

Government of Pakistan

National Vocational and Technical Training Commission

Prime Minister's Hunermand Pakistan Program

"Skills for All"



Course Contents / Lesson Plan

Course Title: CAD/CAM Advance

Duration: 3 Months

Revised Edition

Trainer Name

Course Title

Advance CAD/CAM

Objectives and Expectations

Employable skills and hands-on practice in Advance CAD/CAM

This course offers a broad, cross-disciplinary learning experience for students looking to pursue career in Advanced CAD CAM. The needs for superior Computer Aided Designing and Computer Aided Manufacturing technology have increased in keeping with the demands for a wide variety of performances such as high productivity, high quality, as well as labor and cost savings. This course will provide participants with an integrated approach to learn about the various aspects of CAD and CAM. The course will introduce the execution of Product design & Manufacturing of Tools & Dies using latest CAD/CAM software, CNC Programming & Machining Practices

Main Expectations:

In short, the course under reference should be delivered by professional instructors in such a robust hands-on manner that the trainees are comfortably able to employ their skills for earning money (through wage/self-employment) at its conclusion. This course thus clearly goes beyond the domain of the traditional training practices in vogue and underscores an expectation that a market-centric approach will be adopted as the main driving force while delivering it. The instructors should therefore be experienced enough to be able to identify the training needs for the possible market roles available out there. Moreover, they should also know the strengths and weaknesses of each trainee to prepare them for such market roles during/after the training.

- i. Specially designed practical tasks to be performed by the trainees have been included in the Annexure-I to this document. The record of all tasks performed individually or in groups must be preserved by the management of the training Institute clearly labeling name, trade, session, etc. so that these are ready to be physically inspected/verified through monitoring visits from time to time. The weekly distribution of tasks has also been indicated in the weekly lesson plan given in this document.
- ii. To materialize the main expectations, a special module on **Job Search & Entrepreneurial Skills** has been included in the latter part of this course (2nd & 3rd month) through which, the trainees will be made aware of the Job search techniques in the local as well as international job markets (Gulf countries). Awareness around the visa process and immigration laws of the most favored labor destination countries also form a part of this module. Moreover, the trainees would also be encouraged to venture into self-employment and exposed to the main requirements in this regard. It is also expected that a sense of civic duties/roles and responsibilities will also be inculcated in the trainees to make them responsible citizens of the country.
- iii. A module on **Work Place Ethics** has also been included to highlight the importance of good and positive behavior in the workplace in the

line with the best practices elsewhere in the world. An outline of such qualities has been given in the Appendix to this document. Its importance should be conveyed in a format that is attractive and interesting for the trainees such as through PPT slides +short video documentaries. Needless to say, that if the training provider puts his heart and soul into these otherwise non-technical components, the image of the Pakistani workforce would undergo a positive transformation in the local as well as international job markets.

To maintain interest and motivation of the trainees throughout the course, modern techniques such as:

- Motivational Lectures
- Success Stories
- Case Studies

These techniques would be employed as an additional training tool wherever possible (these are explained in the subsequent section on Training Methodology).

Lastly, evaluation of the competencies acquired by the trainees will be done objectively at various stages of the training and a proper record of the same will be maintained. Suffice to say that for such evaluations, practical tasks would be designed by the training providers to gauge the problem-solving abilities of the trainees.

(i) Motivational Lectures

The proposed methodology for the training under reference employs motivation as a tool. Hence besides the purely technical content, a trainer is required to include elements of motivation in his/her lecture. To inspire the trainees to utilize the training opportunity to the full and strive towards professional excellence. Motivational lectures may also include general topics such as the importance of moral values and civic role & responsibilities as a Pakistani. A motivational lecture should be delivered with enough zeal to produce a deep impact on the trainees. It may comprise of the following:

- Clear Purpose to convey the message to trainees effectively.
- Personal Story to quote as an example to follow.
- Trainees Fit so that the situation is actionable by trainees and not represent a just idealism.
- Ending Points to persuade the trainees on changing themselves.

A good motivational lecture should help drive creativity, curiosity, and spark the desire needed for trainees to want to learn more.

The impact of a successful motivational strategy is amongst others commonly visible in increased class participation ratios. It increases the trainees' willingness to be engaged on the practical tasks for a longer time without boredom and loss of interest because they can see in their mind's eye where their hard work would take them in short (1-3 years); medium (3 -10 years) and long term (more than 10 years).

As this tool is expected that the training providers would make arrangements for regular well planned motivational lectures as part of a coordinated strategy interspersed throughout the training period as suggested in the weekly lesson plans in this document.

Course-related motivational lectures online link is available in **Annexure-II**.

(ii) Success Stories

Another effective way of motivating the trainees is using Success Stories. Its inclusion in the weekly lesson plan at regular intervals has been recommended till the end of the training.

A success story may be disseminated orally, through a presentation, or using a video/documentary of someone that has risen to fortune, acclaim, or brilliant achievement. A success story shows how a person achieved his goal through hard work, dedication, and devotion. An inspiring success story contains compelling and significant facts articulated clearly and easily comprehensible words. Moreover, it is helpful if it is assumed that the reader/listener knows nothing of what is being revealed. The optimum impact is created when the story is revealed in the form of: -

- Directly in person (At least 2-3 cases must be arranged by the training institute)
- Through an audio/ videotaped message (2-3 high-quality videos must be arranged by the training institute)

It is expected that the training provider would collect relevant high-quality success stories for inclusion in the training as suggested in the weekly lesson plan given in this document.

The suggestive structure and sequence of a sample success story and its various shapes can be seen in **Annexure III**.

(iii) Case Studies

Where a situation allows, case studies can also be presented to the trainees to widen their understanding of the real-life specific problem/situation and to explore the solutions.

In simple terms, the case study method of teaching uses a real-life case example/a typical case to demonstrate a phenomenon in action and explain theoretical as well as practical aspects of the knowledge related to the same. It is an effective way to help the trainees comprehend in depth both the theoretical and practical aspects of the complex phenomenon in depth with ease. Case teaching can also stimulate the trainees to participate in discussions and thereby boost their confidence. It also makes the classroom atmosphere interesting thus maintaining the trainee interest in training till the end of the course.

Depending on suitability to the trade, the weekly lesson plan in this document may suggest case studies be presented to the trainees. The trainer may adopt a PowerPoint presentation or video format for such case studies whichever is deemed suitable but only those cases must be selected that are relevant and of a learning value.

The Trainees should be required and supervised to carefully analyze the cases.

