Government of Pakistan

National Vocational and Technical Training Commission

Prime Minister's Hunarmand Pakistan Program

"Skills for All"

Course Contents/ Lesson Plan

Course Title: Water Quality Testing Technician (WQTT)

Duration: 6 Months

Revised Edition

Trainer Name	Pakistan Council of Research in Water Resources (PCRWR), Islamabad
Course Title	**Water Quality Testing Technician (WQTT)**
Objectives and Expectations	**Employable skills and hands on practice for water quality monitoring** This diploma aimed at integrating the different steps in the water quality monitoring process, from the information needs, monitoring network design, field and laboratory procedures up to data collection and processing. The resulting water quality data can then be evaluated together with the natural water quality. Course provides an opportunity to build a career in the field of water and wastewater quality laboratory operation, course start from basic level and then move towards the advance level. Starting from introduction of water contamination and contaminants then move towards use of portable, bench top and high tech testing instruments. This course will cover the different techniques for water quality monitoring design, field testing and laboratory testing, efficiency evaluation of water treatment technologies, data analysis and reporting. **<u>Main Expectations</u>:** In short, the course under reference should be delivered by professional instructors in such robust hands-on manner that the trainees are comfortably able to employ their skills for earning money (through wage/self-employment) at its conclusion, where's hands on practice are not valid than demonstration will be required through video contents/ project prototype. 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 individual trainee to prepare them for such market roles during/after the training. 1. 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. 2. 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 (5^{th} & 6^{th} 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 favoured 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. 3. A module on **Workplace Ethics** has also been included to highlight the importance of good and positive behavior at work place in the line with the best practices elsewhere in the world. An outline of such qualities has been given in the Annexures 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.

1. 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:

1. Clear Purpose to convey message to trainees effectively.

2. Personal Story to quote as an example to follow.
3. Trainees Fit so that the situation is actionable by trainees and not represent a just idealism.
4. 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.

5. 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 comprehendible 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:-

1. Directly in person (At least 2-3 cases must be arranged by the training institute)
2. 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.

3. 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 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 to be presented to the trainees. The trainer may adopt a power point presentation or video format for 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. 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. Case studies can be implemented in the following ways: - 1. A good quality trade specific documentary (At least 2-3 documentaries must be arranged by the training institute). 2. Health & Safety case studies (2 cases regarding safety and industrial accidents must be arranged by the training institute). Field visits (At least one visit to a trade specific major industry/ site must be arranged by the training institute)
Entry level of trainees	Since intake level is Matriculation/FSC/DAE, the expectations from the trainees are: • To have basic knowledge of chemistry, biology, mathematics and/or physics. • Knowledge of water and wastewater quality • To have concept of water pollution
Learning Outcomes of the course	**<u>Main Expectation</u>** After successful completion of the course, participants will be able to: • Understand and apply concepts of water quality and pollution processes in water resources. • Developing further knowledge and understanding of some core scientific concepts and principals about water quality treatment needs. • Improving ability to understand and express scientific knowledge about water quality testing through hi-tech equipment and bench methods. • Preparing for the further study and practical work for the determinations of major water quality test parameters • Preparing for further practice applications of learned skills in

	science and technology as well industrial applications. **<u>By the end of this course, the trainees should be able to perform the following competencies</u>**: **Access to Safe Drinking Water and Sustainable development** • Understand the concepts of water policy and sustainable development goals • Designing a water quality monitoring project • Demonstrate different type of water/wastewater sampling methodologies • Demonstrate field monitoring protocols • Perform testing for physic-chemical and biological parameters • Assess correctness of water quality testing • Perform efficiency evaluation of water treatment products and technologies • Demonstrate water testing outcomes **Water/Wastewater sampling** • Design a workable sampling and analysis plan • Perform Field Equipment Decontamination methods • Perform Quality Assurance/Quality Control for Field Sampling & Analysis Programs • Calibrate Surface Water Sampling Devices • Calibrate Sediment Sampling Devices • Undertake sampling, preservation and transport of samples considering representativeness and integrity **Physico-Chemical testing** • Design the laboratory analysis plan for water quality monitoring project • Select Spatial and temporal monitoring criteria • Calibrate Turbidity meter, Electrical Conductivity meter, pH meter, Dissolved Oxygen meter, Flame Photometer, and

	Spectrophotometer, and Colorimeter. **Biological testing** • Demonstrate operation of autoclave. • Select microbial testing method as per customer demand • Calibrate autoclave, incubators, water baths, pH meter, Temperature and humidity meter. • Sterilize all glass ware, surfaces, and incubators • Perform testing using standard methods • Report the degree of fitness of water samples **Quality Control Checks** • Demonstrate calibration verification process • Develop control charts of all test parameters • Determine method detection limits • Prepare the quality control samples • Calculate percent recoveries of test parameters • Perform test methods validation • Perform volume deliveries checks • Calculate uncertainty of test parameters **Job Searching** • Analyze job in local market • CV building as per job demand • Analyze job demand in any two-international countries • Jobs Applying procedure in any two-international countries **Entrepreneurship** • Analyze customer demand • Perform cost analysis of customer demand • Conduct market survey for project estimation • Prepare quotation for customer • Negotiate with customer • Deal with customer and sign MOU • Prepare quotations/ invoice report

	• Complete the Work done on site **Soft skills /Teamwork/professionalism** • Develop professionalism • Motivational Lectures • Success Stories • Develop work ethics • Follow teamwork environments principals • Ensure punctuality of time • Ensure job deliverable within assigned time frame • Show dedication and commitment with your duty • Be creative in your work • Ensure positive attitude in group task • Ensure willing worker attitude in teamwork • Be goal oriented • Ensure HSE SOPs • Obey organizational rules and regulations • Be loyal with your duty and organization • Honesty is best policy
Course Execution Plan	Total duration of course: **6 months (24 Weeks)** Class, Lab and Field hours:**5 hours per day** Theory:**20%** Practical: **80%** Weekly hours: **25 hours per week** Total contact hours: **600 hours**
Companies offering jobs in the respective trade	**Companies Offering Jobs in the respective trade** • Water Supply Agencies • Bottled Water Industries • Beverage Industries • Government Organizations • All Private Institutes who are managing water quality • Food, pharmaceutical and textile industries

