

नेशनल इंस्टीट्यूट ऑफ इलेक्ट्रॉनिक्स एंड इंफॉर्मेशन टेक्नोलॉजी, चेन्नई  
**National Institute of Electronics and Information Technology, Chennai**

Autonomous Scientific Society of Ministry of Electronics & Information Technology (MeitY), Govt. of India

ISTE Complex, 25, Gandhi Mandapam Road, Chennai - 600025

# Course Prospectus

## Certificate Course in Development of FDM based 3D Printer

**Mode: ONLINE (Blended)**



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## Course Prospectus

**Name of the Group:** ISM

**Course Name:** Certificate Course in Development of FDM Based 3D Printer

**Course Code:** 3D102

**Duration:** 80 Hours

**Last Date of Registration:** 04<sup>th</sup> September 2022

**Display of Provisional Selection List:** 05<sup>th</sup> September 2022

**Course Start Date:** 06<sup>th</sup> September 2022

### **Preamble:**

**3D Printing**, sometimes called additive manufacturing or rapid prototyping, is all about building 3D objects using plastic and other materials from a digital design. As a technology, it has actually been around and in use by engineers and designers.

Usage of some personal 3D printers is going to make an impact on the industry by reducing the price of the product in a drastic way. We could make some of our required products in our home rather paying huge money.

So this 3D printer will become a usual house hold in the future. When the situation arises, we must be in a situation to manufacture 3D printers. This course enables the learner to manufacture a 3D printer of their own design and requirements.

**Objective of the Course:** The Course is of 80 Hrs. The course is aimed at giving knowledge on the Development of FDM based 3D Printer. This course will make the learner to select materials on their own to build and use their own 3D printers which were designed using commercial CAD software.

**Outcome of the Course:** The participants will be able to:

- Understand the basics, various types, Processes and Applications involved in the 3D Printing/Additive Manufacturing.
- Develop a CAD model for their 3D printer.
- Select the mechanical and electronic components required to make their 3D printer.
- Operate various open source software used for slicing the STL files
- Select and install from various firmware.
- Calibrate the printer for best performance
- Operate the 3D printer to produce required objects.

**Course Structure:** This course contains total of seven modules as follows:

Sl.No	Module Name	Duration (Hours)
1.	Introduction to 3D Printing/Additive Manufacturing	5
2.	Modeling and Development of 3D printer structure	25
3.	Configuring the Electronic Components to 3D printer	10
4.	Firmware Installation	15
5.	Printer Setting and Calibration	10
6.	Print Setting and Calibration	10
7.	Case Studies	5
<b>Total Duration</b>		80

## Course Contents:

### 1. INTRODUCTION TO 3D PRINTING/ADDITIVE MANUFACTURING

- Introduction and basic principles
- Evolution
- Classification
- Fused Deposition Modeling(FDM) technology in brief

### 2. DEVELOPMENT OF 3D PRINTER STRUCTURE

- Introduction
- Classification
- Structure Selection
- Material Selection
- Design Selection
- Real time Assembly

### **3. CONFIGURING THE ELECTRONIC COMPONENTS TO 3D PRINTER**

- Introduction
- Microcontroller and CNC Shield
- Stepper Motor and Driver
- Power supply
- End stops
- Hot End and Heating Bed
- Thermocouple

### **4. FIRMWARE INSTALLATION**

- Introduction to Firmware
- Firmware types
- Handling configuration file
- Installation of firmware in microcontroller

### **5. PRINTER SETTINGS AND CALIBRATION**

- Printer settings
- Printer Calibration
- Communication testing
- Axis Movement and Direction
- Home Position
- Extruder
- Heating elements
- Working with Open Source software

### **6. PRINT SETTINGS AND CALIBRATION**

- 3D Model Download
- Print Settings
- Bed levelling
- Slicing
- Printing
- Calibration Prints

## 7. CASE STUDIES

- Case Study 1 – Maker Bot
- Case Study 2 – Prusa Research
- Recommended Mechanical Components
- Recommended Electronic Components
- Recommended Firmware
- Recommended Open Source Software

### Course Fees:

Course fee is Rs.2000/- incl. of GST

*\*GST is Applicable as per Govt. Norms GST (currently it is 18%).*

However, the above Course fee shall be refunded on few special cases as given below

- ✓ Course postponed and new date is not convenient for the student.
- ✓ Course cancelled.

