

Government of Pakistan

National Vocational and Technical Training Commission

Prime Minister's Hunarmand Pakistan Program

"Skill for All"



Course Contents / Lesson Plan

Course Title: Advanced Civil Survey

Duration: 6 Months

Course Details / Description & Preliminaries

Course Title	Advanced Civil Survey
Objectives and Expectations	<p><u>Employable skills for DAE (Civil) through an intensive course on Advanced Civil Survey Techniques</u></p> <p>This is a special course designed to address unemployment in the youth. The course aims to achieve the above objective through hands on practical training delivery by a team of dedicated professionals having rich market/work experience. This course is therefore not just for developing a theoretical understanding/back ground of the trainees. Contrary to that it is primarily aimed at equipping the trainees to perform commercially in a market space in independent capacity or as a member of a team.</p> <p>The course therefore is designed to impart not only technical skills but also soft skills (i.e. interpersonal/communication skills; personal grooming of the trainees etc) as well as entrepreneurial skills (i.e marketing skills; free lancing etc). The course also seeks to inculcate work ethics to foster better citizenship in general and improve the image of Pakistani work force in particular.</p> <p><u>Main Expectations:</u></p> <p>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.</p> <p>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</p>

Key Features of Training & Special Modules

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 individual 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. In order to materialize the main expectations, a special module on **Job Search & Entrepreneurial Skills** has been included in the later part of this course (5th & 6th 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 labour destination countries also forms 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 at

**Training Tools/
Methodology**

work place 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 Pakistani workforce would undergo a positive transformation in the local as well as international job markets.

In order 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 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 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.

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 longer time without boredom and loss of interest because they can clearly 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.

(ii) Success Stories

Another effective way of motivating the trainees is by means of 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 by means of 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. 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.

Suggestive structure and sequence of a sample success story and its various shapes can be seen at 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 class room 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 to be presented to the trainees.

The trainer may adopt a power point presentation or video format for

	<p>such case studies whichever is deemed suitable but it's important that only those cases are selected that are relevant and of a learning value. The Trainees should be required and supervised to carefully analyze the cases.</p> <p>For the purpose they must be encouraged to inquire and collect specific information / data, actively participate in the discussions and intended solutions of the problem / situation.</p> <p>Case studies can be implemented in the following ways: -</p> <ol style="list-style-type: none"> i. A good quality trade specific documentary (At least 2-3 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)
<p>Learning Outcome of the Course</p>	<p>After completion of this course, the trainees must be able to:</p> <ul style="list-style-type: none"> • Determine the relative position of any objects or points on the earth. • Determine the distance and angle between different objects. • Prepare a map or plan to represent an area on a horizontal plan. • Determine the required areas and volumes of land and materials needed during construction. • Ensure that the construction takes place in the correct relative and absolute position on the ground. • Record the final position of the construction, including any design changes. • Provide permanent control points from which particularly important projects can be surveyed - such as regular monitoring of a construction to check for movement.

	<ul style="list-style-type: none"> • Develop methods using the knowledge of modern science & technology and using them in the field. • Solve measurement problems in an optimal way
Entry level of trainees	DAE (Civil)
Course Execution Plan	Total Duration of Course: 6 Months (26 Weeks)
	Class Hours: 4 Hours per day (06 Days/Week)
	Theory: 20% Practical: 80%
	Weekly Hours: 24 Hours Per week
	Total Contact Hours: 600 Hours
Companies Offering Jobs in the respective trade	<p>Besides overseas employment, the following Pakistani companies/firms/Organizations are also offering jobs as well, with details as under:-</p> <ul style="list-style-type: none"> • Frontier Work Organization (FWO) • Pakistan Real Estate Investment & Management Company (PRIMACO), Islamabad. • Decision HR Recruitment, Rawalpindi. • Appraisals, Islamabad. • Marwareed Enterprises, Rawalpindi. • Aitmaad Group of Industry, Peshawar. • Construction Company, Peshawar. • MH Engineering Services, Lahore. • Euro Power Services, Lahore. • Sketch & Design Arch Studio, Lahore. • The Urban Unit, Lahore. • Real Estate Company, Multan.