For this purpose, they must be encouraged to inquire and collect specific information/data, actively participate in the discussions, and intended solutions to the problem/situation.

Case studies can be implemented in the following ways: -

- i. A good quality trade-specific documentary (At least 1-2 documentaries must be arranged by the training institute)
- ii. Health & Safety case studies (2 cases regarding safety and industrial accidents must be arranged by the training institute)
- iii. Field visits (At least one visit to a trade-specific major industry/site must be arranged by the training institute)

Entry-level of trainees	Intermediate
Learning Outcomes of the course	<p>By the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • Describe basic structure of CAD workstation, Memory types, input/output devices and display devices and computer graphics • Acquire the knowledge of geometric modeling • Execute the steps required in CAD software for developing 2D and 3D models and perform transformations • Explain fundamental and advanced features of CNC machines • Analyze technical drawings using both CAD and basic manual tools • Apply the stages of the design process from scratch using engineering graphics techniques such as sectional projections, dimensioning and computer-generated drawings (2D).
Course Execution Plan	<p>The total duration of the course: 3 months (13Weeks) Class hours: 4 hours per day Theory: 20% Practical: 80% Weekly hours: 24 hours per week Total contact hours: 312 hours</p>
Companies offering jobs in the respective trade	<ol style="list-style-type: none"> 1. Steel manufacturing industry. 2. Construction industry. 3. Fertilizer industry 4. Chemical industry 5. Sugar industry 6. Industrial projects. 7. Shipyards. 8. Railways. 9. Ordinance Factory 10. Heavy Mechanical Complex 11. Heavy Forge and Foundry 12. Tractor and Agricultural Equipment Industry. 13. Automobile industry. 14. Local industry. 15. Local metal fabrication shops. 16. Medical field (dentistry etc.)
Job Opportunities	<p>All over the world there is a high demand in the Integrated CAD/CAM/CAE Software like Pro/Engineer, I-DEAS & CATIA help manufacturers optimize product concept early in Design process, enabling them to significantly improve product quality, while reducing product development time and cost.</p> <p>6 Advanced CAD CAM With the help of this course, we will be able to give technical trainings of Advance Computer Aided Designing & Computer Aided Manufacturing to our youth. There are also opportunities for start-up entrepreneurship due to the high demand in the market in following designated jobs;</p> <ul style="list-style-type: none"> • CAD/CAM Operator • 3D Draftsman • CNC Machine Operator • CAD/CAM Course Instructor

No of Students	25
Learning Place	Classroom / Lab
Instructional Resources	<ol style="list-style-type: none"> 1. CAD/CAM Theory and Practice by Ibrahim Zaid R Sivasubramanian McGraw-Hill Education 2. CAD/CAM/CIM by P. Radhakrishan S. Subramanyan V. Raju New Age International Publishers 3. CAD/CAM Theory and Concepts by Kuldeep Sareen Chandandeep Grewal S. Chand Publishers 4. CAD/CAM Principles and Applications by J. Srinivas Oxford Higer Education 5. Fundamentals of CAD/CAM/CIM by Dr. Vikram Sharma International Book House (Pvt) Ltd, India 6. CAD/CAM Computer-Aided Design and Manufacturing by M. Groover E. Zimmers Pearson 7. https://youtu.be/FZVyn3-E6IU 8. https://www.youtube.com/watch?v=NZCMTK9VTSQ 9. https://www.youtube.com/watch?v=10tKTUX9DM4 10. https://www.youtube.com/watch?v=r5Ntr4JcFqI

Modules

Scheduled Weeks	Module Title	Days	Learning Units	Home Assignment
Week 1	<p style="text-align: center;">Orientation/Course Introduction</p> <p style="text-align: center;">Understand the basics of Power Shape</p> <p style="text-align: center;">Understand the wire frame generation</p>	Day 1	<p>Motivational Lecture (<i>For further detail please see Page No: 3& 4</i>)</p> <p>Students are introduced to:</p>	<ul style="list-style-type: none"> • Task 1 • Task 2 • Task 3 • Task 4 <p style="text-align: center;"><u><i>Details may be seen at Annexure-I</i></u></p>
		Day 2	<p>Course Introduction</p> <p>Job market</p> <p>Course Applications</p> <ul style="list-style-type: none"> • Introduction to Design & 2D/3D drafting 	
		Day 3	<ul style="list-style-type: none"> • Understanding the concepts of MS Window based CAD and CAM tools • Understand types of different CAD/CAM software 	
		Day 4	<ul style="list-style-type: none"> • Identify and use the editing toolbar, Status tool bar, view standard directions • Identify and use Model display options • Use Quick key commands from keyboard • Generating wireframe • Draw single lines • Create swept arc, fitted arc, fillet arc 	

		Day 5	<ul style="list-style-type: none"> • Create a composite curve • Use general edit toolbar • Use point Limiting • Perform interactive limiting • Draw filleting composite curves • Draw wireframe arc • Perform Switch off trim tangent items • Use of position input form • Saving the model with a name 	
Week 2	Understand Work Planes	Day 1	<p>Success stories (<i>For further detail please see Page No: 3& 4</i>)</p> <p>Students are introduced to:</p> <ul style="list-style-type: none"> • Create different geometrical shapes 	<ul style="list-style-type: none"> • Task 5 • Task 6 • Task 7 <p><i><u>Details may be seen at Annexure-I</u></i></p>
		Day 2	<ul style="list-style-type: none"> • Draw Work Plane Placement 	
	Day 3	<ul style="list-style-type: none"> • Create geometry based on active work plane • Use of position button 		
	Day 4	<ul style="list-style-type: none"> • Twist and align work planes • Parameterizes surfaces • 7 Primitive surfaces 		
	Perform Surface Modeling & Fill in Surfaces			

		Day 5	<ul style="list-style-type: none"> • Extruded Surfaces • Surfaces of Revolution • Creation of composite curve • Application of Extrusion Command 	
Week 3	Perform Surface Limiting and introduction to POWER SURFACES	Day 1	<p>Motivational Lecture (<i>For further detail please see Page No: 3& 4</i>)</p> <p>Students are introduced to:</p> <ul style="list-style-type: none"> • Use of Surface Limiting in Power SHAPE 	<ul style="list-style-type: none"> • Task 8 • Task 9 <p><u>Details may be seen at Annexure-I</u></p> <p>Monthly Test 1</p>
		Day 2	<ul style="list-style-type: none"> • Use of limiting surfaces • Use of multiple surfaces • Trim Region editing 	
	Create surfaces from wire	Day 3	<ul style="list-style-type: none"> • Knowledge of Laterals, Longitudinal and Spine (drive curve) • Three types of POWER surfaces i.e., Surfaces from wire frame, Fillet, Split and Draft 	
		Day 4	<p>Draw surfaces from wire and bead</p> <ul style="list-style-type: none"> • Draw curves and sections • Creation of wireframe 	