	• Companies involved in water treatment business • NGOs and UN Organizations working on WASH programmes • Environmental agencies
Job Opportunities/ job titles	Over large parts of the world, rivers and lakes show increasing trends of water pollution. This holds especially for developing countries under economic expansion and increasing population sizes. Evaluation of the physical, chemical and biological water quality is essential for the abatement of freshwater pollution. For this, sound and sustainable water quality assessment is required. To meet the Sustainable development Goals SDG-6 Target 6.1, 6.2. The Federal/Provincial Govt, international organizations and private organizations are focusing on water and wastewater quality, thus working has been started on large scale. All such organizations have a demand of skilled professionals water quality technicians.
No of Students	25
Learning Place	Classroom/ Lab
Instructional Resources	**Development Platform:** • National Water Quality Laboratory • National Capacity Building Institute **Learning Material:** • Modules for each course developed by NWQL and NCBI • Printed books on water testing • Practical demonstration for each parameter in Laboratory

Course Outline (Module)
Course Outline: Water Quality Testing Technician Course

Scheduled Week	Module Title	Learning Units	Remarks
Week 1	**Module-I** Water Quality Introduction and Requirements **& Motivational Lecture**	○ Motivational Lecture ○ Course Introduction ○ Course Applications ○ Institute/work ethics ○ Code and Conducts of institute ○ Water Quality Sources ○ Water Quality Situation in Pakistan	**Home Assignment** **Task 1** Details may be seen at Annexure-I
Week 2	**Module -II** Understand basic concepts of chemistry and **Success stories of water testing laboratories**	• **Introduction** ○ Aim of Course ○ Scope of Learning/Objective ○ Nature of Matter ○ Definition ○ States of Matter ○ Classification of Matter ○ Properties of Matter ○ Exercise • **Atoms, Molecules, And Ions** ○ Atomic Theory ○ Sub Atomic Particles ○ Atomic Number ○ Molecule ○ Chemical Nomenclature ○ Ions ○ Ionic Formula of Ionic Compounds ○ Dissociation of Ions in Water ○ Exercise • **Chemical Reactions and Equations** • **Chemical Equation** • **Chemical Reactions** Exercise • **Solutions And Their Concentrations** ○ Solution ○ Quantitative Units of Concentration ○ Dilutions and Concentration ○ Colligative Properties of Solutions ○ Buffer Solutions ○ Exercise • **Organic Chemistry** ○ Hydrocarbons ○ Alkyl Halides and Alcohols ○ Organic Acids Esters ○ Nitrogen Containing Compounds ○ Sulphur Containing Compounds ○ Polymers ○ Exercise	**Task 2** **Task 3** Details may be seen at Annexure-I **Monthly Test 1**

		• **Water Chemistry** • **Physical Properties of Water** o Specific heat o Viscosity o Surface tension • **Chemical properties of water** o Hydrogen Bonding o Hydronium Ion Formation o Self-Ionization of Water	
Week 3	**<u>Module -III</u>** Water Quality Sampling and **Motivational Lecture**	o Pre Sampling Operations o Collection of Samples (Ground Water) o Water Quality Sampling (Surface Water) o Water Quality Samples for Quality Control o On site Field Testing o Store and transport the samples to laboratory	**Task 4** *<u>Details may be seen at Annexure-I</u>* **Monthly Test 1**
Week 4	**<u>Module -III</u>** Physico-chemical Analysis of Water **(Chemical Lab-I) & Success stories**	• **ELECTRICAL CONDUCTIVITY** o Introduction o Standard Operating procedure for analysis of Electrical conductivity o Calibration Procedure o Testing o Expression of Results o Checklist for testing of EC o Planned Demonstration o Class Exercises • **TDS (Total Dissolved Solids)** o Introduction o Standard Operating procedure for analysis of TDS o TDS measurement o Quality Control o Expression of Results o Precautions o Checklist for testing of TDS o Planned Demonstration o Class Exercises o Group project • **pH** o Introduction o Standard Operating Procedure for o Analysis of pH o Standards and Reagents o Sample handling preservation o Calibration Procedure of pH Meter o Testing o Quality Control o Expression of Results o Precautions o Planned Demonstration o Class Exercises • **TURBIDITY** o Introduction o Standard Operating Procedure for	**Task 5** **Task 6** **Task 7** **Task 8** <u>Details may be seen at Annexure-</u>

		• **Analysis of Turbidity** o Standards and Reagents o Analysis Procedure o Expression of Results o Quality Control o Precautions o High Tech instrument for turbidity analysis o Checklist for testing of pH o Planned Demonstration o Class Exercises o Group project	
Week 5	**<u>Module -III</u>** Physico-chemical Analysis of Water **(Chemical Lab-I) & Success stories** **And Motivational Lecture**	• **SODIUM** o Introduction o Standard Operating procedure for analysis of Sodium o Principle o Interferences o Apparatus o Standards and Reagents o Calibration of Flame Photometer o Quality Control o Expression of Results o Planned Demonstration o Class Exercises • **POTASSIUM** o Introduction o Standard Operating Procedure for analysis of Potassium o Quality Control o Expression of Results o Interpretation of Results o Precautions o Alternate Testing o Checklist for testing of potassium o Planned Demonstration o Class Exercises • **TOTAL AND FREE CHLORINE** o Definition o Testing Method o Principle of Measurement o Expression of Results o Quality Control o Precautions o High Tech Instrument o Checklist for testing of chlorine o Planned Demonstration o Class Exercises	**Task 12** *<u>Details may be seen at Annexure-I</u>* **Task 9** **Task 10** **Task 11** *<u>Details may be seen at Annexure-I</u>*
Week 6	**<u>Module -IV</u>** Physico-chemical Analysis of Water **(Chemical Lab-II) And Success stories**	• **CALCIUM** o Introduction o Determination of Calcium o Testing methods o Standard Operating Procedure for Calcium by EDTA Titrimetric Method o Principle of Measurement o Preparation of reagents o Standardization Procedure	**Task 12** **Task 13** <u>Details may be seen at Annexure-I</u> <u>Details may be seen</u>