	<ul style="list-style-type: none"> • Fayakoon Engineering Pvt Ltd. Rahim Yar Khan. • TPL Properties Ltd. Karachi. • Cooperative Housing Society, Karachi • TSA North, Karachi. • Bmr Arab Tech International, Hafizabadetc.
Job Opportunities	<ul style="list-style-type: none"> • Supervisor & Property Surveyor • Civil Surveyor • Chief Surveyor / Site Engineer • Surveyor • Quantity Surveyor • Assistant Surveyor • Supervisor • Quality Surveyor • Land Surveyor • General Surveyor • Field Surveyor • Chief Surveyor • City Surveyor • Supervisor & Property Surveyor
No of Students	25
Learning Place	Classroom / Lab / Site

WEEKLY SCHEDULE OF TRAINING

Scheduled Week	Module Title	Learning Units	Remarks
Week 1 to 3	Introduction, Levelling	<ul style="list-style-type: none"> • Course Introduction • Motivational Lecture(<i>For further detail please see Page No: 4</i>) • Application of the course • Job market overview • Institute/Work ethics (<i>For further detail please see Annexure-II at the end</i>) • Health & Safety • Introduction to Leveling • Definition of terms: Datum, Datum Line, Reduced Level, Line of collimation, Horizontal Plane, Vertical Plane, Station Point, Axis of Telescope, Axis of Bubble Table, Back Sight, Front Sight, Intermediate Sight, Change Point, Height of Instrument, Station. • Bench Mark & Types • Types of Leveling Instrument & Parts • Types of Leveling Staves and description • Finding Reduced Level • Booking→ Height of Instrument and Rise & Fall Method, Finding missing Reading in Level Book Page. • Success story (<i>For further detail please see Page No: 5 and Annexure-III at the end</i>) 	<ul style="list-style-type: none"> • Task – 1 <u><i>Details may be seen at Annexure-I</i></u>
Week 3 to 6	Classification of Leveling, Curves & its Types, Calculations	<ul style="list-style-type: none"> • Feedback of the previous Task • Motivational Lecture (<i>For further detail please see Page No: 4</i>) • Classification of Levelling and detailed description, Profile Levelling, Plotting, 	<ul style="list-style-type: none"> • Task – 2 <u><i>Details may be seen at Annexure-I</i></u>

		<p>Calculation of Cut & Fill</p> <ul style="list-style-type: none"> • Definition, Types and necessity of Curves • Designation of Curves • Elements & Notation of Curves and their Relationship • Calculation of Data & Methods of Setting out Simple Curves • Description, Types and necessity of Transition Curves • Characteristics, Elements and Notation of Transition Curves and their interrelationship • Success story (<i>For further detail please see Page No: 5 and Annexure-III at the end</i>) • Introduction to Super Elevation and methods of calculating length of Transition curves with numerical problems. • Calculation of Data and method of setting out of Transition Curves. • Introduction to Vertical Curves, elements, terms and their interrelationship • Calculation of Data and setting out Vertical Curves • Case Study-1 (Health & Safety) (<i>For further detail please see Page No: 6</i>) 	<p><u>Monthly test at the end of 4th week.</u></p>
<p>Week 7 to 9</p>	<p>Triangulation and principle of Triangulation</p>	<ul style="list-style-type: none"> • Feedback of previous Task • Motivational Lecture (<i>For further detail please see Page No: 4</i>) • Triangulation and principle of Triangulation • Methods to solve Triangles • Types of Triangulations • Selection of Station Point 	<p>• Task – 3 <u>Details may be seen at Annexure-I</u></p>

