2020-21

E - Quiz on the Occasion of National Statistics Day

On the occasion of 15th National Statistics Day on 29/06/2021, the Department of Mathematics and Statistics, Under DBT-Star College Scheme, conducted an Online "E- Quiz in Statistics" to Commemorate the birth anniversary of Professor P. C. Mahalanobis, the father of Indian Statistics. This quiz was conducted for Undergraduate and Postgraduate Students in Statistics, Mathematical statistics, Data Analytics and Mathematics and Statistics from Basic/programming complementary level. Overall, 360 students participated from different states of India. Among them, 80% of the students were undergraduates from various disciplines and 20% were Postgraduate students. Participants who scored more than 60% marks were awarded E-certificate.
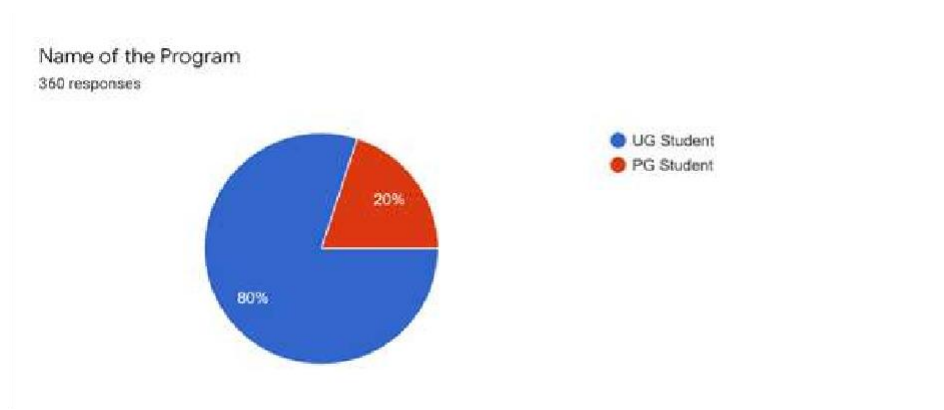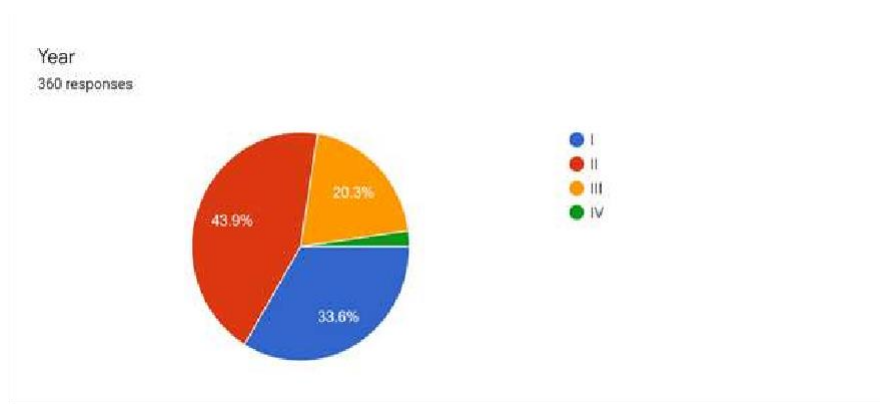
Fig 1: Graduate participation in %

Name of the Program
360 responses

- UG Student
- PG Student

80%   20%

Fig 2: Year Wise Representation of Participation

Year
360 responses

- I
- II
- III
- IV

43.9%   20.3%   33.6%

MATHEMATICS DAY 22ND DECEMBER 2020

Our life is just like a sum of mathematics. No matter how tough it seems, in the end, it all simplifies and comes down as solved. Happy National Mathematics day. This year, we at Bhavans Vivekananda College organized a Math Day Event as a tribute to one of humblest soul Late Dr Rao (HOD Department of Mathematics and Statistics) in addition to paying homage to Indian's best mathematician Ramanujan, the man who knew infinity.

Online quiz competition and a virtual treasure hunt competition was conducted as this year's math day events with overwhelming response received from students of different states and colleges.

The event began with a video message from-

who had been a mentor to our dearest departed soul Dr. Rao. In his message, he emphasized on the virtue of Dr Rao being an earnest learner and giving his best to every step that he took in the field of mathematics.

