

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 the [TEDx talk](#). This project is funded by 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 **R Programming language** training being taken up next.

R (<http://www.r-project.org/>) is a Free/Libre and Open Source Software (FLOSS) - a well organized and sophisticated package - that facilitates data analysis, modeling, inferential testing, and forecasting. It is a user-friendly software that allows creating new function commands to solve statistical problems. It runs on a variety of UNIX platforms (and similar systems such as LINUX), Windows and Mac OS.

R is one of the most preferred open-source languages for analytics and data science. The cross-platform compatibility of R and its capacity to handle large and complex data sets makes it an ideal tool for academicians to analyze data in their labs.

R can be used for simple calculations, matrix calculations, differential equations, optimization, statistical analysis, plotting graphs, etc. Also, it is useful for anybody who wishes to undertake extensive statistical computations and data visualization.

R allows you to develop custom Artificial Intelligence Apps to deploy within your own organization. It has numerous packages that are used in the field of ML.

The FOSSEE project at IIT Bombay (<https://fossee.in>) has been promoting R, and other FLOSS, such as Scilab, Python, OpenFOAM, eSim, Osdag, OpenModelica, DWSIM, Drupal

and Linux, and Open source hardware, such as Arduino and OpenPLC. FOSSEE is also funded by NMEICT, MHRD.

The R workshop is organized by the Teaching Learning Centre (ICT) at IIT Bombay, funded by the *Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMNMTT)*, MHRD, Govt. of India. As the Spoken Tutorial method offers hands-on practice, with 100% active learning, those who undergo this training will be able to start using the R language immediately after the workshop. They will also be able to conduct R workshops for their students, using Spoken Tutorials, without requiring any help from anyone else.

The one day R Coordinators' workshop will be conducted on **Saturday, 12 October 2019**, through select Remote Centres of IIT Bombay (the details will be shared later). This will be a blended training programme that uses A-VIEW for live interactions and Spoken Tutorials to learn to use R language. Details of the workshop will be announced later. The medium of instruction for this workshop is English.

2. Methodology of the Large-scale Workshop

It will be a one day workshop, on **Saturday, 09 November 2019**. All participants will have to go to their chosen Remote Centre. They will learn R programming language 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 which are 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 R team at IIT Bombay, ask them questions, etc. through the video conferencing software A-VIEW. There will be about 4 hours available for R language training and 2 hours for interactions.

A timed discussion forum <https://forums.spoken-tutorial.org/> will be used to answer the questions that the participants may have in different Remote Centres. One has to select the Spoken Tutorial, and the exact time (minute and second) when the doubt arises. It will be answered immediately by one of the volunteers. Answers can also be provided by other participants in the same Remote Centre or in other Centres. These answers double as additional learning material. Course Coordinators at Remote Centres, already trained for this purpose, ensure that the workshop goes through smoothly.

Using this approach, we have trained 3,500, 4,200, 4,300, 5,300 and 2,600 teachers, respectively, on Koha, Moodle, Scilab, Python, and Linux, in the past 10 months.

3. Syllabus for the workshop

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.

Basic Tutorials:

1. Introduction to basics of R
2. Introduction to data frames in R
3. Introduction to RStudio
4. Introduction to R script
5. Working Directories in RStudio
6. Indexing and Slicing Data Frames
7. Creating Matrices using Data Frames
8. Operations on Matrices and Data Frames
9. Conditional Statements
10. Functions in R
11. Plotting Histograms and Pie Chart
12. Plotting Bar Charts and Scatter Plot
13. Introduction to ggplot2
14. Aesthetic Mapping in ggplot2

Intermediate Tutorials:

15. Merging and Importing Data
16. Data Types and Factors
17. Lists and its Operations
18. Data Manipulation using dplyr Package
19. More functions in the dplyr Package
20. Pipe Operator

4. Useful content and activities in R:

Lab Migration Project The R- team (<https://r.fossee.in/>) has taken up the effort to promote R language in colleges all over India. We help you migrate your proprietary software based labs to R. If interested, please write to us at contact-r@fossee.in

Textbook Companion Project: The Textbook Companion Project (TBC) aims to port solved examples from standard textbooks using R. Any standard textbook can be used for this purpose. The completed TBCs can be accessed [here](#).

5. Teaching faculty

- **Prof. Radhendushka Srivastava**, Department of Mathematics, IIT Bombay
- **Prof. Kannan M. Moudgalya**, Department of Chemical Engineering
- FOSSEE and Spoken Tutorial Teams, IIT Bombay

6. Course Fee

The course fee for the Coordinators' workshop is **Rs. 200/-**, which has to be paid at the time of online registration.

Please note that the registration fee once paid is neither refundable nor adjustable under any circumstances.

7. Who should attend?

It is mandatory for each participating Remote Centre to nominate a teacher, who will learn how to conduct the Spoken Tutorial based R workshop and implement it during the main workshop. The Remote Centre Coordinator should inform by **27 September 2019**, if they want to host the main workshop in their Remote Centre. The online registration of the nominated teacher (who will later act as a Course coordinator) from the remote centre, is available from **28 September 2019 to 10 October 2019, 12.30 pm**. We will be sending the registration link to the nominated Course Coordinator from the remote centres.

8. Criteria for issuing Certificates

E-certificate will be provided to the participants after the successful completion of the workshop.

9. Duration and Venue

The workshop will be conducted on **Saturday, 12 October 2019 from 9.30 AM to 6.00 PM at select Remote Centres of IIT Bombay (These details will be shared later)**. 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.

10. How to apply?

Enrollment will be strictly online, and no other mode of application will be entertained. **The last date of registration is 10 October 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

- All Course Coordinators, who have to go to other Remote Centres for Coordinators' Training have to bear the travel expenses. Boarding and Lodging for one day will be provided, subject to availability.
- All participants are required to bring **earphones**, as they will have to listen to video tutorials. Without earphones, the workshop will not at all be effective.
- Computers with Linux (Ubuntu OS v 16.04) or Windows OS to practise the Spoken Tutorials, will be available at the Remote Centres. But if they wish, participants can bring their own laptops with Linux installed.

11. Address for communication

Dr. Kalpana Kannan
Project Coordinator, ESOS Project
Department of CSE, Kanwal Rekhi Building
Indian Institute of Technology Bombay
Mumbai - 400 076
Tel.: +91-22-2576 4989
Email: coutreach@it.iitb.ac.in

One day Coordinators' Workshop

on

R

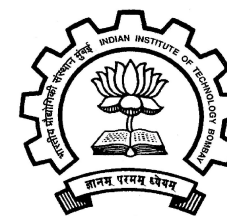
Under the aegis of the
Pandit Madan Mohan Malaviya
National Mission on Teachers and Teaching,
MHRD, Govt. of India

on

12 October 2019

Conducted by the
Teaching Learning Centre (ICT),
Supported by FOSSEE & Spoken Tutorials
at

IIT Bombay



R- Course Instructor

Prof. Radhendushka Srivastava
Department of Mathematics
Indian Institute of Technology Bombay

Project Coordinator

Prof. Kannan M. Moudgalya
Department of Chemical Engineering
Indian Institute of Technology Bombay
Powai, Mumbai 400076