer.
GChemPaint	GChemPaint allows you to draw and display 2D chemical structures. Very useful to teach and learn abstract chemistry concepts.
Cell Designer	Cell designer is a drawing tool – a structured diagram editor for biochemical networks & gene-regulatory drawings.
Jmol Application	It is used for molecular modelling chemical structures in 3 dimensions. eg. In molecular biology pertinent structures.

Electronics / Physics

Arduino	Arduino is an open source platform used for building electronics projects. Or creating interactive objects or environments. eg. Used in Robotics
Ngspice	It is a program used in integrated circuit and board-level design to check the integrity of circuit designs and to predict circuit behavior.
ExpEYES	ExpEYES stands for Experiments for Young Engineers and Scientists. A tool for learning science by exploring and experimenting.
Single Board Heater System(SBHS)	The application of this device is in the Control Systems area of Engineering.

Learning Management System

Moodle	Moodle is a learning management system or an online platform for customized learning, assignment and assessment purposes.
LaTeX	The best tool for Technical writing. eg. Math typesetting for Science, Engineering, Technology writing of theses, projects, journal articles, books etc. LaTeX has automatic generation of high quality PDF reports.
Scilab (like MATLAB)	Scientific computation package for Advanced mathematical computations. Use for academics in Physics, Engineering, Applied mathematics, Statistics & in Data Analytics companies and departments.

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Spoken Tutorial project is funded by National Mission Education through ICT, Ministry of Education, Govt. Of India.

<http://spoken-tutorial.org>



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IIT Bombay

Syllabus IIT Bombay Certification under the Spoken Tutorial Project

Course Name: Java

Credit Hours: 30

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

1. Java - First program

1. write simple java program
2. print "My First Java Program!" on Console
3. save the file
4. file name given to the java file
5. compile the file
6. run the file
7. correct the errors
8. naming conventions for class
9. naming conventions for method
10. naming conventions for variable

Eclipse

2. Installing Eclipse

1. Install Eclipse on Ubuntu on the Terminal
2. Set up the proxy on the Terminal

3. Then fetch the list of all the available softwares
4. Type `sudo apt-get update`
5. Then install eclipse on the Terminal
6. Type `sudo apt-get install eclipse`
7. Verify if Eclipse is installed on the system
8. Installing Eclipse on Debian,Kubuntu,Xubuntu
9. Installing Eclipse on Redhat
10. Installing Eclipse on Fedora,centos and suse linux

3. Getting started with Eclipse

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

4. Hello World Program

1. Open Eclipse
2. Create a Java Project named DemoProject
3. Create a class named DemoClass
4. Class name and file name will be the same
5. Eclipse suggests various possibilities as we type a command
6. Eclipse also completes the parentheses by automatically adding the closing parentheses
7. Include the statement that we want to print
8. Eclipse also completes the quotes by adding the closing quote
9. Compile and execute the program
10. Change the code to print

5. Errors and Debugging

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

6. 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

7. Numerical datatypes

Define datatypes and numerical datatypes

Int, float, byte, short, long, double, range & size of each numerical datatypes, declaration and initialization of numerical datatypes, valid and invalid declaration

8. 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

9. 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, Method of string class String length(), String concat(), String toUpperCase(), String toLowerCase()

10. Primitive type conversions

1. define type conversion or type casting
2. higher order integer to lower order integer- Explicit type casting
3. program to show explicit type casting
4. common mistake in explicit type casting.
5. program to show common mistake in explicit type casting
6. lower order integer to higher order integer – Implicit type casting
7. program to show implicit type casting
8. char to integer
9. integer to char
10. program to show char to int type casting.

Control flow

11. Relational Operations

1. boolean datatype
2. equal to and not equal to
3. less than and less than or equal to
4. greater than and greater than or equal to

12. Logical Operations

1. use of logical operators
2. and (&&) operator
3. example to explain **and** operator
4. program to demonstrate **and** operator
5. or (||) operator
6. example to explain **or** operator
7. program to demonstrate **or** operator
8. not (!) operator
9. program to demonstrate **or** operator
10. save, compile and run the programs

13. if else construct

1. Conditional Statements and types of Conditional Statements
2. Use of if statement
3. Syntax for if statement
4. Program using if statement
5. Use of if else statement
6. Syntax for if else statement
7. Program using if else statement
8. Use of if else if statement
9. Syntax for if else if statement
10. Program using if else if statement

14. nested if and ternary operator

1. explain nested if
2. nested if syntax
3. program to demonstrate nested if
4. explain the control flow of the program
5. explain ternary operator
6. syntax for ternary operator
7. explain the syntax
8. program to demonstrate ternary operator
9. comparison between ternary operator and nested if
10. save, compile and run the program

15. switch statement

1. define switch case statement
2. compare switch and nested if
3. switch case syntax
4. working of a switch case statement
5. use of keyword switch
6. valid and invalid use of keyword **case**
7. use of keyword default
8. use of keyword break
9. program to demonstrate switch case statement
10. save, compile and run the program to check the output

16.while loop

1. Loop control statement
2. types of loop control statements
3. Introduction to while loop
4. syntax of while loop
5. Program using while loop
6. Check the output.
7. Introduction to infinite loop
8. loop variable modification
9. Check the output
10. How to terminate the infinite loop

17.for loop

1. syntax, introduction to for loop
2. for loop syntax
3. loop variable
4. loop condition
5. loop variable increment or decrement
6. loop block
7. flow of loop
8. advantage of using loop

18.do while loop

1. define do while
2. do while syntax
3. working of do while loop
4. example of do while loop
5. explain the do while programming
6. save, compile and run the program to check the output
7. how different is it from the while loop
8. program to demonstrate the differences

Arrays

19. Introduction to Arrays

1. About Arrays
2. Declare an Array
3. Initialize an array
4. Initialization using for loop
5. Index of an array elements
6. change values of an array
7. print the value of an array
8. Advantage of an array.

