

**Four Weeks Summer Internship/Training  
On  
MATLAB & Its Application in  
Engineering**

**June 17 – July 15, 2019**

*Organized by*



**Rajkiya Engineering College  
Ambedkar Nagar**

*Under the Aegis of*



**Dr. A. P. J. Abdul Kalam Technical  
University**

**&**

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**Early Bird Registration Fee before 15<sup>th</sup> 30th April 2019**

Internal UG/PG students/ Lab Assistant Rs. 2500/-

Faculty Members/Research Scholar Rs. 3500/-

External UG/PG students/ Lab Assistant/ Rs. 3500/-

**Registration Fee after 15<sup>th</sup> 30th April 2019**

Internal UG/PG students/ Lab Assistant/ Rs. 2500/-

Faculty Members/Research Scholar Rs. 5000/-

External UG/PG students/ Lab Assistant/ Rs. 5000/-

Fee shall be paid by Demand Draft in favour of "**Rajkiya Engineering College, Ambedkar Nagar**" payable at Akbarpur, Ambedkar Nagar or NEFT transfer in account number- **6257000100005758** (IFSC Code- **PUNB0625700**). Registration charges are non-refundable for selected candidates.

Applicants have to register by filling the form by using link <https://goo.gl/1hUuEd> on or before 30.05.2019

**Registration Form**

Please complete the details below

1. Name(Mr./Ms.) \_\_\_\_\_

2. Organization: \_\_\_\_\_

3. Address: \_\_\_\_\_

4. Tel. No. (Mob): \_\_\_\_\_

5. E-mail ID: \_\_\_\_\_

6. Highest Acad. Qualification: \_\_\_\_\_

**7. Registration Fees Detail**

Draft No. \_\_\_\_\_ Date \_\_\_\_\_ for Rs. \_\_\_\_\_ in favour of Rajkiya Engineering College, Ambedkar Nagar payable at Akbarpur, Ambedkar Nagar

**Signature of the Candidate**

**Signature of the Head of the Department/Institution (If required)**

**For Further Details, Contact:**

**+91-9012872877, +91-8470892739**

## Objective of the Summer Internship Programme

MATLAB (matrix laboratory) is a multi-paradigm numerical computing environment and proprietary programming language developed by MathWorks. MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages, including C, C++, C#, Java, Fortran and Python.

Although MATLAB is intended primarily for numerical computing, an optional toolbox uses the MuPAD symbolic engine, allowing access to symbolic computing abilities. An additional package, Simulink, adds graphical multi-domain simulation and model-based design for dynamic and embedded systems.

The technical program will include state-of-the-art lectures, hands-on lab sessions, tool demonstrations, and discussion/presentation sessions.

This internship/ training program is aimed to cater the needs of Undergraduate and Post Graduate Students of Engineering who have enthusiasm to become a dab hand in handling MATLAB. This training program will cover MATLAB Basics and Advanced Programming Tools, Toolboxes like Simulink, Image Processing Toolbox, Neural Network Toolbox, Fuzzy Logic Toolbox, Optimization, Control System Toolbox, etc. Participants will also be taught to assess and catalyze innovations, problem solving, and discover immediately to the problems that encounter in the field jobs. This will be accomplished by the extensive use of intuition, graphical plots and real world examples. Whether the participant is new to MATLAB, statistical tools, or modeling or is looking for a mixed course, he/she will find this summer internship program a great platform to grasp it quickly in systematic manner. This course is designed to not only cover all the aspects of modeling and simulation, experimentation but also guide the proper content requirement for research paper publications.

### What does MATLAB do?

MATLAB includes hundreds of mathematical functions. It has a high-level programming language allowing access to advanced data structures, 2-D and 3-D graphical functions.

A large number of functionalities is included in MATLAB, viz.:

- **Maths & Simulation**

For usual engineering and science applications including mathematical operations and data analysis.

- **2-D & 3-D Visualization**

Graphics functions to visualize annotate and export data and many ways to create and customize various types of plots and charts.

- **Optimization**

Algorithms to solve constrained and unconstrained continuous and discrete optimization problems.

- **Statistics**

Tools to perform data analysis and modelling

- **Control System Design & Analysis**

Standard algorithms and tools for control system study

- **Signal Processing**

Visualize, analyse and filter signals in time and frequency domains.

- **Application Development**

Increase MATLAB native functionalities and manage data exchanges with external tools.

- **SIMPOWER Library**

The Simscape Power Systems Simscape Components library contains Simscape blocks specifically developed for working with multiphase electrical domains. In addition to the Simscape Foundation domains, the product contains a three-phase electrical domain, and you can use this domain to develop your own custom three-phase blocks with Simscape language.

### MATLAB as a platform

MATLAB combines a desktop environment tuned for iterative analysis and design processes with a programming language that expresses matrix and array mathematics directly.