		○ Calculation ○ Procedure for analysis of sample ○ Quality Control ○ Expression of Results ○ Safety precautions ○ Checklist for testing of calcium ○ Planned Demonstration ○ Class Exercises • **TOTAL HARDNESS** ○ Introduction ○ Determination of hardness ○ Testing methods ○ Standard Operating Procedure for Total Hardness by EDTA Titrimetric Method ○ Quality Control ○ Expression of Results ○ Safety precautions ○ Checklist for testing of hardness ○ Planned Demonstration ○ Class Exercises ○ Group project • **MAGNESIUM** ○ Introduction ○ Determination of magnesium	<u>at Annexure-I</u>
Week 7	**<u>Module -IV</u>** Physico-chemical Analysis of Water **(Chemical Lab-II) And Motivational Lecture**	• **ALKALINITY** ○ Introduction • **DETERMINATION OF ALKALINITY** ○ Principle of Measurement ○ Reagents ○ Preparation of mixed indicator ○ Preparation and Standardization Of ○ 0.1N Hydrochloric Acid ○ Preparation and Standardization of ○ 0.02N Hydrochloric Acid ○ Procedure for analysis of sample ○ Quality Control ○ Expression of results ○ Safety precautions ○ Planned Demonstration ○ Class Exercises • **BICARBONATES** ○ Introduction ○ Health impacts • **CARBONATES** ○ Introduction ○ Determination of Carbonates (CO3-2) ○ by Titrimetric Method ○ Principle of Measurement ○ Alkalinity Testing ○ Phenolphthalein alkalinity ○ Reagents ○ Standardization ○ Procedure for analysis of sample ○ Quality Control ○ Safety precautions ○ Planned Demonstration	**Task 14** **Task 15** <u>Details may be seen at Annexure-I</u>

		○ Class Exercises	
Week 8	**Module -IV** Physico-chemical Analysis of Water **(Chemical Lab-II) and Success stories**	• **CHLORIDE** ○ Introduction • **Determination of Chlorides (Cl-1) by Argentometric Method** ○ Principle of Measurement ○ Reagents& Glassware ○ Preparation of Reagents ○ Standardization of silver nitrate solution ○ Procedure for analysis of sample ○ Calculation ○ Expression of Results ○ Quality Control ○ Safety precautions ○ Planned Demonstration ○ Class Exercises	**Task 16** **Task 17** Details may be seen at Annexure-I
Week 9	**Module -V** Physico-chemical Analysis of Water **(Chemical Lab-III) & Motivational Lecture**	• **Introduction of Spectroscopy** ○ Types of spectroscopy ○ Application of UV/VS Spectroscopy in water chemistry • **Basic Principle of spectroscopy** ○ Types of UV/VIS Spectrophotometer ○ Lambda max (λmax) ○ Learning Outcomes ○ Class Quiz • **Introduction of UV-VIS Spectrophotometer** ○ Testing instrument ○ Principle of Measurement ○ Operation ○ Maintenance ○ Trouble shooting ○ Precautions ○ Planned Demonstration ○ Learning Outcomes ○ Class Quiz • **NITRATE** ○ Introduction ○ Determination of Nitrate (NO_3^{-1}) by ○ Spectrophotometer ○ Testing instrument UvLINE -9400 ○ UV/VIS Spectrophotometer ○ Standards and Reagents ○ Calibration of Spectrophotometer for Nitrate ○ Testing ○ Quality Control ○ Expression of Results ○ Interpretation of Results ○ Precautions ○ Planned Demonstration ○ Learning Outcomes ○ Class Quiz	**Task 18** **Task 19** *Details may be seen at* Annexure-I
Week 10	**Module -V** Physico-chemical Analysis of Water	• **SULPHATES** ○ Introduction • **Determination of Sulphate (SO_4^{-2}) by**	**Task 20** **Task 21**

	(Chemical Lab-III) & Success stories	**Spectrophotometer** o Testing instrument: o UvLine 9400 UV/VIS Spectrophotometer o Standards and Reagents o Calibration of Spectrophotometer for Sulphate Testing o Quality Control o Expression of Results o Interpretation of Results o Precautions o Planned Demonstration o Learning Outcomes o Class Quiz • **Alternate method for the determination of Sulphates by Colorimeter** o Testing instrument: Colorimeter Model DR/890 Hach o Analytical parameters o Calibration of Colorimeter for sulphate o Testing o Quality Control o Planned Demonstration o Learning outcomes o Class Quiz • **Iron:** • **Introduction** o Determination of iron (II) by spectrophotometer o Definition o Testing instrument: Model is UvLine 9400 UV/VIS Spectrophotometer o Analytical parameters o Major Components o Principle of measurement o Standards and Reagents o Calibration of spectrophotometer for o iron o Testing o Quality Control o Expression of Results o Interpretation of results o Precautions o Planned Demonstration o Learning outcomes o Class Quiz • **Alternate method for determination of Iron (II)** o Definition o Testing instrument: DR/2800 Colorimeter, HACH o Analytical parameters o Major Components o Principle of measurement o Standards and reagents o Calibration of colorimeter 2800 o Testing o Quality Control	Details may be seen at Annexure-I **Home Assignment** *Details may be seen at Annexure-I*