		Day 5	<ul style="list-style-type: none"> • Generation of wireframe section • Application of drive curve command • Creation of different sections to be drive • Use of curves • Draw surface from lateral curves • Draw surface from a network of curves • Surface from two rails 	
Week 4	Perform filleting of surfaces and split surfaces	Day 1	<p>Success stories (<i>For further detail please see Page No: 3& 4</i>)</p> <p>Students are introduced to:</p> <ul style="list-style-type: none"> • Knowledge of fillet surfaces • Perform basic filleting operation • Application of Extrusion command • Perform filleting using secondary surfaces 	<ul style="list-style-type: none"> • Task 10 • Task 11 • Task 12 • Task 13 <p><i><u>Details may be seen at Annexure-I</u></i></p>
		Day 2	<ul style="list-style-type: none"> • Knowledge of split surfaces and their definition • Using of part/model for split surface • Automatic stepped split surfaces 	
		Day 3	<ul style="list-style-type: none"> • Adding laterals • Adding longitudinal • Deleting laterals • Deleting longitudinal • Editing laterals 	
	Perform editing of surfaces			

	<p>Perform Basic Solid Modeling</p> <p>Perform different operations & Use of Die wizard</p>	<p>Day 4</p>	<ul style="list-style-type: none"> • Concept of basic solid modeling • Main solid commands known as Boolean i.e., Add, Remove and Intersect • Generate solid extrusion • Draw the draft angle • Draw Solid Cut • Create primitive solid cone • Create hollow solid • Curve projection • Create bulge on the part 	
	<p>Week 5 Introduction to CAM and Power MILL Software</p> <p>Introduction to Machining Setup</p>	<p>Day 5</p>	<ul style="list-style-type: none"> • Create solid hole • Create plain hole • Making cavity and core • Chamfer corners/edges • Simulate operation 	
		<p>Day 1</p>	<p>Motivational Lecture(For further detail please see Page No: 3& 4)</p> <p>Students are introduced to:</p> <ul style="list-style-type: none"> • Power MILL Environment • Menu Bar • Main Toolbar • Explore Graphics Window • Import Model from computer drive 	<ul style="list-style-type: none"> • Task14 • Task 15 <i><u>Details may be seen at Annexure-I</u></i>
		<p>Day 2</p>		
		<p>Day 3</p>	<ul style="list-style-type: none"> • Loading a model into Power MILL. • Viewing the model. • Gather information on the model i.e., Minimum radius / Draft angles. • Measure the model. • Material block definition. • Cutting tool definition. • Feed rate and Spindle Speed Settings. 	
		<p>Day 4</p>		

	Start Preparing your portfolio	Day 5	<ul style="list-style-type: none"> • Rapid Move Heights. • Tool Start Point. • Save the project. <ul style="list-style-type: none"> • Concept of design portfolios • Concept of present design work/projects in a professional manner 	
Week 6	Perform rough machining options	Day 1	<p>Success stories (<i>For further detail please see Page No: 3& 4</i>)</p> <p>Students are introduced to:</p>	<ul style="list-style-type: none"> • Task 16 • Task 17 <p><u>Details may be - seen at Annexure-!</u></p>
	Use finish machining options	Day 2	<ul style="list-style-type: none"> • Introduction to Components used in Rough Machining • Tool paths • Raster Area Clearance • Simulating the tool path • Offset area clearance • Profiling area clearance • Cutter direction 	
	Introduction to Freelancing	Day 3	<ul style="list-style-type: none"> • Ramping • Zag angle <ul style="list-style-type: none"> • Introduction to finish machining 	
		Day 4	<ul style="list-style-type: none"> • Raster finishing • Radial Machining • Spiral Machining • Pattern Strategies <ul style="list-style-type: none"> • Concept of freelancing • How to become freelance and create a sustainable income • pros and cons of 	

		Day 5	freelancing <ul style="list-style-type: none"> Resources available for freelancing in the field of design how to join freelancing sites the process of creating a freelancing profile 	
Week 7	Mid terms			
Week 8	Use of 3D Offset & constant Z	Day 1	Success stories (For further detail please see Page No: 3& 4) <ul style="list-style-type: none"> Introduction of 3D offset machining Constant Z machining Corner correction Pocket machining Optimized Constant Z Machining 	<ul style="list-style-type: none"> Task 18 Task 19 Task 20 <p><u>Details may be seen at Annexure-1</u></p>
		Day 2		
	Perform corner machining & Projection machining	Day 3		
		Day 4		
	Use editing tool paths & Collision Checking	Day 5		

Week 9	Use of Leads, Links & Patterns	Day 1	Success stories (For further detail please see Page No: 3& 4) Students are introduced to:	<ul style="list-style-type: none"> • Task 21 • Task 22 <u>Details may be seen at Annexure-I</u>
		Day 2	<ul style="list-style-type: none"> • Z Heights • Lead In/Lead out Moves • Vertical Arcs • Horizontal Arcs • Circular Arcs • Extended Move • Extensions • Links • Skim • Introduction to patterns • Patterns with 3D offset machining 	
		Day 3	<ul style="list-style-type: none"> • Introduction to NC Programs • Setting Preferences • Creating NC Program • Viewing & Editing NC Code • Output Area • Features • 2D Geometry • Pocket • Slot • Boss or Hole 	
		Day 4	<ul style="list-style-type: none"> • Area Clearance • Drilling 	
		Day 5		
Week 10	Employable Project/ Assignment (4 weeks) i.e., 10-13 besides regular classes OR on the job training (1 week)	Day 1	Motivational Lecture (For further detail please see Page No: 3& 4) <ul style="list-style-type: none"> • Guidelines to the Trainees for selection of student's employable project like final year project (FYP) • Assign Independent project to each Trainee • A project-based on trainee's aptitude and acquired skills. • Designed by keeping in view 	