It was followed by a message from Dr. Uma Dixit, who happens to be an ex-colleague of Late Dr. Rao. She reminded us about some of Dr. Rao's most humblest memories she had of working with sir. She let us know that he was a man of few words and was a very down to earth and compassionate colleague.

This was followed by Mini ma'am's report on all the events and activities taken by the department of mathematics and statistics in this year. Prof. Y Ashok, Principal, BVC additionally spoke on the eminent personality of Dr. Rao and urged the department to fill in his shoes and remember him, his dedication towards the department by organising events at national level.

Later, students presented their poems, posters and presentations related to maths. These presentations included everything from constants like pi or e to application of integration and statistical methods used in a solid waste management paper. Topics like regression to mean method, IPL statistics analysis reminded us, yet again that maths is everywhere.

On a whole, the program instilled a sense of learning, growing yet was a sordid affair because of the absence of our beloved person. We transcribed a sense of responsibility and hoped that we follow his footsteps to reach great heights for our department participated from various colleges.

Workshops / Training 2020-21

| S. No.	Nature of program	Date	Title of Program	Number of beneficiaries
1	10dayTrainingProgrm on MATLAB for students and Faculty	March 29th toApril9th2021	10dayTrainingProgram on MATLAB for students and Faculty	41
2	10dayWorkshop cum Training Program on Data Analytics using R programming	March 23rd toApril2nd2021	10 day Workshop cum Training Program on Data Analytics using R programming	70
3	5 day FDP on Basics of MATLAB	23rd to 27th February 2021	5dayFDPon Basics of MATLAB	37
4	Training program on usage of Linear Algebra Tool Kit	30th January,2021	Training program on usage of Linear Algebra ToolKit	93
5	4dayWorkshop/Hands on training on MATLAB	27thto30thJanuary,2021	4day Workshop/Hands on training on MATLAB	15
6	3 day National Workshop on statistical thinking through Python	16th to 19thJanuary,2021	3 day National Workshop on statistical thinking through Python	48
7	10 Days National Workshop	20 to 23Oct ,2021	Workshop on MATLAB	133
8	5 day National Workshop	15to 20Nov, 2021	Univariate and Multivariate Data Analysis using SPSS	128

1. Training on MATLAB March 29th – April 9th 2021

The department of Mathematics and Statistics conducted a 10 day Training on MATLAB.

Resource person details: 1. Dr.Sanyasiraju VSS Yedida,Professor,
Department of Mathematics ,IIT Madras, Chennai.

2. Dr.Sateesh Kumar Deevi, Associate Professor
Dept. Of Mathematics, KL University, AP.

The topics discussed were Introduction to MATLAB, basic operations, plotting and different types of plotting, image processing, solving differential equations with given conditions,dot product, cross product of vectors, gradient, divergence, curl, integration, Linear algebra-solving linear systems of equations, Eigen values, Eigen vectors.41 participants from all over the country participated.
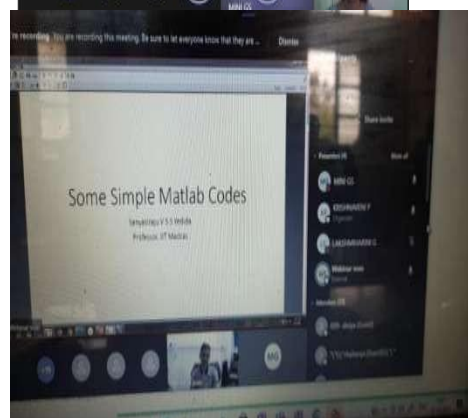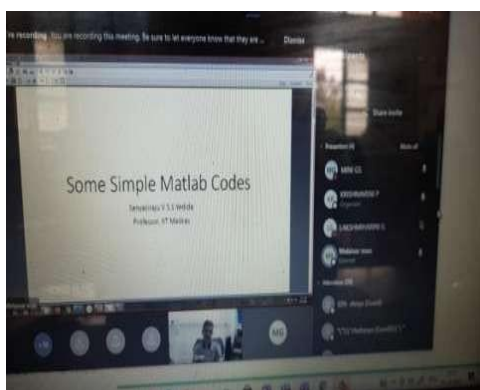
2. 10 day workshop cum training on Data Analytics using R for undergraduate students 23rd march - 3rd April 2021

Organized by Department of Mathematics and Statistics, Bhavan's Vivekananda college of science, humanities and commerce, Sainikpuri, Sec-bad.