		○ Expression of results ○ Interpretation of results ○ Precautions ○ Planned Demonstration ○ Learning outcomes ○ Class Quiz	
Week 11	**<u>Module -V</u>** Physico-chemical Analysis of Water (Chemical Lab-III) **& Motivational Lecture**	• **Fluoride** ○ Introduction • **Determination of Fluoride by ISE Meter JENWAY 3345** ○ Testing Instrument Ion meter Model ○ Analytical Parameters ○ Major Components ○ Principle of Measurement ○ Standards and Reagents ○ Calibration of ISE Meter for Fluoride ○ Testing ○ Quality Control ○ Expression of Results ○ Precautions ○ Planned Demonstration ○ Learning outcomes ○ Class Quiz • **Alternate method for the determination of fluoride (F-) by SPADNS method** ○ Testing instrument DR/2800 Colorimeter, HACH ○ Analytical Parameters ○ Principle of measurement ○ Standards and reagents ○ Calibration of colorimeter DR/2800 for Fluoride ○ Testing ○ Quality Control ○ Expression of results ○ Precautions ○ Planned Demonstration ○ Learning outcomes ○ Class Quiz	**Task 22** **Task 23** <u>Details may be seen at Annexure-</u>
Week 12	**<u>Module -VI</u>** Quality Control and Quality Assurance**& Success stories** **<u>Module -VI</u>** Quality Control and Quality Assurance**& Motivational Lecture**	• **Introduction to Quality Control and Quality Assurance** ○ Quality Assurance ○ Quality Control • **Calibration and Calibration** • **Verification** ○ Calibration ○ Instrument Calibration ○ Initial calibration (IC) ○ Continued Calibration Verification (CCV) • **Analysis of Method Blank** ○ Method Blank ○ Purpose ○ Evaluation • **Verification of Reproducibility & Repeatability**	**Task 24** *<u>Details may be seen at Annexure-I</u>*

		○ Repeatability ○ Reproducibility • **Analysis of Lab Control Sample** ○ Preparation of Laboratory Control ○ Sample ○ Analysis of Laboratory Control Sample • **Control Charting and Control Limits** ○ Preparation of Lab Control Sample for Control Chart ○ Analysis of Lab Control Sample ○ Setting Control Chart (Mean Chart) Limits ○ Using a Mean Chart ○ Interpretation of Control Chart Data ○ Control Limits ○ Warning Limits ○ Standard Deviation ○ Trending ○ Corrective Action • **Competence Checking of Laboratory Analyst through Audit Blind Samples** ○ Procedure ○ Handling of Lab Control Samples (LCS) ○ Analysis • **Analysis of Spiked Matrix Samples (Laboratory Fortified Matrix Lfm)** ○ Proficiency Testing ○ Analysis of PT Samples ○ Submission of Results and Final Report ○ Evaluation of PT Results ○ Method Detection Limits ○ Procedure ○ Anion Cation Balance ○ Correctness of Analysis ○ Procedure ○ Measure EC and ions sum ○ Measured TDS to EC ratio	
Week 13		**MID TERM EXAMS**	
Week 14	**<u>Module -VII</u>** Microbiological Testing of Water**&** **Success stories**	• **Basics and Water microbiology** ○ Introduction ○ Bacteria ○ Viruses ○ Fungus ○ Algae ○ Protozoa ○ Water Microbiology ○ Total Coliforms ○ Fecal Coliforms ○ Escherichia coli (E. coli) • **Water Quality Sampling for Microbiological Samples** ○ Guidelines for Water Sampling ○ Preparations for Water ○ Quality Sampling ○ Sampling Containers for ○ Microbiological Analysis ○ De-chlorination	**Home Assignment** **Task 25** *<u>Details may be seen at Annexure-I</u>*

		○ Key Points for Preventing ○ Contamination during ○ Microbiological Sampling11 ○ Labeling of microbiological samples ○ Sample transportation ○ Reception of samples by the laboratory ○ Sampling Procedures ○ Location of sampling points ○ Water can be divided into three basic types for the purpose of sampling: • **Instrumentation** ○ Incubator ○ Analytical Balance ○ Autoclave ○ Water Bath ○ Safety Precautions ○ Refrigerator ○ Biology Safety Cabinet ○ Microscope ○ Hot Air Oven	
Week 15	**Module -VII** Microbiological Testing of Water **& Motivational Lecture**	• **Essential Methods for maintaining, preparing and using cultures** ○ Scope ○ Culture Media ○ Reference Strains ○ Reference Culture Maintenance Programme ○ Sub Culturing Procedure ○ Purity Check ○ Bio-Chemical Tests ○ Positive and Negative Controls ○ Preservation (Practical Activities) • **MICROBIOLOGY IN ACTION** **Method I: Enumeration Of Total Coliforms, Fecal Coliforms and E.coli by Most Probable Number (MPN) Method Using Culture Media** ○ Scope ○ Principle ○ Resources ○ Preparation of Media ○ Media Quality Control ○ Performance of Sterility Check ○ Procedure for Testing ○ Procedure ○ Confirmed test ○ Completed Phase for Coliforms ○ Determination of Fecal Coliforms ○ Confirmation of E-coli ○ IMViC Test: ○ Quality Control ○ Media Disposa	**Task 26** **Task 27** *Details may be seen at Annexure-I*
Week 16	**Module -VII** Microbiological Testing of Water**&** **Success stories**	• **Method II: Enumeration of Total Coliforms, Fecal Coliforms & E. Coli by Membrane Filtration Method** ○ Scope ○ Principle ○ Resources of Media ○ Sterilizing Solutions	**Task 28** *Details may be seen at Annexure-I*

