1. Essentials for NX Designers

Introduction to cad - Introduction NX - Opening and closing parts and activity - User interface and working with interface and activity - Impact of datum coordinate systems - Sketching methods - Sketching constraints and activity - Sketch curve functions and activities - Sketching Exercises - Sweeping geometry and activity - Concept of layers - Creating expressions for dimensions and activity - Creating datum geometry (planes) and activity - Examining structure of model - Editing and manipulating sketches - Trimming a solid body - Swept features offset and draft - Creating and editing holes and activity - Manipulating shell features and activity - Creating pattern and mirrors in bodies - Blending and chamfering - Measuring Techniques and Synchronous modelling - Loading assemblies - Working with assemblies - Simple drawings – Project

2. NX Basic Design

Introduction to cad - Introduction NX - Opening and closing parts and activity - User interface and working with interface and activity - Sketching methods - Sketching constraints and activity - Sketch curve functions and activities - Sketching Exercises - Sweeping geometry and activity - Concept of layers - Creating expressions for dimensions and activity - Creating datum geometry (planes) and activity - Creating and editing holes and activity - Blending and chamfering - Measuring Techniques and Synchronous modelling - Loading assemblies - Working with assembly’s - Simple drawings – Project

3. Synchronous Modeling Fundamentals

Synchronous Modelling - Modify Face - Detail Feature - Delete Face - Reuse commands - Synchronous Modelling relationships - Dimension commands - Adaptive Shell - Edit Cross Section and Edit Section - Optimize Face - Projects: Create and edit parts using Synchronous Modelling

4. Synchronous Modeling and Parametric Design

Documenting design intent - Editing parametric models - Associative curve operations - Emboss geometry - Blending techniques - Interpret references - Capturing part shape variations when assembled - Design optimization - Introduction to Synchronous Modelling and Modify Face - Detail Feature, Delete Face, Reuse commands - Synchronous Modelling relationships, Dimension commands - Adaptive Shell, Edit Cross Section and Edit Section, Optimize Face

5. Intermediate NX Design and Assemblies

Capturing Design intent by constraining sketches - Applying advanced techniques to sketched parts - Creating freeform shaped surfaces - Capturing design intent with formulas - Duplicating features - Organizing Assy Model structure - Controlling display of parts in Assembly - Modelling parts within content of assembly - Building geometric relation between parts - Modify parts at assembly level - Creating geometric relation between parts - Modify Geometry for manufacturing process - Creating round of fillet with varying radius - Simplifying geometry - Storing Position Constraints in parts - Controlling instances in Assemblies - Defining Reusable Geometry - Revising and replacing parts - Capturing part shapes Variations when assembled - Controlling moving parts in Assembly – Project

6. Drafting Essentials

Part Navigator - Master model drawings and drafting standards - Drawing sheets - Drafting views - Custom views - Move, copy, and align views - Hiding geometry in drafting views - Updating drawings and drafting views - Centreline symbols – Dimensions - Notes and labels - Balloon symbols - GD&T
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symbols - Surface finish, weld, and custom symbols - Section views - Editing section lines - Maintaining associativity - Detail views - View boundaries - Broken views - Break-out section views - View dependent edits - Part Attributes - Parts lists - Sectioning assembly views - Exploded views

7. Mechanical Freeform Modeling

Introduction to Mechanical Freeform - Curves used for creating freeform features - Edit Splines - Curve Analysis - Primary Sheets and Bodies – Transitions - Face Analysis - Working with sheets - Sheets and solids

8. NX Sheet Metal

Sheet Metal workflow - Establish basic part characteristics - Define the basic shape of the part - Constructing base features - Sheet Metal corners - Sheet Metal cut-outs - Sheet Metal deform features - Flat Solid and Flat Pattern - Advanced Sheet Metal commands - Analyse Formability – One step - Aerospace Sheet Metal - Working with non-sheet metal data

9. Routing Electrical

Wiring assembly organization - Overview of qualifying parts - Placing parts in a wiring harness assembly - Segments and paths - Converting logical data into physical data - Assigning components – Overstock - Overview