		Day 2	<p>the emerging trends in the local market as well as across the globe.</p> <ul style="list-style-type: none"> • The project idea may be based on Entrepreneur. • Leading to successful employment. • The duration of the project will be 4 weeks • Final viva/assessment will be conducted on project assignments. 	
		Day 3	<ul style="list-style-type: none"> • At the end of the session, the project will be presented in a skills competition • The skill competition will be conducted on zonal, regional, and National levels. • The project will be presented in front of Industrialists for commercialization • The best business idea will be placed in the NAVTTC business incubation center for commercialization. 	
		Day 4		
		Day 5	<p style="text-align: center;">OR</p> <p>On the job training for 1 weeks:</p> <ul style="list-style-type: none"> • Aims to provide 1 weeks of industrial training to the Trainees as part of the overall training program • Ideal for the manufacturing trades • As an alternative to the projects that involve expensive equipment • Focuses on increasing Trainee's motivation, productivity, efficiency, and quick learning approach. 	
Week 11	How to search and apply for jobs in at	Day 1	Motivational Lecture (<i>For further detail please see Page</i>	

least two labor marketplace countries (KSA, UAE, etc.)	Day 2	No: 3& 4	<ul style="list-style-type: none"> ✓ Browse the following website and create an account on each website <ul style="list-style-type: none"> www.linkedin.com <ul style="list-style-type: none"> - primarily used for professional networking and career development, and allows job seekers to post their CVs and employers to post jobs • www.glassdoor.com <ul style="list-style-type: none"> - where current and former employees anonymously review companies. Glassdoor also allows users to anonymously submit and view salaries as well as search and apply for jobs on its platform <ul style="list-style-type: none"> pk.indeed.com <ul style="list-style-type: none"> - worldwide employment website for job listings • www.rozee.pk <ul style="list-style-type: none"> - Pakistan's leading website for employers and employees to hunt new job opportunities • Find the handy 'search' option at the top of your homepage to search for the jobs that best suit your skills. • Select the job type from the first 'Job Type' drop-down menu, next, select the location from the second drop- down menu • Enter any keywords you want to use to find suitable job vacancies. • On the results page you can search for part-time jobs only, fulltime jobs only, employers only, or agencies only. Tick the boxes as appropriate to your search. <ul style="list-style-type: none"> • Search for jobs by: <ul style="list-style-type: none"> • Company • Category • Location • All jobs 	<ul style="list-style-type: none"> • Task 23 • Task 24 <p><u>Details may be seen at Annexure-I</u></p>
	Day 3			
	Day 4			
	Day 5			

	<p>Professional practice methods & legal side of design</p>		<ul style="list-style-type: none"> • Agency • Industry • The standards that define the expectations of a professional CAD/CAM designer • The principles of integrity that demonstrate respect for the profession, for colleagues, for clients, for audiences or consumers, and society as a whole • The perspectives of the CAD/CAM profession i.e., understanding the profession, the meanings of environmental responsibility, copyright, and ethics • What legalities are involved in professional CAD/CAM projects • how to build strong professional proposals • Copyrights, copyright infringement, plagiarism, crediting creators, purchasing online products, downloading 'free' content • The dos and don'ts of how to price their time, effort, and creativity • Resume title i.e., CAD/CAM operator 1 Years' Experience • Profile Summary • Personal Information • Educational details • Experience/Portfolio • Professional Courses/Certifications/Trainings • Projects Completed • Contact details/profile links • Always keep your CV up to date 	
	<p>Prepare CV</p>			

Week 12	Freelancing	Day 1 Day 2 Day 3 Day 4 Day 5	Success stories (For further detail please see Page No: 3& 4) <ul style="list-style-type: none"> • Create profile on Fiverr • Create gigs • Create profile on Upwork • Prepare cover letter • Make proposal • Find project on Upwork and apply for it 	<ul style="list-style-type: none"> • Task 25 <i><u>Details may be seen at Annexure-I</u></i>
Week 13	Entrepreneurship and Final Assessment in project	Day 1 Day 2 Day 3 Day 4 Day 5	Success stories (For further detail please see Page No: 3& 4) <ul style="list-style-type: none"> • Job Market Searching • Self-employment • Entrepreneurship • Startup Funding • Business Value Statement • Business Model Canvas • Sales and Marketing Strategies • How to Reach Customers and Engage 	Final Assessment
Final Assessment				

Tasks For Certificate in Computer Advance CAD/CAM

Task No.	Task	Description	Week
1.	Use Curve Wizard	Draw a curve line using curve wizard	Week 1
2.	Use axis for a model	Draw a simple cube model and show its X-Axis, Y-Axis and Z-axis	
3.	Increase and decrease the model size	Draw a simple rectangle model and zoom in and zoom out the model	
4.	Draw a wire frame octagon model	<ul style="list-style-type: none"> • Open Power shape software • Select line icon and select continuous line option • Move the mouse towards the end of the last line. When the Intelligent cursor finds the end point the word End appears. • Click the Left mouse button • Move the mouse vertically upwards until you get a distance of 50 & press left mouse button. • Select the XYZ button at the bottom of screen. • The Position form appears, with the Cartesian tab selected to show Cartesian options i.e., moves in X, Y and Z. • Select the Polar tab and fill in the values of 135° and Distance 50. • Apply the form and the line is drawn and the position form remains available • Select the Cartesian tab in the form. • Enter a distance of -50 in the X • Apply the form and the line is drawn and the position form remains available • Select the Polar tab in the form • Enter an Angle of 225 and a distance of 50. • Apply the form, the line is drawn and the position form remains available. • Select Cartesian tab and enter a distance of -50 in Y. • Accept the form to enter line and remove form. • Move the cursor to the end of the first line, until the word end appears and click the left mouse button to accept that position • Exit out of line creation by selecting Select icon 	
5.	Draw a geometrical shape and perform Workplane placement	<ul style="list-style-type: none"> • Create the wire frame shape from 0 • Draw base length 100, width of 75, back height of 150, and front height of 125 • Create a work plane and position it at the rear corner point • Move the mouse to the small blue line just to the right of the X • Drag the work plane around to line up with the 0 position 	

