



GEMOLOGIST CURRICULUM

DURATION: 6 Months

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Technical Training for Polio-affectedees

The United Nations Industrial Development Organization (UNIDO) is the specialized agency of the United Nations mandated to promote industrial development and global industrial cooperation.

UNIDO's Education Programme strives to promote industry-relevant education and training for the sustainable industrial development of Pakistan.

The UNIDO Education Programme, in collaboration with the National Vocational & Technical Training Commission (NAVTTTC) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), has developed ten curricula as part of its Polio-Plus Initiative.

Amongst its main objectives, the United Nations' Polio-Plus Initiative is intended to aid in the rehabilitation of working-age disabled individuals by means of technical training programs in employable skills. With such training, it is projected that these individuals may then positively contribute, both socially and economically, within their respective communities.

In December 2013, teachers of selected Technical Educational & Vocational Training Authority (TEVTA) centres from the priority districts underwent such technical training for the specified ten curricula.

NAVTTTC delivered competency-based training to trainers of selected TEVTAs from several high-priority polio districts. The competency standards developed and validated during the curricula development process, now certified as National Standards, are to be used during the training of polio-affected individuals. The workshop was markedly interactive in nature, focusing on group work and presentations while highlighting the intended goal of applicability in such competency-based trainings.

One notable trainer recounted his own experiences working with thousands affected by Polio in Pakistan. Noting their often absence from rigorous economic participation, he referred to these individuals as Pakistan's 'untapped resources'. The trainer also placed special emphasis on the work of disabled working-age individuals in the carpet industry and urged the other trainers to

use this as an example during their own training to ensure the successful streamlining of polio-affectees into Pakistan’s workforce.

In order to sensitize participants and raise awareness on the matter, participants shared individual experiences linked to polio-affectees and working-age individuals. Most of the high-priority TEVTAs are located in smaller districts of Pakistan where trainers aimed to raise awareness through word-of-mouth. Additionally, they spoke of success stories and considered using these experiences as sources of inspiration during their own trainings for polio-affectees. Trainers were quick to suggest several untapped avenues to maximize the potential of this training.

It is imperative to note that although polio-affectees may require special attention and training, it must be delivered without compromising their dignity and self-esteem.

The idea is to train polio-affectees and equip them with the ability to earn a respectable living. The TEVTAs of these high-priority districts will carry out these trainings through the coordination and support of NAVTTC.

The pattern of the training is such that it will aim to merge the training of Life Skills Curriculum into the training polio-affectees will receive. Earlier in 2012, the Education Programme at UNIDO along with GIZ and NAVTTC developed a Curriculum on Life Skills.

The Life Skills component of this training will impart knowledge on the use of ‘soft skills’. This will result in employees who have:

Effective communication skills	A knack for internal and external customer care	Plain “common sense”	A good work ethic	Flexible attitude and are self-driven
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Since polio-affectees are disconnected from the mainstream workforce, their inclusion through the use of Life Skills Curriculum will make their transition into Pakistan’s mainstream workforce smoother. If trainings consist of five sessions per week, three will consist of technical training for polio-affectees while the other two will incorporate ‘Life Skills’ trainings, thereby making it more effective and successful.

UNIDO hopes that the creation of these curricula will serve the purpose for which they were made i.e. the rehabilitation of working-age disabled individuals through technical training programs in employable skills, so that they may contribute socially and economically in their respective communities.

Furthermore, it is hoped that this training will serve to educate and sensitize local communities, particularly illiterate people & workers, on measures for prevention against fatal diseases and the benefits of early intervention while also mobilizing support in local communities for the polio eradication drive.

1. Curriculum Specification for Gemologist

- Overall objective of course

- The overall objective of Curriculum of gemology is to give students all required knowledge about gemstones, their occurrences, their physical and chemical properties and the internationally employed scientific methods for the identification and grading of Gemstones. After completion of this Curriculum the certificate holder in Gemology can work anywhere in the world in the gem and jewellery sector or can start his or her own gem and jewellery business with confidence. Those who successfully complete this certificate program will be known as Gemologists.

