

**Sant Longowal Institute of Engineering & Technology, Longowal**

(Deemed-to-be-University)

**TECHNICAL EDUCATION QUALITY IMPROVEMENT PROGRAM (TEQIP) Phase-III**

Sub: Component 1.3: (Twinning Arrangement to build capacity and Improve Performance of Participating Institutes)

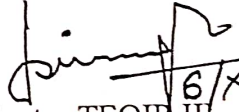
**OFFICE ORDER**

The competent authority has approved an online training on "Robotics and Automation" for UG students for a duration of 80 Hours (Theory & Practical) under sub component "Improve Student Learning" (1.3.2.1) of TEQIP-III. The training shall be arranged strictly as per NPIU guidelines vide letter no. NPIU/TEQIP-III/Acad/2020/492 dated 07.02.2020.

The terms and conditions for this activity are given below:

- Honorarium to the faculty trainer will be given as per letter no. NPIU/TEQIP-III/Acad/2020/492 dated 07.02.2020.
- As per above NPIU circular, faculty trainer shall arrange a progress review test during the mid way of the training, post training assessment and certification through SSC NASSCOM for the students participating in the training.
- Faculty trainer will submit a brief report of the activity (on the requisite format) along with details of the students to the TEQIP office.
- Date wise course plan shall be prepared by the organizer in a appropriate format and same may be uploaded on the institute website.

(Approval of Competent authority dated: 29.09.2020)

  
Coordinator TEQIP-III 6/10/2020

Copy to

1. Director – for kind information please.
2. Dean (A) – for kind information please.
3. Prof. Dilip Kumar, Institute coordinator- With a request to coordinate a progress review test during the event.
4. HOD (ME, CSE, EIE, ECE, CT, FET)
- ✓ 5. Dr. Sunil Kumar, AP (ME) –Faculty Trainer
6. File Copy

NPIU/TEQIP-III/Acad/2020/500

Date: 07-02-2020

**CIRCULAR**

I offer my sincere thanks to Heads of TEQIP institutions for deputing their faculty for Train-the-Trainer program on IT-ITes future Skill technologies at different IITs/ IIIT. The objective of Train-the-Trainer program is to make student training feasible, easier and cheaper and also to make our faculty certified trainers for future. The passionate faculty who are participating in the training program need appreciation.

In order to enhance employability and improve placement of students, students need to be imparted requisite hands-on-training on technologies like Artificial Intelligence, Data Science, Internet of Things, Cloud Computing, Cyber Security, Robotics, Virtual reality etc. These emerging technology areas have huge employment potential for engineering graduates in coming 2-3 years.


While the faculty training is already completed at few IITs and also Diagnostic Test of majority students completed through Sector Skill Council NASSCOM, it is a high time to schedule the student training program at each institute level. As a next step, the trained faculty is required to further train the students of their institutes to make them industry ready for complying to the future skill requirements of IT-ITes industries. The diagnostic test has helped the institute as well as an individual student to identify his/ her inclination for requisite technology area and is made available through the score cards issued.

The guidelines for the conduction of student training at all TEQIP institutes (1.1 & 1.3) shall be as follows:

1. The training of students may be conducted during March - May 2020.
2. The training shall be conducted for the designated number of hours (approx. 150- 200 hrs) at the institute by the faculty trained in IITs.
3. The training curriculum shall have both components of Theory and Lab in 50:50 proportion.
4. Minimum Batch Size for commencement of training in a particular skill is 30.
5. Industry experts may also be invited for completing lab work on per day honorarium basis (Guidelines available on TEQIP website).
6. The training schedule shall be finalized by the institute with intimation to NPIU.
7. The requisite training is based on the willingness of student for the respective technology area and not compulsory for the student.
8. The training by the faculty trainers may be over and above their regular academic activities and hence may be paid extra remuneration (Max. Rs. 700/- per hour), through TEQIP, based on hours of training.
9. The Institute coordinator for Future Skill (FS) trainings may be nominated by Head of the institute and may be paid Max. Rs. 500/- per month as honorarium (for three months) through TEQIP for facilitating training in all skills.
10. Post training assessment and certification shall be conducted through SSC NASSCOM for the students participating in the training and every institution may target for at least 25% of trained students attaining certification.
11. The implementation status shall be requested shortly on a Google Drive through SPIU.

TEQIP Coordinators are kindly requested to initiate the process of students training as per the above guidelines. In case of any query you may contact Mr. Laxmikant Nagar at [lnagar.teqip@gmail.com](mailto:lnagar.teqip@gmail.com) or 8827749689.