20. Array operations

1. import java.util.Arrays
2. use methods from class Arrays
3. toString() method
4. sort() method
5. fill() method
6. copyof() method
7. copyofRange() method
8. about parameters for each method.

Classes & Objects

21. Creating class

1. Whatever we can see in this world are all objects
2. Objects can be categorized into groups known as class
3. This is class in real world
4. Human Being is an example of class in real world
5. Class in java is the blue print from which individual objects are created
6. Class consists defines a set of properties called variables and a set of behaviors called methods
7. Syntax for creating class
8. Create a simple class Student using Eclipse
9. The Student class can contain properties

22. Creating Object

1. An object is an instance of a class
2. Each object consist of state and behavior
3. Object stores it state in fields or variables
4. It exposes its behavior through methods
5. Reference variables

6. Create a class named TestStudent
7. Create an object of the Student class
8. Use new operator
9. Check what the reference variable contains
10. Create one more object of the Student class and check what the reference variable contains

23. Instance fields

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

24. Methods

1. method definition
2. write simple method
3. method returning value
4. call a method in another method
5. flow of the program
6. call a static method
7. call a method from another class
8. method signature
9. method body

Constructors

25. Default constructor

1. what is a constructor?
2. what is a default constructor?
3. when is it called?
4. define a constructor
5. initialize the variables
6. call the constructor
7. difference between constructor and method

26. Parameterized constructors

1. What is a parameterized constructor?

2. create constructor without parameter
3. create a constructor with parameter
4. assign values to the variables in the constructor
5. pass arguments during the constructor call
6. working of parameterized constructor
7. show common errors
8. resolve the errors
9. create another parameterized constructor
10. why to use constructor?

27. Using this keyword

1. this is a reference to the current object
2. helps to avoid name conflicts
3. we can use this keyword inside a constructor to call another one
4. the constructors must be in the same class
5. explicit constructor invocation
6. Explain it using the parameterized constructor code
7. Make this statement the last one in the constructor
8. You will get an error
9. this statement should be the first one inside a constructor

28. Non-static block

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

29. Constructor Overloading

1. define multiple constructor
2. what is constructor overloading?
3. constructor with different number of parameters.
4. parameters with different datatypes.
5. how is constructor overloaded?
6. flow of overloading process.
7. advantage of constructor overloading.

30. Method Overloading

1. define multiple methods.
2. methods with same name.
3. methods with different number of parameters.
4. methods with different datatypes of parameter.
5. what is method overloading?
6. example for overloading method
7. how to overload method?
8. advantage of method overloading.
9. error in method overloading.

31. Taking user input in Java

1. What is BufferedReader?
2. Importing three classes from Java.io package
3. How to take the input from the user?
4. Syntax to implement BufferedReader
5. What is InputStreamReader?
6. Create object of InputStreamReader
7. Create object of BufferedReader
8. About IOException
9. About throws keyword
10. 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*

1. 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

For and On behalf of
Spoken Tutorials,
Indian Institute of Technology, Bombay

Akanksha Saini



Mrs. Akanksha Saini
National Coordinator
Spoken Tutorial Project, IIT Bombay

Courses and Participants List

Academic Year 2018-19

January - June, 2018 Total : 7

#	Semester Start Date	Software Course	Department	Participant List Status	Action
1	Feb. 18, 2019	Linux	B.Sc. Computer Science	29	Participant List Participation certificates available
2	Feb. 18, 2019	PHP and MySQL	B.Sc. Computer Science	29	Participant List Participation certificates available
3	Feb. 27, 2019	Biopython	B.Sc Biosciences	33	Participant List Participation certificates available
4	Feb. 27, 2019	CellDesigner	B.Sc Biosciences	33	Participant List Participation certificates available
5	Feb. 6, 2019	Introduction to Computers	B.A Batch 1	18	Participant List Participation certificates available
6	Feb. 15, 2019	Java	B.C.A(Cloud Technology & Information Security)	33	Participant List Participation certificates available
7	Feb. 15, 2019	Python	B.C.A(Cloud Technology & Information Security)	33	Participant List Participation certificates available

Linux



Vivekanand College, Kolhapur (Autonomous)

IIT Bombay, Spoken Tutorial Courses 2018

Course Name: Java

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HEAD
DEPARTMENT OF COMPUTER SCIENCE
VIVEKANAND COLLEGE, KOLHAPUR
(AUTONOMOUS)



Spoken Tutorial
Project at
IIT Bombay

Certificate of Participation

This is to certify that **SUHAS LAWATE** participated in the **Java** training organized at **Vivekanand College** in **January 2019** semester, with course material provided by the Spoken Tutorial Project, IIT Bombay.

A comprehensive set of topics pertaining to **Java** were covered in the training. This training is offered by the Spoken Tutorial Project, IIT Bombay.

April 16th 2019

Prof. Kannan M Moudgalya
IIT Bombay

Credits for the Spoken Tutorial courses are based on our estimates of the work required to complete them. Recipient institutions are required to apply due diligence and get them ratified/modified by their own duly formed academic/assessment body. Spoken Tutorial is a project at IIT Bombay, started with funding from the National Mission on Education through ICT, Ministry of Education (previously MHRD), Govt. of India.