- Competencies gained after completion of course

- After completion of this Curriculum, the Certificate holder in Gemology can work anywhere the world in the gem and jewellery sector or can start his or her own gem and jewellery business with confidence. Those who successfully complete this certificate program will be known as Gemologists.

- Job opportunities available immediately and in the future

- A huge scope in the job market for the gem and jewellery sector
- A certificate holder can take on the role of an entrepreneur in the Gem and Jewellery sector.
- Every jewellery outlet requires a gemologist.

- Trainee entry level

- Matriculation / Gemstone traders

- Minimum qualification of trainer

- M Sc. Geology/ Graduate with Science
- Diploma in Gemology

- Medium of Instruction i.e. language of instruction

- English / Urdu

- Sequence of the modules

- Module 1:- Gemstone Identification
- Module 2:- Diamond Grading and Pricing
- Module 3:- Colored stone Grading
- Module 4:- Natural, Treated and Synthetic Gemstone Identification
- Module 5:- Marketing Gemstones

2. Overview of the program – Curriculum (for Gemology)

Module Title and Aim	Learning Units	Theory ¹ Days/hours	Workplace ² Days/hours	Timeframe of modules
Gemstone Identification Aim: To identify gemstones correctly	Introduction to Gemology Gemstone Classification Basic Crystallography The Instruments Physical & Optical Properties Inorganic Gem Material Organic Gem Material	62 hours	246 hours	308 hours
Diamond Grading and Pricing Aim: To grade diamond correctly	History , formation and Physical Properties of Diamond Optical Properties of Diamond Colour Grading: Diamond. Clarity Grading. Proportion grading. Finish Grading. Carat weight. Diamond Treatment, substitute and Synthetic Pricing in general.	33 hours	121 hours	154 hours
Colour stone Grading Aim: To Grade colour stones according to the International grading system.	The concept of Grading Colour Clarity Cut Carat weight Grading Enhanced Gemstones	31 hours	123 hours	154 hours

Natural, Treated and Synthetic Gemstone Identification. Aim: to differentiate natural gemstones from Treated and Synthetic gemstones.	Identification of synthetic and treated gemstones Classification of Gemstones Inclusion Treatment of Gemstones Synthetic Gemstones and processes.	31 hrs	123 hrs	154 hours
Marketing Gemstones Aim: To learn gemstone marketing.	Care of gemstones. Packing of gemstones. Price determination. Advertisement. Regular Market visits.	05 hrs	25 hrs	30 hours

3. (Gemology) Curriculum Content (Teaching and Learning Guide)

Module: Title # 1. **Gemstone Identification**

Objective of the Module: **To understand all types of Gemstones and the process of identification.**

Duration:- **308 hours**

Theory:- **62 hours**

Practice:- **246 hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
Introduction to Gemology	The learner will be able to interpret basic concepts of Gemology.	-Introduction to gemology, What is a gemstone?	2hrs	Tweezer 10x Loupe Balance	Class Room
		-Factors which influence the value of gemstones. -Weights and measures -Uses of basic tools like the loupe and tweezers <u>Ability to:</u> -understand gemology and gemstones -use basic tools like 10x loupe and tweezers	8 hrs		
Gemstone	The learner will be able to	-Definition of	02 hrs	Tweezer	Class