With Regards,

  
Prof. (Dr.) P. M. Khodke  
Central Project Advisor

To

1. All Institutions (1.1 & 1.3)

Copy to

1. All SPIUs

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ई-मेल / E-mail : [npiu-mhrd@gov.in](mailto:npiu-mhrd@gov.in)

## Course plan for: Robotics and Automation

### Lecture plan of: Robotics and Automation

Theory

Main Topics	Course outlines	Lecture(s)	Date
1. Introduction to Robotics	1.1 Types and components of a robot, Classification of robots	2 Hr. T1-T2	01/10/2020
	1.2 Kinematics systems; Definition of mechanisms and manipulators, Degrees of Freedom	1 Hr. T3	01/10/2020
2. Robot Kinematics and Dynamics	2.1 Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, DH parameters, Forward and inverse kinematics, Jacobian, Singularity, and Statics	7 Hr. T4-T10	02,03,05/10/2020
	2.2 Dynamic Modelling: Forward and inverse dynamics, Equations of motion using Euler-Lagrange formulation, Newton Euler formulation	4 Hr. T11-T14	08,09/10/2020
3. Sensors	3.1 Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc.	2 Hr. T15-T16	13/10/2020
	3.2 Introduction to Cameras, Camera calibration,	1 Hr. T17	16/10/2020
	3.3 Geometry of Image formation, Euclidean /Similarity/ Affine/Projective transformations	4 Hr. T18-T21	20,21/10/2020
	3.4 Vision applications in robotics.	1 Hr. T22	16/10/2020
4. Robot Actuation Systems	4.1 Actuators: Electric, Hydraulic and Pneumatic; Transmission: Gears, Timing Belts and Bearings, Parameters for selection of actuators.	4 Hr. T23-T26	22,23/10/2020
5. Robot Control	5.1 Basics of control: open loop- closed loop, Transfer functions, Control laws: P, PD, PID	4Hr. T27-T30	27, 28/10/2020
	5.2 Linear and Non-linear controls	1 Hr. T31	29/10/2020
6 Control Hardware and Interfacing	6.1 Embedded systems: Microcontroller Architecture and integration with sensors, actuators, components, Programming Applications for Industrial robot - programming in – VAL II	4Hr. T32-T35	02,03/11/2020
7.	7 AI in Robotics: Applications in unmanned systems, defense, medical, industries, etc.	2 Hr. T36-T37	06/11/2020
8.	8 Robotics and Automation for Industry 4.0	1 Hr. T38	29/10/2020
9.	9 Robot safety and social robotics.	2 Hr. T39-T40	10/11/2020

## PRACTICALS (FOCUSSED ON INDUSTRIAL ROBOTICS) plan

Practical . No.	Practical title	Lecture(s)	Date
i.	Study components of an industrial robot (PUMA, KUKA, FANUC, MTAB, UR, etc.) and its DH parameters / Simpler laboratory version of robotic arm having 4 or 5 DOF.	4 Hr. P1-P4	06,07/10/2020
ii.	Forward kinematics and validation using a software (Robo Analyser/MathLab or any other free software tool).	4 Hr. P5-P8	10,12/10/2020
iii.	Inverse kinematics of an industrial robot and validation using any open source software/ Simpler laboratory version of robotic arm.	4 Hr. P9-P12	14,15/10/2020
iv.	Industrial Robot programming using VAL II or equivalent / simpler laboratory version of robotic arm.	4 Hr. P13-P16	17,19/10/2020
v.	Microcontroller lab – programming (free software /open source)	4 Hr. P17-P20	24,26/10/2020
vi.	Integration of assorted sensors (IR, Potentiometer, strain gages etc.), micro controllers and ROS (Robot Operating System) in a robotic system. (Free software, Matlab)	4 Hr. P21-P24	30,31/10/2020
vii.	Control experiment using available hardware or software. (Open source or Matlab).	4 Hr. P25-P28	04,05/11/2020
viii.	Use of open source computer vision programming tool/ MatLab, open CV.	4 Hr. P29-P32	07,09/11/2020
ix.	Research related experiment in AI, e.g. multi agent system, unmanned systems control using ROS, etc.	4 Hr. P33-P36	11,12/11/2020
x.	Small group project work relevant to Industrial automation.	4 Hr. P37-P40	13,14/11/2020



List of enrolled students for NPIU & TEQIP III guided 80 Hours Course on Robotics and Automation