		<ul style="list-style-type: none"> • Measurement of Base Line, Correction of Base Line measurement • Success story (<i>For further detail please see Page No: 5 and Annexure-III at the end</i>) 	<u>Monthly test at the end of 8th week.</u>
Week 10 to 11	Theodolite, Traverse and its types and methods of Traversing, Calculations	<ul style="list-style-type: none"> • Feedback of the previous Task <ul style="list-style-type: none"> • Motivational Lecture (<i>For further detail please see Page No: 4</i>) • Theodolite, Parts and Types • Technical terms: Centering, Transiting, Face left, Face right, Swinging the Telescope, Bubble axis, Horizontal axis, Vertical axis, Telescope normal, Telescope inverted, Axis of Telescope, Line of Collimation • Function of Theodolite: Measurement angle, Prolonging a line, Lining in, Measuring heights, and distances by Stadia formula • Introduction of Traverse and its types and methods of Traversing • Calculation of angles from given bearings and vice versa • Computation of Co-ordinates • Computation of missing data associated with Theodolite Traversing • Case Study-2 (Health & Safety) (<i>For further detail please see Page No: 6</i>) 	• Task – 4 <i><u>Details may be seen at Annexure-I</u></i>
Week 12 to 14	Tunnels	<ul style="list-style-type: none"> • Feedback of the previous Task <ul style="list-style-type: none"> • Motivational Lecture (<i>For further detail please see Page No: 4</i>) • Introduction, Definition and Purposes of Tunnels • Alignment of Tunnel: Surface Survey or Staking out the Alignment of the Tunnel 	• Task – 5 <i><u>Details may be seen at Annexure-I</u></i>

<p>Week 18</p>		<p>(Knowledge of downloading software)</p> <ul style="list-style-type: none"> • Putting data in respective software and its mapping <p>Case Study-3 (<i>For further detail please see Page No: 6</i>)</p> <ul style="list-style-type: none"> • Session on CV Building. • How to make notable CV. • Dos and Don'ts of CV making. 	
<p>Week 19 to 21</p> <p>Week 20</p>	<p>GPS</p> <p>Business Development & entrepreneurship</p>	<ul style="list-style-type: none"> • Feedback of the previous Task • Motivational Lecture (<i>For further detail please see Page No: 4</i>) • Session on Self-Employment • How to start a Business. • Requirements (Capital, Physical etc) • Benefits/Advantages of self-employment • Introduction to GPS, types of GPS, parts of GPS • Functions and modes of GPS • Setting Parameters • Preparation for observations • Success story (<i>For further detail please see Page No: 5 and Annexure-III at the end</i>) 	<p>• Task – 7 <i>Annexed on page-15</i></p> <p><u>4th monthly test/ Assessment</u></p>
<p>Week 22 to 23</p>	<p>Bridges & Culverts</p>	<ul style="list-style-type: none"> • Feedback of the previous Task <ul style="list-style-type: none"> • Motivational Lecture (<i>For further detail please see Page No: 4</i>) • Definition and importance of Bridges and Culverts • Introduction, types of bridges & culverts • Setting out: <ol style="list-style-type: none"> a) alignment method (chain age & offset) b) Co-ordinate system 	<p>• Task – 8 <i>Annexed on page-15</i></p>

<p>Week 23</p>	<p>General Oversees Employment</p>	<ul style="list-style-type: none"> • Determination of length of centerline • Determination of location of piers • Case Study-4 (<i>For further detail please see Page No: 6</i>) <ul style="list-style-type: none"> • Session on General Overseas Employment opportunities. • Job search Avenues. • Visa Processes and other necessary requirements. • Immigration Information (Legal age requirements, Health Certificate, Police Clearance & Travel Insurance) 	
<p>Week 24 to 26</p> <p>Week 24 and 25</p>	<p>Application of Auto CAD in Surveying</p> <p>Oversees Employment</p>	<ul style="list-style-type: none"> • Feedback of the previous Task <ul style="list-style-type: none"> • Motivational Lecture (<i>For further detail please see Page No: 4</i>) • Introduction to Auto CAD and its uses • Application of Auto CAD software in Surveying <ul style="list-style-type: none"> • Selection of two countries of destination (Gulf Countries, Malaysia, South Korea etc) focusing on:- <ol style="list-style-type: none"> I. Trade specific Job Prospects and Earning levels in that country. II. Country Specific Labor laws, entry and exit requirements (Legal age requirements, Health Certificate, Police Clearance & Travel Insurance etc.). • Survey figures, importing a field book • Points overview, importing & exporting points • Success story (<i>For further detail please see Page No: 5 and Annexure-III at the end</i>) • Traverse basics, contours, point groups, break lines and boundaries, Surface process and surface editing • Line edits, Point edits, Copy surface, Paste surveys, Surface Labels, Volume 	<p>•Task – 9 <i><u>Annexed on page-15</u></i></p>