Resource person: Dr. R. Vishnu Vardhan, Assistant professor, department of statistics,Pondicherry central University, Pondicherry.

No. of students applied: 169,

No. of students shortlisted: 72 (Beneficiaries)

Aiming to provide an intense training on theory and practical aspects of statistical data analysis and interpretation using R Programming at undergraduate level for college students, a 10-day online workshop has been held from 23-03-2021 to 03-04-2021by Bhavan's Vivekananda College, Sainikpuri, under DBT Star College Scheme. The Department of Mathematics and Statistics, to promote statistical data analysis, hosted the event, and the workshop was delivered by Dr. R. Vishnu vardhan, Assistant professor, department of statistics, Pondicherry central University, Pondicherry. The workshop has provided a practical hands-on session that helped the participants better understand the concepts. Overall, 169 students registered .Finally, 72 students were shortlisted for hands-on training workshop.

DAY 1: INTRODUCTION TO R AND MATRIX OPERATION.

On Day 1, the participants had to initially perform the installations required to practically implement the concepts being taught. The session started from the basics and went on to provide deep insight on the subject. It was a pretty interactive and informative session, which made the participants want to attend the further sessions.

DAY 2: EXPLORATORY DATA ANALYSIS, DESCRIPTIVE STATISTICS

On Day 2, the session started off with Exploratory Data Analysis using R, which was really interesting as it provided a visual insight on statistically analyzing the data. A lot of charts and graphs have been plotted and analyzed, not just as a subject matter but also in a very practical sense. The correlation concept has also been very keenly explained.

DAY 3: DATA VISUALIZATION

On day 3, deep insight of graphs in R can be created easily, explained about plot commands .Explained about how to plot histogram, line chart, bar chart, box plot and scatter plot.

DAY 4: PROBABILITY AND DISTRIBUTIONS

On day 4, had an explanation about basic probability distributions and how to make use of certain functions that can be useful to fit probability distributions. Explained about binomial, poison, normal, exponential distributions. A lot of programs are written and explained about the various distributions.

DAY 5 : TEST FOR NORMALITY AND HYPOTHESIS TESTING-I

On day 5, a pretty deep insight on the testing of hypotheses has been given using the R Programming. Many of the important tests such as the t-test(one and two samples), Z-test(one and two samples), F-test(one-way) have been used for hypothesis testing. Had an insight about parametric tests like one sample t-test, two sample t-test, analysis of variance, chi square test, paired sample t-test.

DAY 6 : HYPOTHESIS TESTING-II

On day 6, Explained about One way analysis of variance, Two way analysis of variance using different examples and coding part was very interesting . And taught about the non parametric tests with examples.

DAY 7 : REGRESSION MODELLING- SIMPLE AND MULTIPLE

On day 7, it started with R codes for simple linear regression and multiple linear regression and had a deep explanation about regression modeling with R code programming.

DAY 8: LINEAR PROGRAMMING PROBLEMS

On day 8, the session started with basics of linear programming which is basic mathematical modeling. Talked about some statisticians like Leonid Kantorovich who developed instrumental in developing linear programming, George B Daunt zig who published simplex method solving linear programming problems. Had an explanation about the structure of LP programming.

DAY 9: CLUSTER ANALYSIS AND LOGISTIC REGRESSION ANALYSIS

On day 9, introduced non-linear regression and performance analytic packages and presented a 3d representation of multiple linear regression. Explained all these with codes in R programming which was very useful and interesting.

DAY 10: DIMENSIONALITY REDUCTION TECHNIQUES

On day 10, which was the last day of the workshop, we started off with a vote of thanks and gave an assignment to all students to be done in that session itself. It was a very informative session and was very useful.

3. Day National Level Faculty Development programme under DBT Star College

Scheme

Online 5 Day National Level Faculty Development programme on MATLAB was conducted by Department of Mathematics and Statistics, Under DBT-Star College Scheme from 23 Feb 2021to 27 Feb 2021 between 2:00 PM to 3:30 PM. This webinar was aimed at benefiting faculty.

