1. Introduction

IIT Bombay has conducted many large-scale teacher training workshops under the Train 10,000 Teachers (T10KT) programme, sponsored by the National Mission on Education through ICT (NMEICT), MHRD, Govt. of India, and trained over 2,00,000 teachers.

Another successful technology developed at IIT Bombay is Spoken Tutorial, using which about 50 lakh students have been trained on various ICT topics. The effectiveness of this method can be seen from the testimonials available here: https://spoken-tutorial.org/testimonials/media/?foss=70 and this TEDx talk. The Spoken Tutorial project is also implemented successfully at IIT Bombay, with funding from NMEICT, MHRD.

It is now proposed to offer the highly effective Spoken Tutorial based ICT training to a large number of teachers, across the country, through the T10KT methodology, with **Python** training being taken up next.

Python is a very versatile and easy-to-learn programming language with an extensive library of open tools allowing users to solve a variety of problems. Python has a rich ecosystem of libraries and tools for scientific computing and data science. There are libraries that provide a powerful interactive computing environment both on the console as well as on a web-browser. Python can interface relatively easily with other well-established languages like FORTRAN/C and C++. In addition to this Python also has libraries to build user interfaces, build web applications, interface to hardware, and a whole host of other domains. This makes Python an excellent language to learn opening up a world of possibilities to users who desire to use their computers more effectively.

The FOSSEE (Free/Libre and Open Source Software for Education) project at IIT Bombay ((https://fossee.in) has been promoting Python, and other FLOSS software, such as Scilab, OpenFOAM, eSim, Osdag, OpenModelica, DWSIM & R, and Open Source hardware, such as Arduino and OpenPLC. FOSSEE is also funded by NMEICT, MHRD. Government of India has mandated the use of open source software.

As Spoken Tutorial method offers hands on practice, with 100% active learning, those who undergo this training will be able to start using Python immediately after the workshop. They will also be able to conduct Python workshops for their students, using Spoken Tutorials, on their own, without requiring any help from anyone else.

The one day Python workshop will be conducted on **Saturday, 22 June 2019,** through select Remote Centres of IIT Bombay. This will be a blended training programme that uses A-VIEW for live interactions and Spoken Tutorials to learn to use Python. The medium of instruction for this workshop is English.

2. Methodology of the Large-scale Workshop

It will be a **one day workshop, on 22 June 2019.** All participants will have to go to their chosen Remote Centre. They will learn Python through Spoken Tutorials, with help from Coordinators, already trained for this purpose by IIT Bombay. As the learning will happen only through carefully designed Spoken Tutorials, designed and developed at IIT Bombay, the quality of learning will be very high. All the participants, from all the Remote Centres, will be able to interact with the Python team at IIT Bombay, ask them questions, etc., through the video conferencing software A-VIEW and a timed discussion forum. There will be about 4 hours available for Python training and 2 hours for interactions.

3. Outline of the workshop

The workshop will have two parts:
(a) About 3.5 hours will be used in Learning Python from Spoken Tutorials.
(b) About 30 minutes will be used to learn about the excellent Python content, developed by FOSSEE.

3 (a) Learning Python from Spoken Tutorials

Depending on the level of the user, one can learn any/all of the topics mentioned below. If one cannot complete all the topics, one can complete them later on, through self-learning, as all required Spoken Tutorials are freely available.

Getting started: Getting started with IPython, Using plot commands interactively, Embellishing a plot, Saving plots, Multiple plots, Subplots, Additional features of IPython, Loading data from files, Plotting data, Other types of plots, Plotting charts,

Basic Level: Getting started with lists, Getting started with for, Getting started with strings, Getting started with files, Parsing data, Statistics, Getting started with arrays, Accessing parts of arrays, Image manipulation using arrays, Basic matrix operations, Advanced matrix operations, Least square fit, Basic datatypes and operators, Sequence datatypes, Input-Output, Conditional statements, Loops, Manipulating lists, Manipulating strings, Getting started with tuples, Dictionaries, Sets, Getting started with functions.