		<ul style="list-style-type: none"> • Release the left mouse button. The X-axis is now fixed • Select one of the yellow lines as indicated and drag the work plane to the back vertical edge and snap on the line • This new work plane becomes active and is now our new datum point of 0 0 0 	
6.	Draw a gear stick made up of simple primitive surfaces using Edit toolbar	<ul style="list-style-type: none"> • Create a work plane at 0 and a box primitive of size X 70, Y 70 and Z 40. • Generate a plane primitive at 0 0 40 of size X 70 and Y 70. • Generate a cone primitive at 0 0 40 and change the base radius to be 30, the top radius to be 5 and the length to be 50. • Generate a cylinder primitive at 0 0 90 and change the length to 60 and the radius to 5. • Generate a sphere primitive at 0 0 160 and change the radius to 15. 	Week 2
7.	Apply Fill-in Surface option	<ul style="list-style-type: none"> • From the Surface menu select the automatic surfaces icon • The automatic surface form pops up and shows what the finished surface will look. • Select fill-in option like • Apply then OK the form to generate the surface • Now generate a composite curve around the base of the neck form. • Select the new curve in addition to the original composite curve defining the top of the bottle sidewalls. • Blank all other entities except the above 2 composite curves. • Make a Fill-in surface from Automatic Surfaces icon using the 2 selected composite curves. 	
8.	Perform multiple surfaces limitation by a single surface.	<ul style="list-style-type: none"> • Create a surface plane at the workplane of size X 75 and Y 50. • Create a cylinder at 25 15 -10 with a radius of 5 and a length of 20. • Create a cone at -25 -15 -10 with a base radius of 5, top radius of 2.5 and a length of 20. • Select the plane and pick the Limit icon. • Pick the cylinder and cone only using the cursor to make a box. • Exit out of trimming. • Select only the cone • Convert the Cone and then double click it. 	Week 3
9.	Generate surface from a network of curves	<ul style="list-style-type: none"> • Generate a primitive cylinder of radius 7.5 at 0 0 20 with a length of 10. • Select the point creation icon from work plane pull down menu • Enter 5 points. 12 0 12 -12 0 12 0 15 15 0 -15 15 8 0 18 	

		<ul style="list-style-type: none"> • Select the curve icon and create a Bezier curve by selecting all four points and double click the first point again to close the curve. • Create a new curve from the point at position 12 0 12 to the extra point to the key point on the cylinder. • Create 3 lines from each of the 3 points to the complimentary point on the cylinder to build up a network for the surface. • Create a composite curve around the bottom curve of the cylinder and then blank the cylinder. • Select all of this (including the points) and generate a surface from a network of curves. • A defined surface is generated. 	
10.	Perform filleting operation	<ul style="list-style-type: none"> • Create a Plane Primitive of length 100 and width 100 at 0 0 0. • Create a Cone Primitive of base radius 30, top radius 15 and length 50 at 0 0 0. • Right click over the cone and select Convert Surface. • Select the Shaded icon. • Select both surfaces by dragging a window around them. • Revert to a normal view by selecting the Wireframe View icon. • Select the Filleting option from the Surfaces submenu. • Select Preview on the Fillet Surface form. • Select the route. • Select OK on the form. • The Fillet Route form appears. • Select Apply. • Select OK off the form 	Week 4
11.	Perform editing surface	<ul style="list-style-type: none"> • Create a cylinder of radius 10 and length 100 up the Z-axis. • Convert the surface and move point 3 on lateral 2 by -20 in the X direction • Move point 1 by 5 in the X and 10 in the Z. • Add in a new lateral halfway from lateral 1 to lateral 2. In parameter terms this is described as 1.5. • Select the Add Curve icon • Select Lateral, enter the Parameter Value of 1.5 in the form. • Apply and the Dismiss the form. • Select the bottom lateral (lateral 1). Open the edit toolbar. • Even though a lateral is selected all of the edit operations work on the complete surface. To work on the selected curve, press in the object icon and note the change in the toolbar. • Select (Switch on) the object icon. • Select offset and enter a value of 5. 	

		<ul style="list-style-type: none"> The bottom lateral is now offset by 5 mm all around. 	
12.	Make a die sample	<ul style="list-style-type: none"> Open a new model. Create a work plane at 0 and set the principal plane to Z. Select the Solid icon from the top toolbar. Select the Create Solid Block icon. Position the block by typing 0 0 -40. Press ESC on the keyboard to break out of the command. Double click on the solid block in the graphics area which brings up the form below Set the length as 100, width as 150 and height as 40 and press OK. The first solid automatically becomes Active and is shown in Red. Set the principal plane to X Select the solid icon and then the solid cylinder primitive icon. Position the cylinder with the co-ordinates: -55 0 0 Enter a radius of 2 and a length of 20. Create a solid cone with the co-ordinates: -35 0 0. Enter a base radius of 2, a top radius of 1 and a length of 30. Select the solid cylinder and right click over it to bring up the sub-menu and select Active. Select the other solid cone. Select the Add the Selected Solid to the Active Solid icon. The surfaces have become one single solid. If the surfaces do not match a watertight wizard will appear to fix any gaps. A copy of this solid should be made for later use Blank all of the solids 	Week 4
13.	Draw an object and make holes and shelling the part	<ul style="list-style-type: none"> Create a work plane at 0 and rename it Datum. Generate a rectangle equally around the work plane of size X 250, Y 300 and turn this into a composite curve. Generate a solid extrusion up the Z-axis using the Solid extrusion icon. Change the extrusion length to 130 and Draft Angle to 340 and OK. Generate a rectangle equally around the work plane of size X 120 Y 160 at Z 130 and turn this into a composite curve. Fillet the composite curve with a Radius of 10. 	

		<ul style="list-style-type: none"> • Select the Solid Cut icon • Select Blind • Select Depth 1 & press Ok • Select the fillet icon to bring up its form • Enter a radius of 10 • Select the 4 steep edges and Apply • Select the top edge. Apply and dismiss. • Create a primitive solid cone at 80 –135 5 • Fill in the values (Top Radius: 10, Base Radius: 6, Length: 90) • Create a 2mm fillet around the base of cone. • Mirror this cone around the YZ, XZ and YZ to produce a total of 4 cones • Select the 4 cones and Remove selected Solid from Active • Create a 1 radius fillet around the top edge of each cone • Select the Hollow Solid icon • Select the bottom face of the model. The red cross will then change to a green tick • Enter a Thickness of 3 & press OK 	
14.	Import any model (.dgn file) from example folder and resize to fit it	<ul style="list-style-type: none"> • Select File -> Import Model from CAD/CAM Examples • Select the phone. dgn (or any other file) model and then click on Open • Select the Resize to fit icon in the Viewing toolbar to show the whole model 	Week 5
15.	Load a model into Power MILL, perform different operations and save to another drive	<ul style="list-style-type: none"> • Select File -> import cad cam training models • Click on the file name speaker_core.dgn (or any other file) and then Open • Select the Resize to fit icon from the View toolbar on the right • Select an Isometric 1 View. • Change the dimensions of the model • Right click over Work planes in the Power MILL Explorer and select Create Work plane • Click on the Plus (+) sign next to Work planes in the explorer. • Right click over the new Work plane in the explorer and select Activate. 	