### Registration Fees: Rs.2000/-(Inclusive of GST)

### Eligibility:

- ✓ Diploma/ B.E/ B.Tech Graduates with knowledge in Mechanical CAD software can apply.
- ✓ Candidates who are doing Diploma/BE/BTech in any branch with Mechanical CAD software knowledge can also apply.

### Number of Seats: 50 (Fifty) - Total

**Note: Seats are allocated based on the merit of the Qualification.**

### How to Apply

Candidates can apply online in our website <http://reg.nielitchennai.edu.in>. Payment towards non-refundable registration fee can be paid through any of the following modes:

- ✓ Online transaction: Account No: 31185720641 Branch: Kottur (Chennai), IFSC Code: SBIN0001669.

**Note:** *The Institute will not be responsible for any mistakes done by either the bank concerned or by the depositor while remitting the amount into our account*

**Last Date of Registration: 04<sup>th</sup> SEPTEMBER 2022**

## Registration Procedure

All interested candidates are required to fill the Registration form online with registration fees before **04<sup>th</sup> SEPTEMBER 2022** all the necessary information.

- Original and self-attested Copies of Proof of Age, Qualifying Degree (Consolidated Mark sheet & Degree Certificate/Course Completion Certificate), etc.
- One passport size photograph and one stamp size photograph for identity card.
- Self-attested copy of Govt. issued photo ID card

## Selection Criteria of candidates

The selection to the course shall be based on the following criteria:

Selection of candidates will be based on their marks in the qualifying examination subject to eligibility and availability of seats.

- ✓ The first list of Provisionally Selected Candidates will be intimated on **05<sup>th</sup> SEPTEMBER 2022** by **5:00 PM**. In case of vacancy, an additional selection list will be prepared and the selection will be intimated by email only.
- ✓ Provisionally selected candidate has to upload their document on registration portal for online verification.

**Admission:** All provisionally selected candidates whose documents are verified and paid the fees and verified by accounts section of NIELIT Chennai will get a welcome message in his login id provided during registration. The credential and URL for online portal will be shared through email.

## Discontinuing the course

- ✓ No fees (including the security deposit) under any circumstances, shall be refunded in the event of a student who have completed the process of admission or discontinuing the course in between. No certificate shall be issued for the classes attended.

**Course Timings:** This program is a practical oriented one and hence there shall be more lab than theory classes. The classes are online cloud based from 2.30 pm to 4.30 pm and Monday to Friday.

## Address:

National Institute of Electronics and Information Technology  
ISTE Complex, No. 25, Gandhi Mandapam Road, Chennai – 60025  
E-mail: [mariyappan@nielitchennai.edu.in](mailto:mariyappan@nielitchennai.edu.in)/ Phone: 044-24421445  
**Contact Person:** Mr. Mariyappan D, **Mobile:** +91 9003541404

## Course enquiries

Students can enquire about the various courses either on telephone or by personal contact between 9.15 A.M. to 5.15 P.M. (Lunch time 1.00 pm to 1.30 pm) Monday to Friday.

**Placement:** Placement assistance is provided to students who qualify our courses.

## Important Dates

- **Last Date of Registration: 04<sup>th</sup> September 2022**
- **Display of Provisional Selection List: 05<sup>th</sup> September 2022**
- **Course Start Date: 06<sup>th</sup> September 2022**

## Certification

- ✓ Certification Body: Examination Section, NIELIT Chennai
- ✓ Certificates will be issued after successful completion of all the modules.

## Grading Scheme

Following Grading Scheme (on the basis of total marks) will be followed

Grade	S	A	B	C	D	Fail
Mark Range (in %)	85 to 100	75 to 84	65 to 74	55 to 64	50 to 54	Below 50

Final Grading as per above grading scheme will be given on the basis of total marks obtained in all modules.