10. Routing Mechanical

The Routing applications and Linear paths - Routings with Heal Path - Qualifying parts - Routings with parts - Routings with stock - Managing Routing Assemblies - Runs and spools - Systems diagramming

11. Mold Wizard


12. Large Assemblies Management

Working in large assemblies - Manipulating assemblies - Creating representations - Create component envelopes in an assembly - Assembly Cloning - Assembly Clearance - Advanced Weight Management - Assembly Arrangements - Assembly Sequencing and Motion - Assembly Cut - Deform Part - Reference Sets - Assembly Navigator

13. Industrial Design using NX

Spline review and Studio Splines - Construction and Reference Geometry and Working with raster images - Curve Tools 1 - Introduction to Studio Surfaces and Shape Analysis - Workflow 1 - Studio Surfaces 2 - Additional freeform features – Blending - Curve tools 2 - Trimming and sewing - Workflow 2 and Enlarge - Shape Analysis 2 - Workflow 3 - Deviation analysis - Refit Face – Visualization

14. Sketching Fundamentals

Overview of cad & creating parts - Creating parts with sketch - Editing & manipulating sketches - Editing & manipulating sketches - Constraining sketches - Applying advanced technique to the sketch - Applying advanced technique to the sketch - Sketch on path overview
15. Product and Manufacturing Information


16. Progressive Die wizard


17. Motion Simulation

Introduction to Motion Simulation – Workflow – Links – Joints - Specialized constraints and couplers - Motion drivers - Working with results - Working with assemblies - Springs and dampers - Forces and torques - Markers, Smart Points, and sensors - 2D contact - 3D contact – Bushings - Load Transfer - Flexible body analysis - PMDC electric motors

18. Advanced Simulation Process


19. Introduction to Finite Element Analysis with NX

Introduction - Finite Element Overview - Solution Control – Nodes – Elements – Constraints – Loads - Special Cases Contact & Glue - Special Cases Welds & Bolt Preload - Linear Buckling Analysis - Model Quality - File Management Section

20. Advanced simulation Solutions

Introduction to advance simulation solutions and modal analysis – response simulation - thermal analysis - buckling analysis and contact and gluing - symmetry and assembly fem - nonlinear static analysis - geometry optimization and super elements - flexible body analysis and project
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21. Thermal and Flow analysis
Introduction - meshing and material properties - heat transfer introduction - thermal initial and boundary conditions - thermal coupling – radiation - thermal solution options and solving - thermal postprocessing - fluid volume creation and meshing - computational fluid dynamics - flow initial conditions and boundary conditions - flow solution option and solving - flow post-processing - coupled thermal and flow - result mapping

22. NX Response Simulation

23. Laminate Composites
Zone-Based Process - Ply Based Process - Modeling 3D Laminates - Solution and Post-Processing

24. NX Nastran Advanced Non-linear
Introduction - Contact - Nastran Keywords - Stress Stiffening Effect - Element Selection – Time Function - Arrival Time - 3D-Iterative Solver - Gasket Modeling - Metal Forming - Case study 1 - Case Study 2

25. Sensitivity and optimization with NX

26. Super Element Analysis with NX

27. Advanced Thermal and Flow Analysis

28. Advanced Dynamic Analysis with NX
Introduction & review of fundamentals - NASTRAN OVERVIEW 1 (File Assignment, Restarts, Executive Control, Case Control) - NASTRAN OVERVIEW 2 (Bulk Data, Parameters, Nastran sets, Tips on Model Verification) - model reduction - shock and response spectrum – random response - extra points, transfer function & nolins – mfluid
29. Introduction to Dynamic Analysis with NX


30. DDAM analysis with NX

Introduction - Review of Fundamentals - DDAM Process Overview - DDAM in NX Nastran - Advanced DDAM Features

Advanced Manufacturing Lab

1. NX Manufacturing Fundamentals

Introduction to cam - basic manufacturing concepts - analyzing a manufacturing – part – tools - operation navigator - parent group - cavity milling_1 – cavity milling_2 activities - machining with t cutters - coordinate systems – visualization - planar milling - floor and wall milling - manual drilling - fixed axis contouring engraving text - tool path information output