		○ Media Quality Control ○ Performance of Sterility Check ○ Sample Size ○ Sterilization of Equipment ○ PLATING ○ Procedure ○ Interpretation and Calculation ○ Calculation of Coliform Densities ○ Expression of Results ○ Media Disposal	
Week 17	**<u>Module – VII</u>** Microbiological Testing of Water**& Motivational Lecture**	• **Method III: Enumeration of Total Coliforms and Escherichia Coli Using Colilert IDEXX Quantitative Method** ○ Resources ○ Procedure ○ Quality Control • **Method IV: Determination of Aerobic Plate Count (APC)** ○ Scope ○ Principle ○ Apparatus and Glassware ○ Resources ○ Media Preparation and Pouring ○ Performance of Sterility Check ○ Media Performance Test ○ Procedure for Testing ○ Enumeration of Aerobic Plate Count ○ Disposal of Media • **Method V: Gram Staining Technique** ○ Scope ○ Principle ○ Reagents ○ Procedure ○ Precaution ○ Quality Control • **Decontamination of Media and Glassware** ○ Scope ○ Equipment ○ Procedure for washing ○ Glassware Washing Protocol	**Task 29** *<u>Details may be seen at Annexure-I</u>*
Week 18	**<u>Module -VIII</u>** Heavy Metals Analysis of Water on AAS**& Success stories**	• **Heavy Metals & Trace Elements** ○ Definition ○ Sources of Heavy Metals ○ Heavy Metal Toxicity ○ Methods of Heavy Metal ○ Determination • **Instrumentation** ○ Atomic Absorption Spectrometer ○ Working Principal of Atomic ○ Absorption Spectrometer (AAS) ○ Major Components of Atomic ○ Absorption Spectrometer (AAS) ○ Working Modes of Atomic Absorption ○ Spectrometers (AAS) ○ Flame Mode ○ Hydride Generation Mode (HGAAS)	**Task 30** **Task 31** **Task 32** *<u>Details may be seen at Annexure-I</u>* **Monthly Test**

		○ Graphite Furnace Mode • **Determination Of Heavy Metals** ○ Testing/Determination of Arsenic by Atomic Absorption Spectrometer ○ Purpose ○ Scope ○ References ○ Instrument ○ Principle ○ Glassware Required ○ Reagent Required ○ Preparation of 1000 ppb Stock Solution of Arsenic in Deionized Water ○ Preparation of Working Standards of ○ Arsenic ○ Calibration of AAS for Arsenic in ○ Hydride Generation Mode ○ Analysis of Arsenic on AAS • **Testing/Determination of Copper (Cu) on Flame Mode of Atomic Absorption Spectrometer** ○ Purpose ○ Scope ○ References ○ Instrument ○ Principle ○ Glassware ○ Reagents ○ Preparation of Stock Solution and Working Standards of Copper for Flame Mode ○ Calibration of Copper on Flame Mode ○ Analysis of Copper on Flame Mode • **Testing/Determination of Manganese (Mn) on Flame Mode of Atomic Absorption Spectrometer** ○ Purpose ○ Scope ○ References ○ Instrument ○ Principle ○ Glassware ○ Reagents Preparation of Stock Solution and Working Standards of Manganese for Flame Mode ○ Calibration of Manganese on Flame ○ Mode ○ Analysis of Copper on Flame Mode • **Testing/Determination of Zinc (Zn) on Flame Mode of Atomic Absorption Spectrometer** ○ Purpose ○ Scope ○ References ○ Instrument ○ Principle ○ Glassware ○ Reagents ○ Preparation of Stock Solution and Working	

		Standards of Zinc for Flame Mode ○ Calibration of Zinc on Flame Mode ○ Analysis of Zinc on Flame Mode • **Testing/Determination of Lead (Pb) by Atomic Absorption Spectrometer on Graphite Furnace Mode** ○ Purpose ○ Scope ○ References ○ Instrument ○ Principle ○ Glassware ○ Reagents ○ Preparation of 1000 ppb Stock Solution of Lead ○ Preparation of Working Standards for Lead ○ Calibration for Lead on Graphite Furnace Mode ○ Analysis of Lead on Graphite Furnace • **Testing/Determination of Chromium (Cr) on Graphite Furnace Mode** ○ Purpose ○ Scope ○ References ○ Instrument ○ Principle ○ Glassware ○ Reagents ○ Preparation of 1000 ppb Stock Solution of Chromium ○ Preparation of Working Standards for Chromium ○ Calibration for Chromium on Graphite ○ Furnace Mode ○ Analysis of Chromium on Graphite Furnace	
Week 19	Employable Project/ Assignment (6 weeks i.e. 21-26) in addition of regular classes. **OR** On job training (2 weeks)	○ Guidelines to the Trainees for selection of students 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 the emerging trends in the local market as well as across the globe. ○ The project idea may be based on Entrepreneur. ○ Leading to the successful employment. ○ The duration of the project will be 6 weeks ○ Ideas may be generated via different sites such as: https://1000projects.org/ https://nevonprojects.com/ https://technofizi.net/best-computer-science-and-engineering-cse-project-topics-ideas-for-	

		students/ https://engineering.eckovation.com/plc-based-final-year-projects/ o Final viva/assessment will be conducted on project assignments. o At the end of session the project will be presented in skills competition o The skill competition will be conducted on zonal, regional and National level. o The project will be presented in front of Industrialists for commercialization o The best business idea will be placed in NAVTTC business incubation center for commercialization. OR o On job training for 2 weeks: o Aims to provide 2 weeks industrial training to the Trainees as part of overall training program o Ideal for the manufacturing trades o As an alternate to the projects that involve expensive equipment o Focuses on increasing Trainee's motivation, productivity, efficiency and quick learning approach.	
Week 20	**Module -IX** Wastewater Testing **& Success stories**	• **Introduction** o What is Waste Water o Types of Wastewater o Sources of Wastewater • **Guidelines for Sampling, Storage and Preservation Testing in Waste Water Lab** • **Determination of Dissolved Oxygen by DO Meter Method (JENWAY 970)** o Testing Instrument o Principle of Measurement o Standards and Reagents o Calibration Procedure of DO Meter o Testing o Quality Control o Expression of Results o Interpretation of Results o Precautions • **Alternate Method for Determination of Dissolved Oxygen by DO Meter (Polarographic YSI PRO 20I)** o Principle of Operation o Calibration of the DO Meter o Testing o Precautions • **Determination of Biochemical Oxygen Demand by Manometric Pressure Measurement Method** o Definition	**Task 33** **Task 34**