The resource person Dr. Sateesh Kumar Deevi, Associate professor from KL Deemed to be University Vaddeswaram, Guntur, AP. The session plan followed for the five day FDP is given below:

Day1: 23-02-2021 Introduction to MATLAB & Basic Terminology with Examples
Day2: 24-02-2021 Roots and Solutions of Equations
Day3: 25-02-2021 Differential Calculus
Day4: 26-02-2021 Plotting 2D
Day5: 27-02-2021 Functions, loops and conditional operations.
Numerical analysis, Importing data.

Day-1(23-feb-2021):
   Ms. Santi Rohit Rao, Assistant Professor, Department of Mathematics & Statistics started the meeting. Ms. G. S. Mini Officiating Head, Department of Mathematics & Statistics welcomed the Principal Prof. Y. Ashok and chief guest Dr. Sateesh Kumar Deevi, then Principal Prof. Y. Ashok addressed the gathering.

No. of participants: 55

Introduction to MATLAB & Basic Terminology with Examples

- MATLAB is a program for doing numerical computation. It was originally designed for solving linear algebra type problems using matrices. It's name is derived from MATrixLABoratory.

- MATLAB has since been expanded and now has built-in functions for solving problems requiring data analysis, signal processing, optimization, and several other types of scientific computations. It also contains functions for 2-D and 3-D graphics and animation.

Cleve Moler:

- The idea for MATLAB was based on his 1960s PhD thesis.
- Moler become a math professor at the University of New Mexico
- Started developing MATLAB's initial linear algebra programming 1967 with his one-
- time thesis advisor, George Forsythe. This was followed by Fortran code for linear

Equations in 1971:

- The first early version of MATLAB was completed in the late 1970 John N. Little and StreveBangert
- 1980 John Little and programmer StreveBangert re-programmed MATLAB in C.

- Created the MATLAB programming language.
- Developed features for toolboxes.
- 2016 including the MATLAB Live Editor notebook
- Present version of MATLAB 2020

MATLAB HeadQuarters:
    Middlesex County, Massachusetts, United States, Near (16km) west of Boston.By 2018 the company had around 3,000 employees.

What are we interested in:
MATLAB
1. m-files: series of MATLAB commands
a) functions: Input/Output
2. Command Line: Command execution like DOS Command window
3. mat-files: Data storage/loading

MATLAB:
MATLAB consists of 3 windows:
1. Command window
2. Editor window
3. Figure window

MATLAB symbols:

>> prompt
... Continue statement on next line
, Separate statement on next line
% Start comment which ends at ends at end of line
; (1) Suppress output

(2) Used as a row separator in a matrix

: Specify range

MATLAB Special Variable:

ans Default variable name for results
pi Value of π
eps Smallest incremental number
inf Infinity
NaN Not a number e.g. 0/0
i and j i=j=square root of -1
realminThe smallest usable positive real number
realmaxThe large usable positive real number

MATLAB supports three logical operators.

not ~ % highest precedence
and & % equal precedence with or
or | % equal precedence with and

Math & Assignment Operations:
Power ^ or .^ a^b or a.^b
Multiplication *or .* a*b or a.*b
Division / or ./ a/b or a./b
Or \ or .\ a\b or a.\b
NOTE: 56/8=8\56

MATLAB Matrices:
    MATLAB treats all variables as matrices. For our purposes a matrix can be through of an array, In fact, that is how it is stored.
Vectors are special forms of matrices and contain only one row OR one column.
Scalars are matrices with only one row AND one column

Day-2(24-feb-2021):
No. of participants: 48
Professor started day-2 by Quotation:
MATHEMATICS is not about numbers, equations, computations, or algorithms: it is about UNDERSTANDING. By William Paul Thurston.
TOPIC: Roots and Solutions of Equations:

- Solving System of equations.
- Rank, Echelon form, LU
- Decomposition.
- Roots of a polynomial.