2. Turning Manufacturing Process

Define part and blank geometry - Create and retrieve tools, Face operations - Verification, Common options - Centerline operations - Rough operations – OD - Rough operations – ID - Finish operations OD and ID work - Groove operations - Teach Mode operations, Thread operations - Using multiple spindles, Mill-Turn - Vertical Turret Lathe, Merging Lathes

3. Fixed Axis and Multi-Axis Milling

Plunge Milling - Z-Level Milling - High speed machining - Fixed-axis contour milling - Introduction to four and five axis machining – Z level 5axis - Sequential Mill basics - Sequential Mill advanced - Variable-axis contour milling - Profiling walls with a variable tool axis - Avoid collisions by tilting the tool axis - Turbomachinery milling - Non Cutting Moves - Associative machining geometry - Hole machining - Transferring a part from one setup to another setup - Generic Motion and Probing operations - Projection Vectors - Advanced surface contouring - Multi-axis drilling (point-to-point operations) - Multi-axis drilling (point-to-point operations) - Machining with a T-Cutter - Pasting operations with reference - Area Milling cut regions

4. NX CAM Customization

Tool and Machining Data Libraries - Custom shop documentation - Manufacturing Wizards – Templates - Feature-based machining - Integrated simulation and verification

5. Robcad Basics


6. Robcad Adv Modelling & Kinematics

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7. **Process Designer Basic**

8. **Process Designer for General Assembly**

9. **Process Designer for Body-In- White Processing**

10. **Process Simulate Part Flow**

11. **Process Simulate Human Simulation**

12. **Process Simulate Basic Robotics**
Basic Concepts - Discussion and Explanation - Process Simulate on Teamcenter Environment - Activity & Practice - Placement Commands - Activity & Practice - Process Simulate Analysis Tools and Scene Data - Activity & Practice - Other Selected Basic Topics - Activity & Practice - Modeling and Kinematics
Course Syllabus


13. Introduction to Teamcenter

Introduction to Teamcenter - Working in My Teamcenter - Working with items in Teamcenter - Viewing and modifying object properties - Creating and managing datasets - Applying data security practices - Performing and managing searches - Navigating the relation hierarchy of an object

14. Using to Teamcenter


15. Mockup

Opening files - Understanding the user interface - Working with the assembly tree - Controlling part visibility - Selecting parts - Navigating around models - Setting viewing preferences - Advanced navigation modes - Part properties and attributes - Alternate hierarchies - Part appearance - True shading - Advanced part appearance - Transform parts using the Part - Transformation dialog box - Use manipulators to translate and rotate parts - Relocate parts by referencing other parts - Use Part Manipulation Mode to move parts - Exploded views - Snapshots - Measuring 3D models - Sectioning models - 3D coordinate systems - Motion file creation - Motion file playback - Recording movies - Compare 3D parts - Visual reports - Viewing CAE results - Display Product Manufacturing Information (PMI) - 3D markup - Callouts and symbols - Creating part reports - Thrust lines - 3D GD&T markups - Capturing 2D images of 3D models - Working with 2D images - Saving your work - Holding virtual conferences - Hide obscuring parts - Clipping volumes - Part groups - Filters - Measurement reports - Aligning parts - Generating part extraction paths - Check clearances

16. Integration for NX users

Introduction to Teamcenter Integration for NX - Using Teamcenter Navigator in NX - Create new data - Revise existing data - Share data using Teamcenter Integration for NX - Import and export assemblies - Part Families - Large Assembly Management - Miscellaneous Topics

17. Schedule Manager

Introduction to Schedule Manager - Applying roles in Schedule Manager - Creating schedules - Creating tasks and milestones - Managing schedule resources - Maintaining schedules - Working with calendars - Adding schedule deliverables and workflow tasks - Creating notifications and subscriptions
18. Managing Requirements using Teamcenter

- Introduction to managing requirements
- Creating requirements
- Importing requirements from Microsoft Word
- Importing requirements from Microsoft Excel
- Maintaining requirements
- Managing requirement structures
- Allocating requirements using trace links
- Managing trace links
- Modifying requirements using live Excel
- Modifying requirements using live Word
- Working with export templates and IRDCs
- Managing requirements using thin client