Sr. No.	Timestamp	Student Name	email ID	Mobile No.	Branch	Gender	Reg. No.
1	9-29-2020 21:26:48	Abhay Kumar Gupta	1840321@sliet.ac.in	7800987873	GME	Male	1840321
2	9-29-2020 21:00:51	ABHISHEK KUMAR	1933015@sliet.ac.in	7528928251	GME	Male	1933015
3	9-29-2020 20:48:10	Abhishek Raj	1830518@sliet.ac.in	8210900929	GME	Male	1830518
4	9-29-2020 20:30:35	Abhishek Singh	1731372@sliet.ac.in	7696759030	CSE	Male	1731372
5	9-29-2020 20:21:15	Aditya Gupta	1840303@sliet.ac.in	6387682430	GME	Male	1840303
6	9-29-2020 20:50:05	ADITYA RAJ	1933504@sliet.ac.in	9006702954	GME	Male	1933504
7	9-29-2020 20:18:41	Aditya vardhan	1933538@sliet.ac.in	8427407158	GME	Male	1933538
8	9-30-2020 20:40:41	Adnan waris	1933537@sliet.ac.in		GME	Male	1933537
9	9-29-2020 20:27:36	Akshit Mahajan	1933542@sliet.ac.in	9876988057	GME	Male	1933542
10	9-29-2020 20:20:42	AKUL PATHANIA	1840358@sliet.ac.in	8627004221	GME	Male	1840358
11	9-24-2020 16:53:35	Amit Kumar Rana	ra02317261@gmail.com	8219982985	CSE	Male	
12	9-29-2020 20:43:02	Anchal Sharma	1950180@sliet.ac.in	9817152573	GME	Female	1950180
13	9-29-2020 20:21:11	Aniket Kumar	1933518@sliet.ac.in	7294017184	GME	Male	1933518
14	9-30-2020 0:58:49	Anjani Tiwari	1840325@sliet.ac.in	6394278684	GME	Male	1840325
15	9-30-2020 12:52:48	Ankit kumar	1840308@gmail.com		GME	Male	1840308
16	9-29-2020 22:40:54	Ankit Raj	<a href="mailto:1933021.sleit.ac.in">1933021.sleit.ac.in</a>	9122665217	GWT	Male	1933021
17	9-29-2020 21:34:36	Anurag Sharma	1933044@sliet.ac.in	8757745787	GME	Male	1933044
18	9-29-2020 21:20:36	Atal Upadhyay	1933543@sliet.ac.in	8460061859	GME	Male	1933543
19	9-29-2020 21:39:41	Avinash kumar	1933517@sliet.ac.in	8789101110	GME	Male	1933517
20	9-29-2020 20:27:22	Ayushi	1830060@sliet.ac.in	9418987043	CSE	Female	1830060
21	9-24-2020 14:05:18	AZAD RANJAN	asranjan1517@gmail.com	8725086135	GME	Male	
22	9-30-2020 19:40:16	Bhaskar Dev Goel	1830010@sliet.ac.in		GCS	Male	1830010
23	10-2-2020 20:00:32	Chandan Kumar	<a href="mailto:1933547.sliet.ac.in">1933547.sliet.ac.in</a>	8882581484	GME	Male	1933547
24	9-30-2020 1:41:07	Darkunde Shashank	1840335@sliet.ac.in	9011696481	GME	Male	1840335
25	9-24-2020 13:58:39	Deeksha sharma	Sharmadeeksha159@gmail.com	8264637315	ECE	Female	
26	9-29-2020 21:36:49	Gattu Adithya	1840355@sliet.ac.in	9581315473	GWT	Male	1840355
27	9-29-2020 20:29:46	Gaurav Joshi	1840360@sliet.ac.in	8126667663	GME	Male	1840360
28	9-28-2020 20:19:36	Gopal Krishna Yadav	1933539@sliet.ac.in		GME	Male	1933539
29	9-29-2020 22:14:57	Govind rajpoot	1840339@sliet.ac.in		GME	Male	1840339
30	9-29-2020 20:19:21	Gurpreet Singh	<a href="mailto:1950179.sliet.ac.in">1950179.sliet.ac.in</a>	9876226491	GME	Male	1950179
31	9-24-2020 14:52:19	Guruveet singh	guruveet21@gmail.com	6388156435	GME	Male	
32	9-29-2020 21:01:21	Harsh Thakur	1830373@sliet.ac.in	7018468787	CSE	Male	1830373
33	9-29-2020 20:45:10	Jatin kumar	1830026@sliet.ac.in	9781513942	CSE	Male	1830026
34	9-30-2020 6:42:34	Jyoti Pratap Singh	1950181@sliet.ac.in	9653504814	GME	Male	1950181
35	9-28-2020 18:04:06	Keshav Kumar Jha	1933524@sliet.ac.in	7986870680	GME	Male	
36	9-24-2020 13:29:27	Krishna kumar yadav	krishsliet2016@gmail.com	7814169737	GME	Male	
37	9-24-2020 17:36:37	Kulwant kaur	Kulwantranhare@gmail.com	6283706242	GCS	Female	
38	9-29-2020 20:42:53	Kulwinder Singh	1830311@sliet.ac.in	8427698433	GCS	Male	1830311