		○ Testing Method ○ Standards and Reagents ○ Calibration Procedure of Tintometer ○ Testing ○ Quality Control ○ Expression of Results ○ Interpretation of Results ○ Precautions • **Determination of Chemical Oxygen Demand by Colorimeter (Dichromate Digestion Method)** ○ Testing Instrument ○ Principle of Measurement ○ Standards and Reagents ○ Calibration Procedure of COD Meter ○ Testing ○ Quality Control ○ Expression of Results ○ Interpretation of Results ○ Precautions • **Determination of Total Suspended Solids** ○ Definition ○ Testing Instrument ○ Principle of Measurement ○ Testing ○ Precautions	
Week 21	Generate report of site work Analyze job in local market CV building as per job demand **& Motivational Lecture**	Students are introduced to: **Generate report of site work** ○ Decide on the 'Terms of reference' ○ Decide on the procedure ○ Find the information ○ Decide on the structure ○ Draft the first part of your report ○ Analyze your findings and draw conclusions ○ Make recommendations ○ Draft the executive summary and table of contents ○ Compile a reference list ○ Revise your draft report **Analyze job in local market** ○ Review the job requirements. ○ Research similar job descriptions. ○ Identify the outcomes required for the job. ○ Examine the job efficiencies. ○ Determine the skills and training required. ○ Define the salary bands. ○ Continue to evolve the job. **CV building as per job demand** ○ Write down your Objective. ○ Enlist your Key skills and experience. ○ Write down your Education. ○ Write down your work experience. ○ Enlist Additional skills. ○ Write down your Interests and activities. ○ Enlist References if any.	**Task 35** **Task 36** Details may be seen at Annexure-I
Week 22	Analyze job demand in	Students are introduced to:	**Task 38**

	any two-international country Jobs Applying procedure in any two-international country Analyze customer demand **& Success stories**	**Analyze job demand in any two-international country** ○ Be clear about why you want to work overseas. ○ Keep an open mind about your choice of location. ○ Start with the constraints. ○ Consult with your employer. ○ Do your research. ○ Think transferable skills. **Jobs Applying procedure in any two-international country** ○ Determine the type of job you want. ○ Decide what country you want to work in. ○ Find a job you're interested in. ○ Apply for a visa or work permit. ○ Update and localize your resume. ○ Apply for the job. **Analyze customer demand** ○ Collection of information from customer. ○ Situational analysis and specification of objectives ○ Conduct of market survey.	**Task 39** **Task 40** *Details may be seen at Annexure-I*
Week 23	Perform cost analysis of customer demand Conduct market survey for project estimation **& Motivational Lecture**	Students are introduced to: **Perform cost analysis as per customer demands.** ○ Categorizing Costs ○ Collect Data for Cost Analysis ○ Calculate the Costs **Conduct market survey for project estimation** ○ Set a clear goal. ○ Know what target market to survey. ○ Know what you want to investigate. ○ Get help from the people who know surveys. ○ Consider the best way to get your answers. ○ Administer the survey effectively. ○ Conduct a thorough survey analysis.	**Task 41** **Task 42** *Details may be seen at Annexure-I* •
Week 24	Prepare quotation for customer Negotiate /Deal with customer and signed MOU **& Success stories**	Students are introduced to: **Prepare quotation for customer** ○ Construct your quote clearly and logically ○ Include all necessary information ○ Try to send your quotes quickly ○ Include your contact information like company name and phone number and try to follow up quotes with another message after a couple of days. ○ If you miss out on a big deal, try to get feedback about why you were not chosen. Was it that your price was too high, or was your quote lacking in some way? ○ If your business can support it, try setting generous payment terms as an incentive. **Negotiate / Deal with customer and signed**	**Task 43** **Task 44** *Details may be seen at Annexure-I*

		MOU ○ Term/duration of the MOU. ○ Cancellation provisions. ○ MOU review process ○ Dispute resolution, including (or excluding) legal actions, negotiations, consultations, or executive actions. ○ Waivers and rights involved in the MOU to make compensation claims related to the execution of the MOU against one another. ○ Intellectual Property provisions. ○ Privacy provisions ○ Methods for transferring funds (if applicable).	
Week 25	Complete the Work done on site Develop professionalism **& Motivational Lecture**	Students are introduced to: **Complete the Work done on site** ○ Collect all related work items ○ Develop a process ○ Get organized. ○ Set a time to review ○ Just do it! **Develop professionalism** ○ Be productive ○ Develop a professional image ○ Take the initiative ○ Maintain effective work habits ○ Manage your time efficiently ○ Demonstrate integrity ○ Provide excellence. ○ Be a problem-solver ○ Be resilient ○ Communicate effectively ○ Develop self-awareness ○ Build relationships	**Task 45** *Details may be seen at Annexure-I*
Week 26	Develop work ethics Follow teamwork environments principles **& Success stories**	Students are introduced to: **Develop work ethics** ○ Practice punctuality. Develop the habit of being on time or early for all appointments. ○ Develop professionalism. Professionalism goes beyond a crisp white shirt and tie. ○ Cultivate self-discipline. ○ Use time wisely. ○ Stay balanced. **Follow teamwork environments principles** ○ Effective Communication amongst team members. ○ Reliable team members. ○ Good approach to conflict management. ○ Strong and effective leadership. ○ Effective allocation of resources. ○ Mutual respect amongst team members. ○ Constructive working relationship. ○ Positive approach to diversity and equality.	**Task 46** *Details may be seen at Annexure-I*