Day-3(25-feb-2021):
No. of participants: 45
Professor started day-3 by Quotation:
Without mathematics, there's nothing you can do. Everything around you is mathematics. Everything around you is numbers.
TOPIC: Differential Calculus and Differential equations:
- Derivative
- Integrations
- Solving Differential Equations
- Differentiation-MATLAB
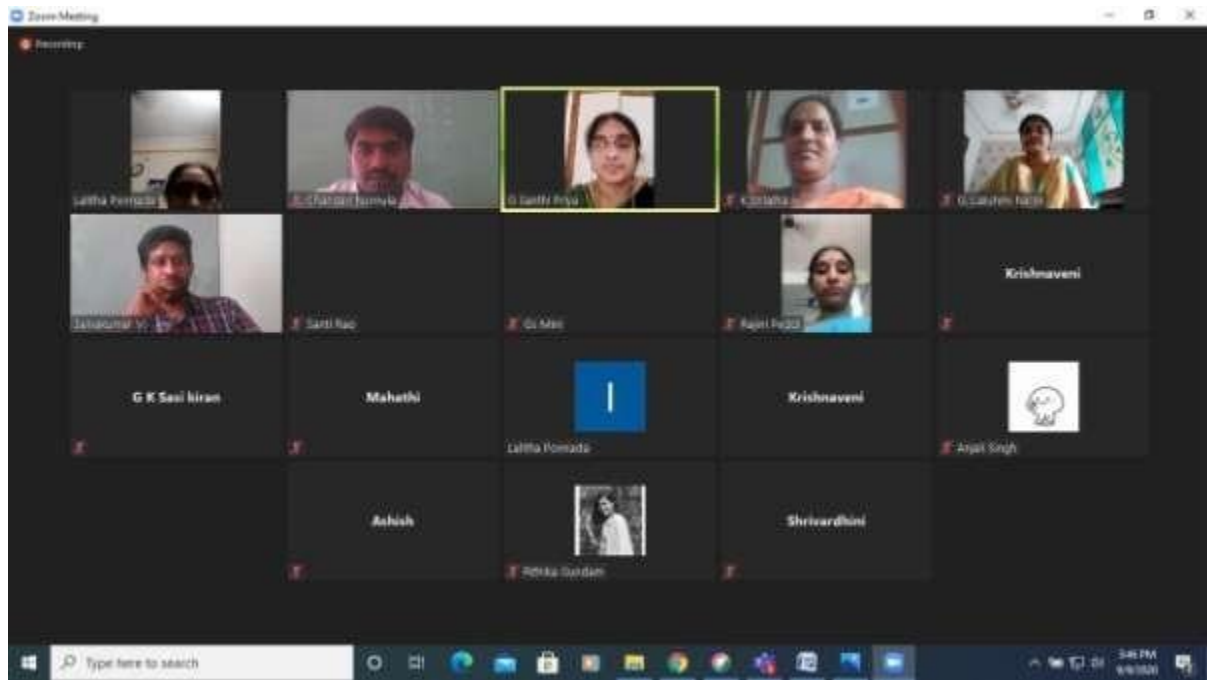
Mathematical Operator MATLAB Command

df
dx

diff(f) or diff(f, x)

df
da

Diff(f, a)

4. <u>Training Programme on Linear Algebra-Usage of ICT Tools Linear Algebra Toolkit</u>

Department of Mathematics and Statistics Organised a Training programme on "Usage of Linear Algebra Toolkit" for undergraduate students on 30-01-2021 under DBT Star College scheme. Mrs G Santhi Priya, Assistant Professor, Bhavans' Vivekananda College, was the resource person. Mrs Santhi Priya explained the importance of improvising the skills to learn using the online tools for Mathematics.

Most of the concepts of Linear Algebra for UG courses of BSc Physical sciences were briefly explained with examples. Different modules in Linear Algebra Toolkit: Row Operations, Echelon Forms, Solving System of Linear equations, Linearly Independent & Linearly dependent Sets, Basis, Null Space, finding kernel and range of Linear Transformations were explained with plenty of examples. It was also mentioned that usage of Online tools has to enhance the understanding of the concepts rather than just using it as a substitute.