		<ul style="list-style-type: none"> • Right click over the work plane in the explorer and select Rename. • Click Models in the explorer • Right click over the model • Select Edit > Rotate > Z. • Type in -90 and select the green tick on the form • Select a View in Z to see the model has been rotated. • Select File -> Save Project as • Save the file with the name "Trainee" 	
16.	Perform offset area clearance	<ul style="list-style-type: none"> • Open the model WingMirrorDie.dgk located in CAD/CAM models. • Create a Tip Radiused tool of 40 diameters with a 6 tiprad and Name it d40t6. • From the Main toolbar open the Block form and calculate a material Block to the full model dimensions. • Reset the Rapid Move Heights and set the Incremental moves to Skim. • Set the Start Point form to Automatic and Block Centre Safe. • From the Main toolbar select the Toolpath Strategies icon • Select the option Offset Area Clear Model to open the popup form • Enter the name D40T6_D1 • Select type Ramping • Thickness: 0.5 • Stepper: 25.0 • Stepperdown -> Automatic: 10.0 • Type: All • Select Ramping Options • Entering; Zig Angle 4, • Follow Circle, and Circle diameter 0.6 • Input or modify the data as shown in the sections arrowed above and click Apply to create the Offset Area Clear toolpath • Select the View Mill icon located towards the right in the Main Toolbar at the top of screen. • Select ISO 2 view of the model and scale it to be as large as possible. • Select the View Mill toggle icon. • Run a View Mill simulation of the tool path. • The finished result indicates that the current tool geometry is not suitable to fully, access some features (arrowed) on the model. • As a result, a further Area Clearance strategy is required. 	Week 6
17.	Perform raster finishing	<ul style="list-style-type: none"> • Delete All and Reset forms and from File > Examples select the model chamber. Dgk. 	

		<ul style="list-style-type: none"> • Calculate the Block and define a 12-diameter ball nose tool named bn12. • Select the Rapid move heights icon from the top toolbar and in the form click Reset to safe heights then Accept. • Select the Start Point icon from the top toolbar then Accept. • Note that it is in Block Centre Safe Z is active. • Select the Tool path Strategies icon from the top toolbar. • Select the Raster Finishing icon then OK. • Name the toolpath Raster_basic. • Enter Tolerance as 0.02 and Thickness as 0. • Select a tool Stepover of 1mm. • Apply and Cancel the Form. • Select the Arc Fit option in the form. • Right click over toolpath Raster_basic in the explorer & select Settings from available menu • Select the copy toolpath icon from the form. • Rename the toolpath Raster_arc fit. • Check the box Arc Fit and change the Arc Radius to 0.1. • Zoom into the same area as previous to see the changes. • Select Leads and Links icon from top toolbar. • Select the Links tab on the form. • Change the Short links to Circular Arc • Change the Long and Safe links to Skim. • Apply Links and Accept the form. • Right click over the toolpath icon in the explorer area, move down • Animate and select the speed • Position the cursor where required and right click on top of the toolpath. • Select Attach Active Tool. • Use the Left and Right arrow keys to move the tool forwards and backwards <ul style="list-style-type: none"> • • Experiment with some of the animation options seen on the Animation toolbar. 	
Midterms			Week 7
18.	Optimized Constant Z Exercise	<ul style="list-style-type: none"> • Generate a new toolpath using the Copy method • Perform Closed Offsets – off • Use Spiral. • Animate to show the difference. 	Week 8
19.	Perform pencil finishing	<ul style="list-style-type: none"> • From File > Examples open the model cowling. Dgk • Calculate the Block. • Create a Ball nosed dia 10 tool and name it as bn10. • Select an Iso2 view. • Keep the threshold angle of 30 degrees. • Selecting both will produce the steep and shallow toolpath. • Apply the toolpath and cancel. 	

		<ul style="list-style-type: none"> • Animate the toolpath. Rename the toolpath as pencil_both. • Right click over the toolpath in the explorer and select Settings. • Select the copy toolpath icon from the form • Change the Output option from Both to Shallow. • Select Apply to generate the Shallow slope machining only. • Animate the toolpath. Rename the toolpath as pencil shallow. • Right click over the toolpath in the explorer and select Settings. • Select the copy toolpath icon from the form. • Change the Output option from Both too Steep. • Generate a steep pencil machining toolpath. • Animate the toolpath. Rename the toolpath as pencil steep • Save the project in computer drive as train corner. 	
20.	Perform Limiting to Planes and Polygons Example	<ul style="list-style-type: none"> • Open the Example model speaker. Dgk. • Calculate a Block with an expansion in X and Y of 20 only, (lock Z Min and Max). • Define a 10mm diameter End Mill tool called em10. • Select the model side surface • Select the Toolpaths Strategy icon at the top of the screen and from the Finishing tab select a Profile Finishing Strategy. • Set the values exactly in the form (Tolerance: Week 18 25 Advanced CAD CAM 0.02, Thickness: 0.0, Radial Offset: 0.0, Boundary: 1, Gouge Check: tick, Multiple Cuts: Mode OFF, Tool Axis: Vertical). • Apply and close the form. 	
21.	Patterns with 3D Offset machining	<ul style="list-style-type: none"> • Use PS-Sketcher to create 2 new 6 diameter holes 30mm each side of the 40-diameter hole. • • Drill the two new holes 	Week 9
22.	Drilling of holes	<ul style="list-style-type: none"> • Use PS-Sketcher to create 2 new 6 diameter holes 30mm each side of the 40-diameter hole. • Drill the two new holes 	
23.	Build your CV	<ul style="list-style-type: none"> • Download professional CV template from any good site (www.coolfreecv.com or www.elevant.com or https://free-cv-templates.com) or build your resume online at www.europa.eu or at www.zety.com or www.cvmkr.com Include following details in the resume: <ul style="list-style-type: none"> • Resume title i.e., CAD/CAM operator 1 Years' Experience • Profile Summary • Personal Information • Educational details • Experience/Portfolio • Professional Courses/Certifications/Trainings • Projects Completed • Contact details/profile links • Always keep your CV up to date 	Week11