List of Major Laboratory Equipment

Sr. No	Name of item as per curriculum	Quantity physically available at the training location
1.	Atomic Absorption Spectrophotometer	02
2.	UV-Visible Spectrophotometer	02
3.	Colorimeter	02
4.	pH meter	02
5.	Flame photometer	02
6.	COD Apparatus	01
7.	Conductivity Meter	02
8.	Chlorine Meter	01
9.	Turbidity Meter	01
10.	Temp. & Humidity Meter	01
11.	Distillation system	01
12.	Analytical Balance	03
13.	Magnetic Stirrer and hot plate	01
14.	Total Organic Carbon Analyzer	01
15.	Microwave Digester	01
16.	Chemical Oxygen Demand Apparatus	01
17.	BOD Measurement System	01
18.	Hot air oven	01
19.	Soxhlet Extraction System	01
20.	Ultra Sonic Bath	01
21.	Muffle Furnace	01
22.	Centrifuge	01
23.	Vortex Mixer	01
24.	Dissolved Oxygen Meter	02
25.	Rotatory Evaporator	01
26.	GCMS	01
27.	Nitrogen sample concentrator	01
28.	Grinder	01
29.	Filtration Assembly	01
30.	Acid Fume Hood	07
31.	Biological safety Cabinet	02
32.	Membrane Filtration Assembly	04
33.	Auto Claves	03
34.	Incubators	04
35.	Refrigerators	05
36.	Autoclave	01

List of essentially Required Certified Reference Material (CRM) in NWQL

Sr. No	Chemical Name
1.	Arsenic Standard 1000 ppm 500 ml
2.	Copper Arsenic Standard 1000 ppm 500 ml
3.	Zinc Standard 1000 ppm 500 ml
4.	Manganese Standard 1000 ppm 500 ml
5.	Chromium Standard 1000 ppm 500 ml
6.	Lead Standard 1000 ppm 500 ml
7.	Nitrate Standard 1000 ppm 500 ml
8.	Sulphate Standard 1000 ppm 500 ml
9.	Fluoride Standard 1000 ppm 500 ml
10.	Iron Standard 1000 ppm 500 ml
11.	Calcium Standard 1000 ppm 500 ml
12.	Hardness Standard 1000 ppm 500 ml
13.	pH Standard 1000 ppm 500 ml
14.	EC Standard 1000 ppm 500 ml
15.	Sodium Standard 1000 ppm 500 ml
16.	Potassium Standard 1000 ppm 500 ml
17.	Turbidity Standard 1000 ppm 500 ml
18.	Chloride Standard 1000 ppm 500 ml
19.	Bicarbonate Standard 1000 ppm 500 ml
20.	Alkalinity Standard 1000 ppm 500 ml
21.	All related chemical and glassware required for course parameters

Minimum Qualification of Teachers / Instructor

The qualification of teachers / instructor of this course should be minimum **of MSc. Chemistry/Biochemistry/Environmental Sciences/Microbiology with minimum 5 years of experience** in relevant trade.

Supportive Notes

Teaching Learning Material

Books Name	**Author**
APHA (2017). Standard methods for examination of water and waste water, 23rd ed. American Public Health Association and Water Pollution Control Federation, New York, Washington, DC.	Eugene W. Rice Roger B. Baird Andrew D. Eaton Lenore S. Clesceri
Food Control Manual, Food and Agriculture Organization (FAO), Rome Italy 1971.	Rafai, FAO
National Standards for Drinking water quality 2010 (Pak-EPA)	Pak -EPA
National Environmental Quality Standards for Municipal and Liquid Industrial Effluents 1999 (Pak-EPA)	Pak-EPA
Guidelines for Drinking Water Quality 4th Edition, 2017 Geneva	WHO

Annexure-I

Week	Task No.	Description
Week-1	Task-1	Enlist the different water sources in Pakistan and identify major sources of pollution for surface as well as groundwater sources
Week-2	Task-2	Explore the difference between: • Atomic number and Atomic mass • homogeneous mixture and a heterogeneous mixture • physical change or a chemical change • chemical compound and a ionic compound
	Task-3	Calculate how many molecules of SO_3 are needed to react with 144 molecules of Fe_2O_3 given this balanced chemical equation? $Fe_2O_3(s) + 3SO_3(g) \rightarrow Fe_2(SO_4)_3$
Week-3	Task-4	Enlist the sterility steps required for microbiological sample collection; also explain the methodology of grab and composite sampling.
Week-4	Task-5	Define Electrical Conductivity (EC); also explain the effect of temperature on EC.
	Task-6	Define TDS, analyze given sample for TDS and evaluate it as per "National Standards for Drinking water Quality" (NSDWQ).
	Task-7	Explain the working principle of pH meter and determined the pH of given sample.
	Task-8	Define NTU and explain the working principle of Turbidity meter
Week-5	Task-9	Enlist three different methodologies being used for the testing of sodium in water.
	Task-10	Explain the working principle of flame photometer for the determination of potassium
	Task-11	Differentiate between free and total chlorine and also explain the working principle of chlorine in water for disinfection.
Week-6	Task-12	Explain the role of EDTA in determination of calcium by titrimetric method.
	Task-13	Calculate the magnesium from given values of calcium and hardness
Week-7	Task-14	Define alkalinity, prepare 0.1 N Hydrochloric Acid(HCl) from 37% HCl stock
	Task-15	Explain the pH ranges at which carbonate, bicarbonate or hydroxide exist in drinking water.
Week-8	Task-16	Define Argentometric method of determination and explain the major sources of chloride contamination in surface water
	Task-17	Perform the testing of chloride in given sample by Argentometric method
Week-9	Task-18	Define Spectroscopy, explain the working principle of UV-Visible Spectrophotometer
	Task-19	Explain the testing procedure of Nitrate on Spectrophotometer
Week-10	Task-20	Explain the working principle of colorimeter and analyze water sample for Sulphates on colorimeter.