Intermediate Level: Advanced Features of Functions, Using Python Modules, Writing Python Scripts, Testing and Debugging, Error and Exception Handling.

3 (b) Useful Python content developed by FOSSEE

A significant issue with the acceptance of open source software on a large scale by academia is due to the lack of documentation. We had proposed and implemented a novel/unique approach to solve this problem through the Textbook Companion (TBC). The Python TBC is a repository of solved examples from standard Engineering and Science textbooks coded using Python. More than 500 standard engineering textbooks now have TBCs available. The solved examples are available in the form of Jupyter notebooks. There are over 4000 such notebooks available. These notebooks can be explored online or downloaded for free. Students and faculty from various parts of the country have created this collection.

One may use the Python TBC (1) to understand the steps of examples (2) to do what if studies by changing parameters. Python TBC are available at

https://tbc-python.fossee.in/completed-books/, absolutely free of cost. Python TBC is also hosted on the cloud.

Yaksh is also developed by FOSSEE, it is a free and open-source online evaluation software. It allows teachers to create full blown courses with video and/or markdown text-based lessons but with *Problem-based learning* at its core, Yaksh focuses on letting teachers create real-time evaluated practice exercises and quizzes. With a large array of question types like Multiple choice question, Fill-in-the-blanks, Arrange options in correct order, Assignment uploads and programming questions available, Yaksh supports Python, C, C++, Java, Bash and Scilab programming languages. Yaksh is designed to be easily deployable, and can scale-up to accommodate 500+ users simultaneously. Faculty members can use Yaksh to evaluate their students.

4. Teaching faculty

- **Prof. Prabhu Ramchandran,** Co-Principal Investigator, FOSSEE project
- **Python Team members,** FOSSEE, IIT Bombay

5. Course Fee

Every participant has to pay Rs. **600** as the course fee to IIT Bombay at the time of online registration. On the day of the workshop, i.e., **on 22 June 2019**, they have to pay Rs. **400** to the Remote Centre that they would be attending, to defray the cost of organising the workshop, lunch, and coffee/tea. Please note that the registration fee once paid is neither refundable nor adjustable under any circumstances.

6. Who should attend?

As this workshop is not subject-specific, industry professionals from any background are welcome.

7. Criteria for issuing Certificates

E-certificate will be provided to the participants after successful completion of the workshop and filling up the feedback form.

8. Duration and Venue

The workshop will be conducted on Saturday**, 22 June 2019 from 9.30 AM to 6.00 PM** at Remote Centres of IIT Bombay. This workshop will be conducted through a blended mode, using both live video conferencing facility (A-VIEW) and hands-on sessions using Spoken Tutorials. A detailed workshop schedule will be available soon.

9. How to apply?

Enrollment will be strictly online, and no other mode of application will be entertained. **The last date of registration is 20 June 2019, 12.30 pm**. The URL for registration is: http://www.it.iitb.ac.in/nmeict/announcements.html

Register on the Spoken Tutorial Website:
1. Before the workshop, participants should register on https://spoken-tutorial.org/
2. Fill up the registration form and submit.
3. An email will be received.

4. The account should be activated by clicking the link in the email.
5. The Username and Password should be noted. This is an extremely important step.
6. One needs the above information to post questions on the forum, which will be explained at the time of the workshop.

Note

- Neither IIT Bombay nor the Remote Centre will bear the travel expense of the participating representatives. There shall also be no accommodation provided to the participants.
- All participants are required to bring **ear phones**, as they will have to listen to video tutorials. Without ear phones, the workshop will not at all be effective.
- Computers to practise Spoken Tutorials and to do Python programming will be available at the Remote Centres. But if they wish, participants can bring their own laptops with Python installed.

10. Prerequisite for the Python Workshop

The attending participants must see the **Introduction to Python video** before the workshop.

10. Address for communication

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One day Workshop

on

Python

for Industry Professionals

22 June 2019

Supported by FOSSEE & Spoken Tutorial

At

IIT Bombay

Course Instructor:

Prof. Prabhu Ramchandran
Co-Principal Investigator, FOSSEE project

Project Coordinator

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