<p>24.</p>	<p>How to search and apply for jobs in at least two labor marketplace countries (KSA, UAE, etc.)</p>	<ul style="list-style-type: none"> • Browse the following website and create an account on each website <ul style="list-style-type: none"> ▪ Bayt.com – The Middle East Leading Job Site ▪ Monster Gulf – The International Job Portal ▪ Gulf Talent – Jobs in Dubai and the Middle East • Find the handy ‘search’ option at the top of your homepage to search for the jobs that best suit your skills. • Select the job type from the first ‘Job Type’ drop-down menu, next, select the location from the second drop-down menu. • Enter any keywords you want to use to find suitable job vacancies. • On the results page you can search for part-time jobs only, full-time jobs only, employers only, or agencies only. Tick the boxes as appropriate to your search. • Search for jobs by: <ul style="list-style-type: none"> ▪ Company ▪ Category ▪ Location ▪ All jobs ▪ Agency 	
<p>25.</p>	<p>Create an account profile on Fiverr (at least two gigs) and Up-work</p>	<p>Create an account by following these steps:</p> <p>Step 1: Personal Info Step 2: Professional Info Step 3: Linked Accounts Step 4: Account Security</p>	<p>Week 12</p>

**Motivational Lectures
Advance CAD/CAM**

What is freelancing and how you can make money online - BBCURDU

<https://www.youtube.com/watch?v=9jCJN3Ff0kA>

What Is the Role of Good Manners in the Workplace? By Qasim Ali Shah | In Urdu

<https://www.youtube.com/watch?v=Qi6Xn7yKIIQ>

Hisham Sarwar Motivational Story | Pakistani Freelancer

https://www.youtube.com/watch?v=CHm_BH7xAXk

21 Yr Old Pakistani Fiverr Millionaire | 25-35 Lakhs a Month Income | Interview

<https://www.youtube.com/watch?v=9WrmYYhr7S0>

**Success Story of a 23 Year - Old SEO Expert | How This Business Works | Urdu Hindi
Punjabi**

<https://www.youtube.com/watch?v=tIQ0CWqszl0>

**Failure to Millionaire - How to Make Money Online | Fiverr Superhero Aaliyaan Success
Story**

<https://www.youtube.com/watch?v=d1hocXWSpus>

Annexure-II

SUGGESTIVE FORMAT AND SEQUENCE ORDER OF MOTIVATIONAL LECTURE.

Mentor

Mentors are provided an observation checklist form to evaluate and share their observational feedback on how students within each team engage and collaborate in a learning environment. The checklist is provided at two different points: Once towards the end of the course. The checklists are an opportunity for mentors to share their unique perspective on group dynamics based on various team activities, gameplay sessions, pitch preparation, and other sessions, giving insights on the nature of communication and teamwork taking place and how both learning outcomes and the student experience can be improved in the future.

Session- 1 (Communication):

Please find below an overview of the activities taking place Session plan that will support your delivery and an overview of this session's activity.

Session- 1 OVERVIEW
Aims and Objectives:
<ul style="list-style-type: none"> • To introduce the communication skills and how it will work • Get to know mentor and team - build rapport and develop a strong sense of a team • Provide an introduction to communication skills • Team to collaborate on an activity sheet developing their communication, teamwork, and problem-solving • Gain an understanding of participants' own communication skills rating at the start of the program

Activity:	Participant Time	Teacher Time	Mentor Time
Intro Attend and contribute to the scheduled.			
Understand good communication skills and how it works.			
Understand what good communication skills mean			
Understand what skills are important for good communication skills			
Key learning outcomes:	Resources:		Enterprise skills developed:

<ul style="list-style-type: none"> • Understand the communication skills and how it works. • Understand what communication skills mean • Understand what skills are important for communication skills 	<ul style="list-style-type: none"> • Podium • Projector • Computer • Flip Chart • Marker 	<ul style="list-style-type: none"> • Communication • Self Confidence • Teamwork
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Schedule	Mentor Should do
Welcome: 5 min	Short welcome and ask the Mentor to introduce him/herself. Provide a brief welcome to the qualification for the class. Note for Instructor: Throughout this session, please monitor the session to ensure nothing inappropriate is being happened.
Icebreaker: 10 min	Start your session by delivering an icebreaker, this will enable you and your team to start to build rapport and create a team presentation for the tasks ahead. The icebreaker below should work well at introductions and encouraging communication, but feel free to use others if you think they are more appropriate. It is important to encourage young people to get to know each other and build strong team links during the first hour; this will help to increase their motivation and communication throughout the sessions.
Introduction & Onboarding: 20mins	Provide a brief introduction of the qualification to the class and play the “Onboarding Video or Presentation”. In your introduction cover the following: <ol style="list-style-type: none"> 1. Explanation of the program and structure. (Kamyab jawan Program) 2. How you will use your communication skills in your professional life. 3. Key contacts and key information – e.g. role of teacher, mentor, and SEED. Policies and procedures (user agreements and “contact us” section). Everyone to go to the Group Rules tab at the top of their screen, read out the rules, and ask everyone to verbally agree. Ensure that the consequences are clear for using the platform outside of hours. (9am-8pm) 4. What is up next for the next 2 weeks ahead so young people know what to expect (see pages 5-7 for an overview of the challenge). Allow young people to ask any questions about the session topic.
Team Activity Planning: 30 minutes	MENTOR: Explain to the whole team that you will now be planning how to collaborate for the first and second collaborative Team Activities that will take place outside

	<p>of the session. There will not be another session until the next session so this step is required because communicating and making decisions outside of a session requires a different strategy that must be agreed upon so that everyone knows what they are doing for this activity and how.</p> <ul style="list-style-type: none"> • “IDENTIFY ENTREPRENEURS” TEAM ACTIVITY • “BRAINSTORMING SOCIAL PROBLEMS” TEAM ACTIVITY” <p><i>As a team, collaborate on a creative brainstorm on social problems in your community. Vote on the areas you feel most passionate about as a team, then write down what change you would like to see happen.</i></p> <p>Make sure the teams have the opportunity to talk about how they want to work as a team through the activities e.g. when they want to complete the activities, how to communicate, the role of the project manager, etc. Make sure you allocate each young person a specific week that they are the project manager for the weekly activities and make a note of this.</p> <p>Type up notes for their strategy if this is helpful - it can be included underneath the Team Contract.</p>
<p>Session Close: 5 minutes</p>	<p>MENTOR: Close the session with the opportunity for anyone to ask any remaining questions.</p> <p>Instructor: Facilitate the wrap-up of the session. A quick reminder of what is coming up next and when the next session will be.</p>

MOTIVATIONAL LECTURES LINKS.