	Task-21	Explain the effect of iron contamination on physical appearance of drinking water
Week-11	Task-22	Perform the testing of Fluoride in given sample and also explain the role of SPADNS solution in the determination of Fluoride in drinking water
	Task-23	Enlist three health effects of fluoride poisoning
Week-12	Task-24	Define method blank and lab control sample, enlist quality control checks during the analysis
Week-13		**Midterm**
Week-14	Task-25	Define Microbiological water testing, explain indicator parameters.
Week-15	Task-26	perform the de-chlorination process during sample collection for microbiological water sample
	Task-27	Define reference strains and culture media
Week-16	Task-28	Perform sterilization of equipment and explain membrane filtration (MF) method for the determination of Coliforms
Week-17	Task-29	Explain aerobic plate count (APC) method and perform gram staining.
Week-18	Task-30	Define Beer Lambered Law and explain its importance in spectroscopy.
	Task-31	Explain working principle of Atomic Absorption Spectrometer(AAS) for the determination of Arsenic
	Task-32	Perform the testing of copper on AAS and also explain the role of acetylene gas in the analysis of copper on flame mode of AAS
Week-19		**Project week**
Week-20	Task-32	Explain the working principle of Dissolved Oxygen(DO)meter
	Task-33	Perform the Chemical Oxygen Demand(COD) test for the given sample
	Task-34	Enlist the ranges of BOD measurement by tintometric method depending upon the level of contamination
Week-21	Task-34	Analyze job in local market
	Task-35	Build your CV as per job demand
Week-22	Task-36	Analyze job demand in international country.
	Task-37	Apply for job in abroad.
	Task-38	Analyze customer demand
Week-23	Task-39	Perform cost analysis as per customer demand.
	Task-40	Conduct market survey for project estimation
Week-24	Task-41	Prepare quotation for customer
	Task-42	Negotiate / Deal with customer and signed MOU
Week-25	Task-43	Complete the Work done on site
Week-26	Task-44	Develop work ethics

Annexure-II

Water Quality Testing Technician

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=Qi6Xn7yKIlQ

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=tIQ0CWgszI0

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

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

Annexure-III

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:
• 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:
• Understand the communication skills and how it works. • Understand what communication skills mean • Understand what skills are important for communication skills	• Podium • Projector • Computer • Flip Chart • Marker	• Communication • Self Confidence • Teamwork

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: 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 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. • "IDENTIFY ENTREPRENEURS" TEAM ACTIVITY • "BRAINSTORMING SOCIAL PROBLEMS" TEAM ACTIVITY" *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.* 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. Type up notes for their strategy if this is helpful - it can be included underneath the Team Contract.
Session Close: 5 minutes	**MENTOR:** Close the session with the opportunity for anyone to ask any remaining questions. **Instructor:** Facilitate the wrap-up of the session. A quick reminder of what is coming up next and when the next session will be.

Motivational Lectures and Success Stories (Course Outlines)

Sr #	Topic title	Contents	Theme
1	**Success stories**	1. Story of Skill worker who get good job. 2. Entrepreneur /self-business 3. Freelancer	1. Family Background 2. How to get Training 3. How to get job 4. Success trait **5.** Few word of advice for youth
2	**Motivational Lectures**	1. Soft skills 2. work Ethics 3. Personality Grooming	**Good Habits** • Punctuality • Honesty • Positive attitude **Interpersonal skills** • Determinant • Consistent • Welling worker • Team work • Initiative • Hardworking • Creative • Enthusiastic • Goal oriented • Self-motivated • Communication • Loyalty

MOTIVATIONAL LECTURES LINKS.

TOPIC	SPEAKER	LINK
How to Face Problems In Life	Qasim Ali Shah	https://www.youtube.com/watch?v=OrQte08Ml90
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=kzSBrJmXqdg
Risk of Success	Denzel Washington	https://www.youtube.com/watch?v=tbnzAVRZ9Xc

Annexure-IV

SUCCESS STORY

S. No	Key Information	Detail/Description
1.	**Self & Family background**	**Danyal Saleem,** who lives in Mirpur (AJK), is an example of how hard work and perseverance can reap rich rewards when bidding for projects online. The graphic designer works exclusively on an online freelancing platform and has earned, on average, **US$20,000** per month for the past several months. But this isn't a story of overnight success – Danyal has had to work hard to differentiate himself and stay true to his goal. It was a full year later, in May 2017, when Danyal finally decided to jump in. He signed up for one of the numerous sites that connect designers or coders with people or companies that have small projects, like designing a logo or building a website. He had already started a small business to help pay for his college education, so he was nervous and apprehensive about the decision. "I gave myself two or three months at most. If I didn't succeed, then I would go back to running the business as it was showing potential," he says. **If at first, you don't succeed, try try again**
2.	**How he came on board NAVTTC Training / or got trained through any other source**	Certification in graphic designing from STEPS (NAVTTC partner institute)
3.	**Post-training activities**	**Danyal's** area of expertise is in **graphic design**. In his first month using Fiverr, he pitched mostly for projects centered around logo designing. But it wasn't so simple. In the first few weeks, he didn't hear back from even a single client, despite pitching 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. Danyal 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 Danyal's way. Within a few months, he was landing an average of a hundred projects every month, with a large number of repeat clients. He also expanded the range of his professional services, branching out from logo design to business cards, banners, Facebook cover pages, letterheads, and stationery. But he's had to face his fair share of challenges too. The shoddy state of internet infrastructure in his city, Mirpur, 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."
4	**Success Traits**	**Success Traits (characteristics)** **Good Habits** • Punctuality • Honesty • Positive attitude **Interpersonal skills** • Determinant • Consistent • Welling worker • Team work • Initiative • Hardworking • Creative • Enthusiastic • Goal oriented • Self-motivated • Communication Loyalty
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.

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***

Annexure-V:

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.