Classification	classify gemstones (natural gemstone, synthetic gemstone, manmade gemstone and assembled gemstone.)	Natural, Treated, Synthetic, and Imitation stones. -Visual observations (colour, transparency, cut, phenomena, Luster) <u>Ability to:</u> -distinguish practically between kinds of gems; natural, treated, synthetic, artificial.	08 hrs	10x Loupe	Room
Basic Crystallography	The learner will be able to identify different rough gemstones on the basis of crystal systems.	-Basic Crystallography -Crystalline material, non Crystalline Material and Gemstones -The Crystal Systems <u>Ability to:</u> -Identify gems on the basis of crystal systems.	04 hrs 16hrs	Wooden crystals / glass crystals and rough gemstone crystals.	Class Room
The Instruments	The learner will learn about different gemstone-testing equipment and the use of this equipment for the purpose of gemstone identification.	The Polariscop e and the testing techniques; The Refractometer and its construction, care and use; Pleochroism; the dichroscope & its construction and use; Construction and function of the two types of spectroscop e; The Chelsea colour filter; Use of UV lamp and behavior of different gems under UV light; Magnification Techniques; Internal and External Features of	12 hrs	Poloriscop e Refractom eter Dichrosco pe Spectrosc ope Chelsea Colour Filter UV Lamp Gemologic al Microscop e Specific Gravity Balance	Class Room and Lab

Module # 1 (Gemstone Identification)Duration:- **308 hours**Theory:- **62 hours**Practice:- **246 hours**

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
Introduction to Gemology	02hrs	08hrs	Basics names and different terminology used in gemology.	MCQ's / Questions and Answers	
Gemstone Classification	02 hrs	08hrs	Origin of gemstones in mineralogy.	Questions and Answers	
Basic Crystallography	04 hrs	16 hrs	Basic crystal structure of seven crystal systems.	Practical observation / Theory.	
The Instruments	12 hrs	48 hrs	Use of Gemological instruments.	Practical work	
Physical & Optical properties	06 hrs	24 hrs	Visual Identification with indicators from physical appearance and Gemstones' optical properties.	Practically observe and check gem properties.	
Inorganic Gem Material	24 hrs	96 hrs	Inorganic varieties and groups of gemstones.	Short question answers.	
Organic Gem Material	12 hrs	46 hrs	Identification of all organic gems.	Practical / MCQ's.	

Module: Title # 2. **Diamond Grading and Pricing.**Objective of the Module: **.To understand the 4 C's of Diamond and how to grade a Diamond.**Duration:- **154 hours**Theory:- **33 hours**Practice:- **121 hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
History, formation and Physical Properties of Diamond	The learner will learn about the physical properties of Diamond.	History and formation of diamond ,Mining techniques, Construction and use of binocular microscope, Demonstration of a 10x triplet loupe Creating dark-field illumination for a loupe, The four C's that determine diamond value – Introduction Physical properties of diamond, Crystallography of	05 hrs	Microscope 10x loupe	Class Room

		<p>diamonds</p> <p><u>Ability to:</u></p> <p>understand the use of binocular microscope and IOx triplet loupe</p> <p>Identify Diamond in its rough form.4C's of Diamond</p>	16hrs		
Optical Properties of Diamond	The learner will learn about the Optical properties of Diamond.	<p>Optical properties of diamond, , How light travels through a diamond.</p> <p><u>Ability to:</u></p> <p>Understand the Optical properties of Diamond,</p>	05 hrs 16hrs	Microscope	Class Room
Colour Grading: Diamond.	The learner will be able to grade diamond by its colour.	<p>-Colour-grading nomenclature</p> <p>-Colour-grading procedure</p> <p>-Fluorescence</p> <p><u>Ability to:</u></p> <p>grade a diamond by its colour. Use ultraviolet unit for diamond colour grading.</p>	04 hrs 17hrs	Diamond colour chart or set, ultraviolet unit	Lab
Clarity Grading.	The learner will learn about the clarity grade of Diamonds.	<p>Defining the GIA clarity grades, Factors influencing the clarity grade, Clarity grading procedures, Why, when and what to plot, Plotting symbols</p> <p><u>Ability to:</u></p> <p>Carry out diamond clarity grading and plotting</p>	04 hrs 17 hrs	Clarity Chart or Representative samples of diamonds and Loupes.	Lab
Proportion	The learner will be able to	Tolkowsky's ideal	03 hrs	Transparent	Lab