		calculations <ul style="list-style-type: none"> • 3D Co-ordinates system • Entering Co-ordinates in Auto CAD 	
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Annexure-I

TASKS FOR ADVANCE CIVIL SURVEY

S. No.	Tasks
1	Perform the fly leveling at the site and calculate the reduce levels of 30 primary and secondary stations using the following methods: <ul style="list-style-type: none"> • Height of collimation method • Rise and fall method
2	Align 15 km road with minimum of six horizontal curves at site and obtain the following results: <ul style="list-style-type: none"> • Plan of road • Profile leveling graphs • Cross sectioning graphs • Transition and Simple curve • Super elevation • Calculation of Cut and Fill along the road section
3	Determine the area of the site through triangulation (with minimum of 30 stations) by using both total station and theodolite and perform following adjustments: <ul style="list-style-type: none"> • Angle • Triangle • Diagonal
4	Establish the 50 control points at the site using traversing and determine the northing and easting along with necessary corrections?
5	Perform the underground survey (in connection with tunneling) with tasks given as follow? <ul style="list-style-type: none"> • Surface survey • Levels in tunnels
6	Develop the contour plan of the site (minimum 2 km ² area) using theodolite and total station? <ol style="list-style-type: none"> 1. In theodolite contouring there must be minimum 50 stations with the rotation interval of 15 degrees across each station. 2. In total station contouring, develop contour using software.
7	Verify the coordinates and area as determined in Problem 3 and 4 using GPS.
8	Perform Setting out of Bridges / Culverts

9	<p>Draw/plot the following details in Auto CAD from the road surveying obtained in Task-2.</p> <ul style="list-style-type: none"> a) Profile leveling drawing / graph b) Cross Section drawing / graph c) Transition & simple curve d) Super elevation e) Calculation of cut and fill along the road section
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Annexure-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 importance of work and manifested by determination or desire to work hard.

The following ten work ethics are defined as essential for employee's 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 own weight and help others who are struggling. Recognize when to speak up with an ideas 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 life time

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. Takes 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 workplace 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.

SUGGESTIVE FORMAT AND SEQUENCE ORDER OF SUCCESS STORY

S. No	Key Information	Detail/Description
1.	Self & Family background	<ul style="list-style-type: none"> • Self-introduction • Family background and socio economic status, • Education level and activities involved in • Financial hardships etc
2.	How he came on board NAVTTC Training/ or got trained through any other source	<ul style="list-style-type: none"> • Information about course, apply and selection • Course duration, trade selection • Attendance, active participation, monthly tests, interest in lab work
3.	Post training activities	<ul style="list-style-type: none"> • How job / business (self-employment) was set up • How capital was managed (loan (if any) etc). • Detail of work to share i.e. where is job or business being done; how many people employed (in case of self-employment/ business) • Monthly income or earnings and support to family • Earning a happy life than before
4.	Message to others (under training)	<ul style="list-style-type: none"> • 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.

Note: Success story is a source of motivation for the trainees and can be presented in a number of ways/forms in a NAVTTC skill development course as under: -

1. To call a passed out successful person of institute. He/she will narrate his/her success story to the trainees in his/her own words and meet trainees as well.
2. To see and listen to a recorded video/clip (5 to 7 minutes) showing a successful person 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 per month etc) and narrates his/her story in teacher's own motivational words.