Mrs. G S Mini, Officiating HOD Dept of Mathematics & Statistics, other faculty members of the department, 103 students of III year BSc Physical Sciences(MPCs,MSCs&MECs) from various colleges were present for the webinar.
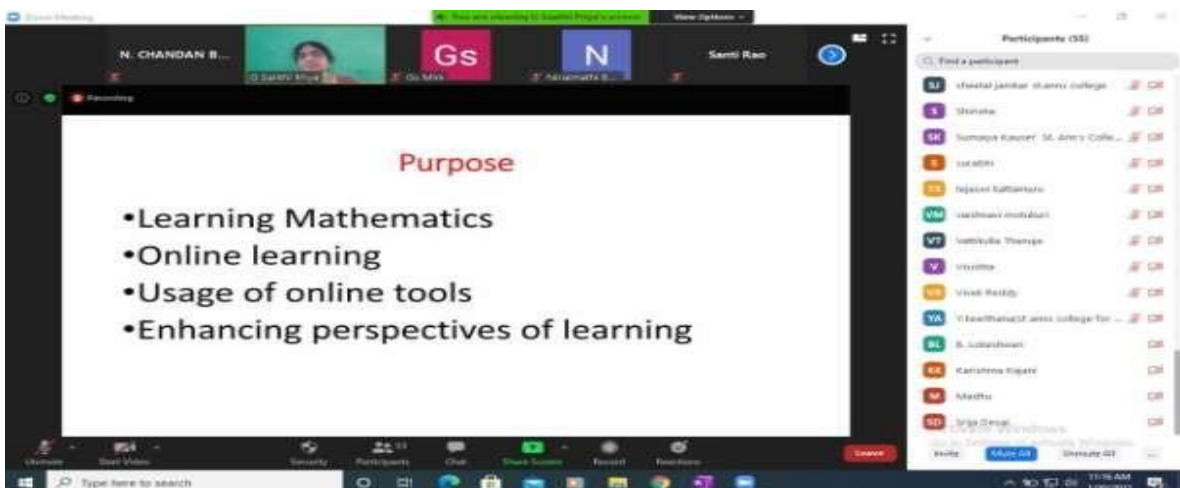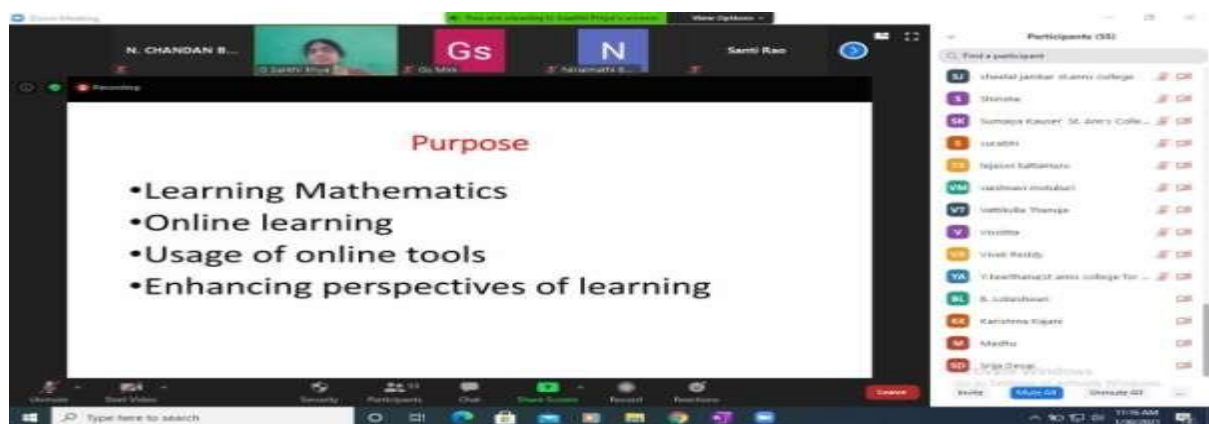
5. 4 day's workshop / Hands on Training on MATLAB

Online 4 day's workshop / Hands on Training on MATLAB was conducted by Department of Mathematics and Statistics, Under DBT-Star College Scheme from 27 Jan 2021 to 30 Jan 2021 between 2:30 PM to 4:00 PM. This webinar was aimed at benefiting faculty. 15 faculty have attended this workshop.

The resource person was from Capricot Technologies, Hyderabad. The session plan followed for the four day training is given below:

Introduction to MATLAB

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses include:

- Math and computation
- Algorithm development
- Modeling, simulation, and prototyping
- Data analysis, exploration, and visualization
- Scientific and engineering graphics
- Application development, including Graphical User Interface building

MATLAB is an interactive system whose basic data element is an array that does not require dimensioning. This allows you to solve many technical computing problems, especially those with matrix and vector formulations, in a fraction of the time it would take to write a program in a scalar non-interactive language such as C or FORTRAN.