TOPIC	SPEAKER	LINK
How to Face Problems In Life	Qasim Ali Shah	https://www.youtube.com/watch?v=OrQte08MI90
Just Control Your Emotions	Qasim Ali Shah	https://www.youtube.com/watch?v=JzFs_yJt-w
How to Communicate Effectively	Qasim Ali Shah	https://www.youtube.com/watch?v=PhHAQEGehKc
Your ATTITUDE is Everything	Tony Robbins Les Brown David Goggins Jocko Willink Wayne Dyer Eckart Tolle	https://www.youtube.com/watch?v=5fS3rj6eIFg
Control Your EMOTIONS	Jim Rohn Les Brown TD Jakes Tony Robbins	https://www.youtube.com/watch?v=chn86sH0O5U
Defeat Fear, Build Confidence	Shaykh Atif Ahmed	https://www.youtube.com/watch?v=s10dzfbozd4
Wisdom of the Eagle	Learn Kurooji	https://www.youtube.com/watch?v=bEU7V5rJTtw
The Power of ATTITUDE	Titan Man	https://www.youtube.com/watch?v=r8LJ5X2ejqU
STOP WASTING TIME	Arnold Schwarzenegger	https://www.youtube.com/watch?v=kzSBrJmXqdq
Risk of Success	Denzel Washington	https://www.youtube.com/watch?v=tbnzAVRZ9Xc

SUCCESS STORY

S. No	Key Information	Detail/Description
1.	Self & Family background	<p>Abdullah Zafar, a resident of an underprivileged area of Khyber Pakhtunkhwa, is an ideal example to be followed by many people. He belongs to a middle-class family and hardly managed to bear his school and college expenses. In 2014, Abdullah successfully completed his college and decided to enroll in a skilled based professional course "CAD/CAM". He did hard work and managed to learn the software. Later on, in 2018, he started his journey as freelancer and started earning through online working. His client mostly belongs to USA and Canada. They were satisfied with his quality of work and commitments. Now Abdullah is earning Rs. 1 million in a year.</p> <p>If at first, you don't succeed, try again</p>
2.	How he came on board NAVTTC Training/ or got trained through any other source	<p>Certification in CAD/CAM from PITAC HQ Lahore (NAVTTC partner institute)</p>
3.	Post-training activities	<p>Abdullah's area of expertise is in Computer Aided Designing & Computer Aided Manufacturing. In start of his career as freelancer, he successfully managed to create profile on Fiverr and Upwork. He applied mostly for projects focused on Computer Aided Designing. In start it wasn't so easy for him to grab clients. In the first few weeks, he didn't hear back from even a single client, despite bidding for dozens of projects. "I needed to understand what worked, so I read blogs, participated in forums, and analyzed profiles of successful freelancers. It was an uphill struggle, but I didn't want to give up," he explains. Abdullah says he understands why clients would be apprehensive giving projects to untested freelancers. They have hundreds of options to choose from, he explains, and to give a project to someone with no experience requires a strong leap of faith. A slow stream of projects started to come Abdullah's way. He soon realized that increased use of precise, versatile and easy-to-machine CAD designs has fundamentally revolutionized the areas of engineering, architecture and the manufacturing industry. But he's had to face his fair share of challenges too. The shoddy state of internet infrastructure in his city, Karak, threatened to derail his freelancing career. "Sometimes I haven't had connectivity for two days straight," he explains. "That's unthinkable for someone who makes his livelihood on the internet."</p>

4.	Message to others (Under training)	Take the training opportunity seriously Impose self-discipline and ensure regularity Make Hard work pays in the end so be always ready for the same.
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Note: Success story is a source of motivation for the trainees and can be presented in several ways/forms in a NAVTTC skill development course as under: -

1. To call a passed out successful trainee of the institute. He will narrate his success story to the trainees in his own words and meet trainees as well.
2. To see and listen to a recorded video/clip (5 to 7 minutes) showing a successful trainee Audio-video recording that has to cover the above-mentioned points. *
3. The teacher displays the picture of a successful trainee (name, trade, institute, organization, job, earning, etc) and narrates his/her story in the teacher's own motivational words.

* *The online success stories of renowned professional can also be obtained from **Annex-II***

Workplace/Institute Ethics Guide

Work ethic is a standard of conduct and values for job performance. The modern definition of what constitutes good work ethics often varies. Different businesses have different expectations. Work ethic is a belief that hard work and diligence have a moral benefit and an inherent ability, virtue, or value to strengthen character and individual abilities. It is a set of values-centered on the importance of work and manifested by determination or desire to work hard.

The following ten work ethics are defined as essential for student success:

1. Attendance:

Be at work every day possible, plan your absences don't abuse leave time. Be punctual every day.

2. Character:

Honesty is the single most important factor having a direct bearing on the final success of an individual, corporation, or product. Complete assigned tasks correctly and promptly. Look to improve your skills.

3. Team Work:

The ability to get along with others including those you don't necessarily like. The ability to carry your weight and help others who are struggling. Recognize when to speak up with an idea and when to compromise by blend ideas together.

4. Appearance:

Dress for success set your best foot forward, personal hygiene, good manner, remember that the first impression of who you are can last a lifetime

5. Attitude:

Listen to suggestions and be positive, accept responsibility. If you make a mistake, admit it. Values workplace safety rules and precautions for personal and co-worker safety. Avoids unnecessary risks. Willing to learn new processes, systems, and procedures in light of changing responsibilities.

6. Productivity:

Do the work correctly, quality and timelines are prized. Get along with fellows, cooperation is the key to productivity. Help out whenever asked, do extra without being asked. Take pride in your work, do things the best you know-how. Eagerly focuses energy on accomplishing tasks, also referred to as demonstrating ownership. Takes pride in work.

7. Organizational Skills:

Make an effort to improve, learn ways to better yourself. Time management; utilize time and resources to get the most out of both. Take an appropriate approach to social interactions at work. Maintains focus on work responsibilities.

8. Communication:

Written communication, being able to correctly write reports and memos.
Verbal communications, being able to communicate one on one or to a group.

9. Cooperation:

Follow institute rules and regulations, learn and follow expectations. Get along with fellows, cooperation is the key to productivity. Able to welcome and adapt to changing work situations and the application of new or different skills.

10. Respect:

Work hard, work to the best of your ability. Carry out orders, do what's asked the first time. Show respect, accept, and acknowledge an individual's talents and knowledge. Respects diversity in the workplace, including showing due respect for different perspectives, opinions, and suggestions.