

VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR

Type of online course: Certificate

Course title: Certificate course on Industrial Robotics and CNC Programming

Offered by: V. R. Jamdar Siemens Center of Excellence, VNIT Nagpur (Interdisciplinary Board)

Eligibility: Diploma/ B.Tech (Any branch) (2nd Year Completed), M.Tech (Electrical, Electronics, Mechanical, and related branches) (First Semester Completed). Bonafide students of VNIT Nagpur are not eligible.

Proposed Maximum Duration: 3 months

Total contact hours: 100 (Lecture: 0+ Tutorial: 16 + Practical: 84)

Mode of course delivery: Hybrid

Course Objectives:

1. Develop an understanding of industrial robotics, including their types, applications, and components.
2. Learn the basics of programming industrial robots, including creating motion paths, setting speeds, and controlling end-effectors.
3. Gain hands-on experience in operating industrial robots and CNC machines, including setting up workpieces, running programs, and troubleshooting common errors.
4. Understand the principles and components of Computer Numerical Control (CNC) machines, including their types, applications, and limitations.
5. Learn about safety considerations when working with industrial robots and CNC machines, including emergency stop procedures, risk assessments, and hazard analysis.

Course structure (per week equivalent):

Sr. No.	Courses (Titles)	L	T	P	Cr
1	Industrial Robotics and CNC Programming	0	1	6	4
Total		0	1	6	4

Course fee: Rs. 20,000+ 18% GST

Course Contents:

Sr. No.	Name of Course and Topics	Hours	
		Tutorial	Practical
1	Industrial Robotics and CNC Programming		
1.1	Introduction to Robot and Robotics, Robot Kinematics, Robot structure	1	2
1.2	IRC5 controller, ABB Robot Studio, Flex Pendant with, IRC5 controller	1	4
1.3	Rapid Instructions Overview, Instructions, Communication	1	4

1.4	Communication & I/O system with IRC5 controller, Protocol, Sensors	0	4
1.5	Introduction to ARC welding, Basic components of arc welding robot, welding, controller, Rapid Programming for ARC welding	1	4
1.6	Introduction to Spot welding, Resistance welding fundamentals, Basic components of spot welding, IRC5 and OBARA	1	4
1.7	Rapid programming for Spot welding. Programming in RobotStudio (Offline programming), Hand-on Programming (Online programming).	1	8
1.8	KUKA robot, ARC600 Robot programming.	1	4
1.9	CNC Hardware and Control Systems	1	4
1.10	Basics of CNC tooling	1	4
1.11	CNC Machine Tools	1	4
1.12	Siemens Controller Sinumerik 828D	0	4
1.13	Siemens Controller Sinumerik 840D	0	4
1.14	3 axis Milling	0	4
1.15	CNC Lathe machine	0	4
1.16	5 axis Machining center	0	8
1.17	Trouble shooting, calibration	0	4
1.18	NX CAM and Post builder, Milling 3 axis, Milling Multi axis operation and machining simulation, cutting parameters and non-cutting moves, blank and tool creation.	6	12
Total Hours		16	84

Course Outcomes:

1. Improved knowledge and understanding of industrial robotics and CNC machines, including their applications, components, and programming languages.
2. Practical skills in programming and operating industrial robots and CNC machines, including creating motion paths, setting speeds, selecting cutting tools, and troubleshooting errors.
3. Increased familiarity with CAM software and the ability to generate CNC programs automatically.
4. Knowledge of safety considerations when working with industrial robots and CNC machines, including risk assessments and emergency stop procedures.
5. Practical experience in completing a final project, such as designing and building a robotic system or creating a complex CNC machining program.
6. Potential for career advancement or expanded job opportunities in fields such as manufacturing, robotics engineering, or CNC machining.

Attendance requirement: 100 % mandatory, 25% relaxation may be given by course coordinator

Course Evaluation plan: Mid-term (30%) + End Term(30%) + Teacher's Assessment (40% which includes mini project)

Course Coordinator(s)(Name and Sign):

Prof. A . B. Andhare

(Professor Incharge, Smart Factory Lab of VRJSCOE)

Dr. Poonam Sharma

(Professor Incharge, Robotics Lab of VRJSCOE)

Dr. T. V. K. Gupta

(Professor Incharge, CNC Machine Lab of VRJSCOE)

Lab Coordinator(s)(Name and sign):

Trainers for Robotics Lab, Smart Factory Lab and CNC Machine Lab of VRJSCOE and
Center Manager

Course Execution Coordinator (Name and Sign):

Prof. Shital S. Chiddarwar

Center Head

V R Jamdar Siemens CoE