The name MATLAB stands for matrix laboratory. MATLAB was originally written to provide easy access to matrix software developed by the LINPACK and EISPACK projects, which together represent the state-of-the-art in software for matrix computation.

MATLAB has evolved over a period of years with input from many users. In university environments, it is the standard instructional tool for introductory and advanced courses in mathematics, engineering, and science. In industry, MATLAB is the tool of choice for high-productivity research, development, and analysis.

MATLAB features a family of application-specific solutions called toolboxes. Very important to most users of MATLAB, toolboxes allow you to learn and apply specialized technology. Toolboxes are comprehensive collections of MATLAB functions (M-files) that extend the MATLAB environment to solve particular classes of problems. Areas in which toolboxes are available include signal processing, control systems, neural networks, fuzzy logic, wavelets, simulation, and many others.

MATLAB is a fourth-generation programming language and numerical analysis environment. Uses for MATLAB include matrix calculations, developing and running algorithms, creating user interfaces (UI) and data visualization. The multi-paradigm numerical computing environment allows developers to interface with programs developed in different languages.

MATLAB is used by engineers and scientists in many fields such as image and signal processing, communications, control systems for industry, smart grid design, robotics as well as computational finance.

MATLAB System

MATLAB system consists of five main parts:

MATLAB language

This is a high-level matrix/array language with control flow statements, functions, data structures, input/output, and object-oriented programming features. It allows both "programming in the small" to rapidly create quick and dirty throw-away programs, and "programming in the large" to create complete large and complex application programs.

MATLAB working environment

This is the set of tools and facilities that you work with as the MATLAB user or programmer. It includes facilities for managing the variables in your workspace and importing and exporting data. It also includes tools for developing, managing, debugging, and profiling M-files, MATLAB's applications.

Handle Graphics

This is the MATLAB graphics system. It includes high-level commands for two-dimensional and three dimensional data visualization, image processing, animation, and presentation graphics. It also includes low-level commands that allow you to fully customize the Appearance of graphics as well as to build complete Graphical User Interfaces on your MATLAB applications.

MATLAB Application Program Interface (API)

This is a library that allows you to write C and Fortran programs that interact with MATLAB. It includes facilities for calling routines from MATLAB (dynamic linking), calling MATLAB as a computational engine, and for reading and writing MAT-files.

27 Jan 2021

Day-1

- Introduction to MATLAB
- What is MATLAB?
- The dominance of MATLAB over other languages
- Power of Matrix computations
- The application of MATLAB in various fields of engineering MATLAB Environment
- Basic matlab commands
- Arithmetic Functions in MATLAB
- Matrices and Vectors
- Creating Matrices and Vectors
- Matrix Operation
- Array Operation

Link: https://capricottechnologies.webex.com/capricottechnologies/j.php?MTID=me3a91e19c6cce83d2e0f1e9b509237ff

28 Jan 2021

Day-2

- ➢ Practice and revision on arithmetic, relational and logical operation
- ➢ Introduction to basic programming structure
- ➢ Introduction to Image Processing
- ➢ What is Image Data?
- ➢ Image Processing Toolbox
- ➢ How to Display Image
- ➢ Image Operations
- ➢ Introduction to Graphical User Interface
- ➢ Application and Demos

Link: https://capricottechnologies.webex.com/capricottechnologies/j.php?MTID=m9ce9be4684b7e36d14764faed5bbeefb

29 Jan 2021 and 30 Jan 2021

Day-3 and 4

Simulink is a simulation and model-based design environment for dynamic and embedded systems, integrated with MATLAB. Simulink, also developed by Math Works, is a data flow graphical programming language tool for modelling, simulating and analyzing multi-domain dynamic systems. It is basically a graphical block diagramming tool with customizable set of block libraries.

It allows you to incorporate MATLAB algorithms into models as well as export the simulation results into MATLAB for further analysis.