19. Manufacturing Assembly Process Planning

- Teamcenter Manufacturing Process Management
- Introduction to Manufacturing Concepts
- Implementing Teamcenter structures for manufacturing
- Engineering data management
- Manufacturing part list creation (MBOM)
- Manufacturing data management EBOM to MBOM
- Manufacturing Process Plan Authoring Part 1
- Manufacturing Process Plan Authoring Part 2
- Manufacturing Process Plan Authoring Part 3
- Plant resource management
- Using Classification
- Work Instructions
- Process plan approval and release
- Manufacturing Assembly Part Planning

20. Manufacturing Assembly Part Planning

- Introduction to Teamcenter Manufacturing Part Planner
- Using the Part Planner Perspective
- Part Planner Views
- Authoring manufacturing structures
- Creating manufacturing operations
- Creating manufacturing operation activities
- Working with physical structures
- Managing manufacturing resources
- Associating structures

21. Managing Systems Design using Tc

- Introduction to Systems Engineering
- Systems engineering process overview
- Creating architecture structures
- Importing architecture structures from Excel
- Creating architecture structures using Vision
- Creating low diagrams
- Linking requirements and architecture structures
- Applying technical measurements to a structure
- Managing architecture configurations
- Using workflow with Systems Engineering

22. Installation

- Teamcenter architecture overview
- Oracle server, listener, and database
- MS SQL Server
- Common Licensing Server
- Corporate server
- Two-tier rich client
- Four-tier architecture overview
- J2EE-based server manager and Web tier
- .NET-based server manager and Web tier
- Four-tier rich client installation
- Installing the Business Modeler IDE
- Administer the in-production system
- FSC performance cache server
- Dispatcher
- Store and Forward
- Teamcenter integrations with Microsoft Office
- Teamcenter Integration for NX
- Embedded visualization
- Creating additional sites

23. Application and Data Model Administration

- Business Modeler IDE fundamentals
- BMIDE process and data model
- Item business object configuration
- Form business object configuration
- LOV (list of value) extensions
- Relation business object configuration
- Dataset business object configuration
- Option extensions and BMIDE reports
- Rule extensions
24. Customization


25. Advanced Workflow and Security Admin

Introduction - Validate criteria in a workflow - Prohibit adding or removing workflow objects - Building workflows with concurrent processes - Assigning reviewers and approvers - Setting the task duration and reacting to delays - Changing multiple statuses using workflow - Tracking in-process workflows - Evaluating audit log files - Controlling data access approaches

Test & Optimization Lab

1. LMS LMS Test Lab-Signature Testing & Analysis

Introduction - Structural Testing - Impact acquisition - Spectral acquisition - Modal Analysis - Multi Run Modal Analysis - Operational Modal Analysis - Operational Deflection Shapes - Modification Prediction - Rigid Body Modes - Documentation of Project

2. LMS Test Lab-Modal Testing and Analysis


3. 1D Simulation using Imagine Lab

Introduction - Getting Started - Advanced Examples - Batch Runs - The Result Manager

Automation Lab

1. Basics of PLC


2. Basic of SCADA

Scada overview - System Overview - Configuration Interface of engineering system - Project Creation & Basic Exercises - Basic configuration - Alarm Configuration – Practice - Data logging & Trend Configuration - Recipe Management – Practice - User administration – Practice
1. Basic Mechatronics


Process Instrumentation Lab

1. Basic of Process Instrumentation


2. SIMATIC PCS 7

Introduction of PCS7 - Introduction to standard architecture of PCS 7 like ES, AS, OS-Server & OS Clients - Introduction to AS Hardware like PS, CPU & CPs. Communication of remote stations with AS - About CPU 410-5H - Configuration and Architecture of PCS7 V9.0 - Working with SIMATIC Manager in PCS 7 - Creating the Multi-project - Configuring Hardware - How to configure the PC station of the OS - Introduction to Time synchronization, Life beat monitoring, Picture tree Manager, User Administration & OS Project Editor - Introduction of Server-Client architecture - Engineering in the PCSV9.0(OS and AS) - Working with CFC Charts and develop logic using CFC charts & optimization of the charts - Compiling, downloading & testing CFC & SFC charts - Compiling Operator Station. Creating process pictures in Graphics editor - Working with standard faceplates, Messages and Trends - Mass Data engineering tools like Process Object View, Process Tag Type & Models using Import Export assistant, Fault Diagnostics and Maintenance in PCS7