## Internship Course Outline

### Module 1, Introduction

About MATLAB

Importance for Engineers and others

Installation on Windows

Development Environment

MATLAB Desktop (Editor, Work space, Command history, Command Window)

MATLAB directory

MATLAB BASIC commands

### Module 2, MATLAB Basic operations

Arithmetic operations

Exponential & logarithmic

Trigonometry

Complex number

Matrix calculations

### Module 3, Editing and debugging M Files

Creation of m file

Loops, branches, control flow

Interactive inputs

Creating own scripts and user defined function file

Nested functions

Debugging

### Module 4, Programming

M-Lint Automatic Code Analyzer

Saving files

Flow control

Conditional Statements

Error Handling

Work with multidimensional array

Cell Array & Characters

Developing user defined function

Scripts and other Functions

Basic Technical Level Computing with MATLAB

### Module 5, MATLAB Graphics

Simple graphics

Graphic Types

Plotting functions  
Creating plot & Editing plot (2D and 3D)  
Graphics Handles  
GUI (Graphical User Interface)  
Designing Scientific Calculator

#### **Module 6, SIMULINK**

Introduction  
Importance  
Model Based Design  
Tools  
Mathematical Modelling  
Converting Mathematical Model into Simulink Model  
Running Simulink Models  
Importing Exporting Data  
Solver Configuration  
Masking Block/Model  
Basic Technical Level Computing with MATLAB

#### **Module 7, Control System Toolbox**

General instructions  
Create linear models  
Classes of Control System Toolbox  
Discussion on state space representation  
Transfer function  
System gain and dynamics  
Time & Frequency domain analysis  
Classical design, State Space Model  
Transfer function representation, System response  
LTI viewer detail and explanation about LTI viewer  
Designing of compensator  
Use of SISO design  
Project on control system

#### **Module 8, Signal Processing Toolbox**

Basics of Signal Processing  
Representing Signals  
Analysis of different Signals  
Complex Signals  
Filter Designing  
Using the Filter Designing GUIs  
Analyzing the filter plots  
Filter Designing using Script Files

Speech Recording  
Speech Processing  
Other Signal Processing Functions  
Signal Sources  
BER Tool  
Modulation  
Special Filter  
Channels  
Equalizers

#### **Module 9, Image Processing Toolbox**

Reading and Writing Image Data  
Displaying and Exploring Image  
Spatial Transformation  
Image Registration  
Designing and implementing 2D linear Filters for Image Data  
Morphological Operations  
Transforms  
Analyzing and Enhancing Images  
ROI based Processing  
Neighbourhood and Block operations

#### **Module 10, Neural Network Toolbox**

Network Objects, Data, and Training Styles  
Multilayer Networks and Backpropagation Training  
Control Systems  
Radial Basis Networks  
Self-Organizing Map  
Vector Quantization Nets  
Adaptive Filters and Adaptive Training

#### **Module 11, Fuzzy Logic TOOLBOX**

FUZZY V/S non fuzzy logic  
Foundation of fuzzy logic  
Fuzzy inference systems  
Building systems with fuzzy logic toolbox  
Building fuzzy inference systems using custom functions  
Working from the command line  
Working in Simulink environment  
Simulating fuzzy inference systems using the fuzzy inference engine

#### **Module 12, Optimization**

Concepts of Optimization  
Concepts and Programming Genetic Algorithms

Concepts and Programming Evolutionary Algorithms  
Concepts and Programming Particle Swarm Optimization

**\*\*Special Learning & Training on “IBM SPSS MODELLER” for UG/PG/Research Scholars/Faculty members\*\* by Dr. Sudhakar Tripathi, Dean (R&D)**

#### **Accommodation**

Accommodation is available in REC, Ambedkarnagar Hostels for participants on nominal charge and first cum first serve basis. The participants will not be paid any TA/DA. Charges of institute hostels are approximately Rs.160/- per day including food and accommodation.

#### **About Dr. A. P. J. Abdul Kalam Technical University:**

**Dr. A.P.J. Abdul Kalam Technical University (AKTU)** (formerly UPTU) was established by the Government of Uttar Pradesh.

The University is affiliating in nature and its jurisdiction spans the entire state of U.P. in affiliating B.Tech. M.B.A., M.C.A., B.Arch., B. Pharma., B.H.M.C.T., M.Tech. and Ph.D. programmes imparting graduate, postgraduate and doctoral level training in all government and private institutions located all over U.P. in engineering, technology, architecture, pharmacy, hotel management and catering technology as well as M.B.A. and M.C.A. programmes.

#### **Rajkiya Engineering College, Ambedkar Nagar**

Government of Uttar Pradesh established Rajkiya Engineering College (R.E.C.) Ambedkar Nagar in 2010. The college has started offering B.Tech. Programme in three disciplines – Civil Engineering (CE), Electrical Engineering (EE) and Information Technology (IT) with intake of 60 seats in each branches from the session 2010-11.

The students are extensively exposed to cross-cultural environment as candidates from various other States such as Jammu & Kashmir, Madhya Pradesh, and Rajasthan etc. join REC for various undergraduate programs. REC Ambedkar Nagar is fully residential institution with four hostels for boys and one for girls.