Simulink supports −

- ➢ System-level design
- ➢ Simulation
- ➢ Automatic code generation
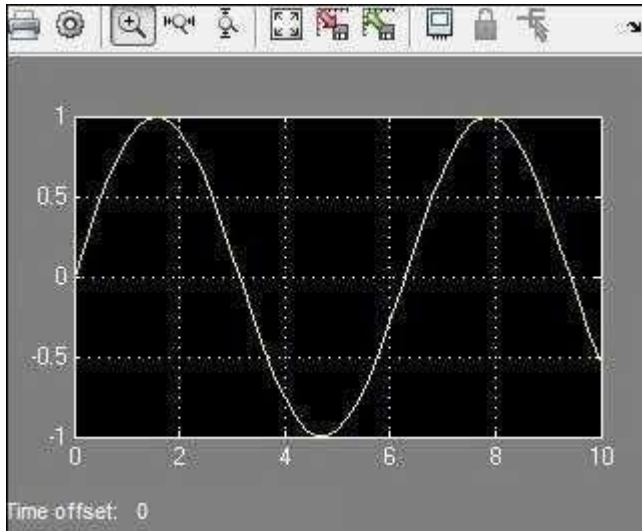- ➢ Testing and verification of embedded systems

There are several other add-on products provided by MathWorks and third-party hardware and software products that are available for use with Simulink.

The following list gives brief description of some of them −

- ➢ **State flow** allows developing state machines and flow charts.

- ➢ **Simulink Coder** allows the generation of C source code for real-time implementation of systems automatically.

- ➢ **xPC Target** together with **x86-based real-time systems** provide an environment to simulate and test Simulink and Stateflow models in real-time on the physical system.

- ➢ **Embedded Coder** supports specific embedded targets.

- ➢ **HDL Coder** allows to automatically generate synthesizable VHDL and Verilog.

- ➢ **SimEvents** provides a library of graphical building blocks for modelling queuing systems.

Simulink is capable of systematic verification and validation of models through modelling style checking, requirements traceability and model coverage analysis.

Simulink Design Verifier allows you to identify design errors and to generate test case scenarios for model checking.

Link:
https://capricottechnologies.webex.com/capricottechnologies/j.php?MTID=m5b
a2ce08fab5b7d940e4ebeaca37a9c9

ONLINE THREE-DAY NATIONAL WORKSHOP ON

"STATISTICAL THINKING THROUGH PYTHON"

FOR UNDERGRADUATE and POSTGRADUATE STUDENTS

Held during 16-19 January,2021

Organized by : Department of Mathematics and Statistics, Bhavan'sVivekananda College of Science,Humanities and Commerce, Secunderabad

Resource Person: Kantam Srikanth

Data Consultant: Larsen & Toubro Info tech Limited (L & T)

No. of Students Applied: 147

No. of Students Shortlisted: 60 (beneficiaries)

Aiming to provide an intense training on theory and practical aspects of statistical data analysis and interpretation using Python at undergraduate level for college and university students, a three-day online workshop has been held on the days 16th, $18^{th}$and 19th January, 2021 by Bhavan's Vivekananda College, Sainikpuri, under DBT Star College Scheme.Department of Mathematics and Statistics, to promote statistical data analysis, hosted the event, and the workshop has been delivered by Kantam Srikanth, Data Consultant, Larsen & Toubro Infotech Limited. The workshop has provided a practical hands-on session that helped the participants better understand the concepts. Overall, 147 students registered from various states. Finally, 60 students are shortlisted for hands-on training workshops.

- **DAY 1 : INTRODUCTION TO PYTHON**
  On Day 1, the participants had to initially perform the installations required to practically implement the concepts being taught. The session started from the basics and went on to provide deep insight on the subject. It was a pretty interactive and informative session, which made the participants want to attend the further sessions.
- **DAY 2: EXPLORATORY ANALYSIS WITH PYTHON**
  On Day 2, the session started off with Exploratory Data Analysis using Python, which was really interesting as it provided a visual insight on statistically analyzing the data. Multiple important modules, including OS, NumPy, Pandas, Matplotlib, and Seaborn, have been imported and worked with. A lot of charts and graphs have been plotted and analysed, not just as a subject matter but also in a very practical sense. The correlation concept has also been very keenly explained.
- **DAY 3: APPLICATION OF HYPOTHESIS TESTING USING PYTHON**

  On day 3, which was the last of the sessions, a pretty deep insight on the testing of hypotheses was given using the python language. Many of the important tests such as the t-test(one and two samples), Z-test(one and two samples), F-test(one-way) have been used for hypothesis testing. The decision-making process in the hypothesis testing has been clearly taught and monitored by Prof. Srikanth, who has also given visual and practical reasoning for the same.