Sr. No.	Timestamp	Student Name	email ID	Mobile No.	Branch	Gender	Reg. No.
39	9-30-2020 20:42:53	Kumar Avinash Prabhat	1933546@sliet.ac.in		GME	Male	1933546
40	9-30-2020 14:24:25	Kunal Kumar	1933526@sliet.ac.in	7696174414	GME	Male	1933526
41	9-29-2020 20:50:20	Kushal Pal Singh	1950177@sliet.ac.in	9582177227	PGMSE	Male	1950177
42	9-29-2020 20:30:56	Mayank Kumar	1933527@sliet.ac.in	7061524106	GME	Male	1933527
43	9-29-2020 19:20:16	Md Wasim Alam	1933545@sliet.ac.in		GME	Male	1933545
44	9-24-2020 16:08:16	Mohit Goyal	greatmohit19@gmail.com	9888976434	GME	Male	
45	9-24-2020 13:15:10	Molathoti Vinay Kumar	vinayfranklin67@gmail.com	9542929152	GME	Male	
46	9-29-2020 20:42:15	Monu Kumar	1840305@sliet.ac.in	8284913742	GME	Male	1840305
47	9-30-2020 0:59:56	Navneet Kumar Nautiyal	1840324@sliet.ac.in	7906073372	GME	Male	1840324
48	9-29-2020 20:28:40	Nirbhay Kumar	1933508@sliet.ac.in	8368239008	GME	Male	1933508
49	9-29-2020 21:32:32	NITISH KUMAR	1840329@sliet.ac.in		GME	Male	1840329
50	9-29-2020 21:22:03	Parth Sachan	1840322@sliet.ac.in	7376788488	GME	Female	1840322
51	9-24-2020 13:56:52	Pragya kumari	Pragya0057@gmail.com	9102412611	GCS	Female	
52	9-24-2020 13:18:58	Priyesh kr. Thakur	1933523@sliet.ac.in		GME	Male	1933523
53	9-28-2020 13:10:56	Rajnish kumar	1933529@sliet.ac.in		GME	Male	1933529
54	9-29-2020 20:45:14	Ravi Ranjan	1933010@sliet.ac.in	9472392973	GME	Male	1933010
55	9-29-2020 21:54:09	Rishabh Anand	1933501@sliet.ac.in	9815947223	GME	Male	1933501
56	9-29-2020 20:52:40	Romil Raj	1933033@sliet.ac.in	7979894226	GWT	Male	1933033
57	9-29-2020 20:50:45	Sachin Jha	1933533@sliet.ac.in		GME	Male	1933533
58	9-28-2020 19:53:54	SANJOG RAJ	Sanjogra@gmail.com	9472210897	CIVIL	Male	
59	9-29-2020 20:22:01	Santosh Kumar Maurya	1840364@sliet.ac.in	9169243987	GWT	Male	1840364
60	9-30-2020 7:42:04	Satish Kaushik	1740603@sliet.ac.in	8407056535	CSE	Male	1740603
61	9-28-2020 14:20:14	SATYAM	7497st@gmail.com		GME	Male	
62	9-29-2020 20:22:07	Satyam Kumar	1933514@sliet.ac.in	7696116343	GME	Male	1933514
63	9-30-2020 12:50:46	Saurav kumar	1933534@sliet.ac.in	9501907334	GME	Male	1933534
64	9-24-2020 13:36:53	Saurav Kumar Suman	sauravkumarsuman47@gmail.com	8789371038	GWT	Male	
65	9-26-2020 23:26:43	Shubham Mehta	1933536@sliet.ac.in	7696603181	GME	Male	1933536
66	9-29-2020 21:52:13	Siddharth Kumar	1840367@sliet.ac.in	8130714804	GME	Male	1840367
67	9-29-2020 20:18:26	Smriti Rani	1830033@sliet.ac.in	9056375968	CSE	Female	1830033
68	9-30-2020 4:55:28	Sonelal kumar	1933515@sliet.ac.in	9530917870	GME	Male	1933515
69	9-29-2020 20:21:41	Sudesh Kumar	1933519@sliet.ac.in	7696134982	GME	Male	1933519
70	9-30-2020 7:22:18	Sudhanshu Kumar Pandey	1933541@sliet.ac.in	07814277959	GME	Male	1933541
71	9-24-2020 14:58:40	Sukhdev Singh	sukhdevsingh2046@gmail.com	7347241913	GME	Male	
72	9-30-2020 10:31:37	Sunny	1940032@sliet.ac.in	8437625530	GCS	Male	1940032
73	9-24-2020 17:50:34	Vikash kumar	1840373@sliet.ac.in	7091898009	GWT	Male	
74	9-29-2020 20:37:14	Vinay Kumar Molathoti	1740881@sliet.ac.in		GME	Male	1740881
75	9-29-2020 23:37:09	Waquar Shahid	1933505@sliet.ac.in	8699687901	GME	Male	1933505

Dr. Sunil Kumar (AP, ME)