Electrical Lab

1. Basics of Induction Motors

2. Low Voltage Switch gear

Introduction to switch gear and Fuse, General purpose relay - Overload relay - Contactor, Types of contactor, maintenance - MCB Construction, Protection in MCB - RCCB and ELCB, Advantage of RCBO, Limitations of RCCB - MPCB, Super switch - MCCB , 3VL MCCB - Power and control wiring of DOL starter, DOL starter practice session - Power and control wiring RDOL starter , RDOL starter practice session - Power and control wiring of star delta starter - Practice session on Star delta starter - Soft starter basics , Sirius soft starter - Soft starter Starting method of IM using 3RW44 - Parameterization of soft starter

3. Electrical Basic Power Systems

Basic of power , Generation - Transmission & Transmission line accessories – Distribution Earthing & Cable dimensioning - Different cable types , PF correction and fault calculation - Introduction to breakers - 3WT ACB, 3WL ACB - ETU and its parameterization - PAC meter, parts of PAC meter - Measured variable, Networking of the PAC meter, PAC meter configuration through Power config software - PAC meter configuration through Power config - Introduction to SIMARIS, Sub distribution board, Loads - Creating bus bar system - Type of power source, Adding couplings

4. Basic Course on Ac - Dc Drive

Power Electronic concepts (Diodes, Thyristors, IGBT, BJT) - Concept of Drive & Expectation from Drive Basic fundamentals of Drives - Siemens Product Portfolio ,Starters Basic concept - Starters Wiring, Hands on practices - DC motors & Concept of DC Drive in details- Features of SINAMIC DCM DC Drive & Parameterization - Types of AC motors and construction & working principle - Concept of AC Drive in details - Selection of AC Drive and its applications - Features of SINAMIC G-120 AC Drive & Parameterization - Working with STARTER Software- Inputs / Outputs, Motor potentiometer - Fixed speed set point, Speed lock Application, Skip Band Application - Basic Ramp Function generator, Shutdown functions - Energy Saving Concept in Motors

Rapid Prototyping Lab

1. Rapid Prototyping Technology


NC Programming Lab

1. MILLING -Numerical control programming

Introduction to CNC - Introduction to CNC controller - Introduction to CNC Part Programming - Introduction of standard TURNING cycles

2. TURNING -Numerical control programming

Introduction To CNC - Introduction to CNC controller - Introduction to CNC Part Programming - Introduction of standard TURNING cycles
1. **CNC TURNING - Operation and Machining**

   Introduction to Turning Center - Introduction to CNC Machine Controller (828D) - Introduction to Different operating Modes - Introduction to Tools and Inserts - Introduction to Different Types of Operation - Introduction to Basic Programming - Work Offset & Tool Offset - Hands on Practice (Machining) - Introduction to Safety & Maintenance

2. **CNC MILLING - Operation and Machining**

   Introduction to Turning Center - Introduction to CNC Machine Controller (828D) - Introduction to Different operating Modes - Introduction to Tools and Inserts - Introduction to Different Types of Operation - Introduction to Basic Programming - Work Offset & Tool Offset - Hands on Practice (Machining) - Introduction to Safety & Maintenance

**Robotics Lab**

1. **Basic Robotics**


2. **Robotics Application - Material Handling Application**


3. **Robot Application-MIG Welding**


4. **Robotic Application- Spot Welding**


**Auto Body Repair lab**

1. **Repair and Overhauling of Chassis System (Passenger Cars)**

1. **Auto Body Repair, Denting and Painting**


2. **Lift Installation & Maintenance Lab**

   Introduction - Lift Installation & Maintenance - Introduction to Elevators - Working of Elevators - Introduction to Escalators – Site Reediness & GAD - Installation of Lift - Troubleshooting