grading.	learn about different types of cuts and the parameters for ideal cuts.	<p>proportions Girdle thickness estimation Culet size estimation, Methods of estimating table percentage, Crown angle estimation, Pavilion depth percentage estimation Proportion grading</p> <p><u>Ability to:</u></p> <ul style="list-style-type: none"> -Examine all 58 facets -Observe the line across the star facets -Tabulate percentage estimation -Examine girdle and culet - Calculate: depth percentage Girdle thickness estimation Culet size estimation <p><u>Ability to:</u></p> <p>Tabulate percentage estimation, Crown angle estimation, Pavilion depth percentage estimation, Overall proportion grade</p>	11hrs	measuring tape or vernier caliper	
Finish Grading.	The learner will be able to check the final grade of diamonds, i.e., Polish and overall appearance.	<p>Fancy cut diamonds and fancy coloured diamonds. Finish grading of diamonds.</p> <p><u>Ability to:</u></p> <p>Judge the ideal polish grade.</p>	03 hrs 11 hrs	Loupes.	Lab
Carat weight.	The learner will learn the value of diamonds according to their weight.	<p>Carat weight and weight estimation, Diamond weight-estimation formulae</p> <p><u>Ability to:</u></p> <ul style="list-style-type: none"> -Calculate a diamond's weight 	03 hrs 11hrs	Carat weight scale.	Class Room And Lab

		miscellaneous gemstone grading (of colour and clarity) -Understand gemstone grading by varieties of corundum			
Colour	The learner will be able to identify colour within proper colour parameters.	-Description of colour (Hue, tone, saturation). -Method of using International Standard Colour Chart. <u>Ability to:</u> -Judge the Colour of gemstones using International Standard Colour Chart	06 hrs 22hrs	Daylight lamp, Loupes and colour charts or colour wheel.	Class Room And lab
Clarity	The learner will learn to check the clarity and transparency of coloured gemstones.	-Clarity of gemstones, -Inclusions (impurities) -Clarity grades according to GIA standard. <u>Ability to:</u> -assign a clarity grade.	05 hrs 23 hrs	Necked eye, Loupes and Microscope,	Class Room And lab
Cut	The learner will learn different types of cuts and their proportions.	-Types of cuts -International standards of cuts -Use of the vernier caliper. <u>Ability to:</u> Identify different cuts.	05 hrs 23 hrs	Note Book. vernier caliper.	Class Room And Lab
Carat weight	The learner will learn the value of coloured gemstones according to their weight.	-Carat weight -Carat weight balance -Procedure of operating carat	06 hrs	Carat weight balance and tweezers	Lab

Module 4: (Natural, Treated and Synthetic Gem Identification)

Duration:- **154 hours**

Theory:- **31 hours**

Practice:- **123 hours**

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
Natural, Treated and Synthetic Gem Identification.	07 hrs	28 hrs	Detection of fake gemstones, separation of treated and synthetic gemstones.	Visual observation (practical demonstrations).	
Classification of Gemstone	06 hrs	22 hrs	Origin of gemstones in mineralogy.	Questions and Answers	
Inclusion	07 hrs	28 hrs	Internal study of gems.	Observation MCQ's	
Treatment of Gemstone	07 hrs	28 hrs	Different ways to enhance gemstones.	Question and answers MCQ's	
Synthetic Gemstone and processes.	04 hrs	17 hrs	Artificial methods of Gem formation in the Lab.	Theory MCQ's Questions and answers.	

Module: Title # 4. **Marketing gemstones.**

Objective of the Module:

In this module students will learn to market gemstones.

Duration:- **30 hours**

Theory:- **05 hours**

Practice:- **25 hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
Care of Gemstones	The learner will learn about different techniques used for cleaning and ensuring the safety of gemstones	Detailed instruction regarding cleaning of mineral specimens/ gemstones during jewellery repair Ability to: -clean and care for gemstones	01 hrs 05 hrs	Detergent, oil and ultrasonic machine	Lab
Packing Gemstones.	The learner will learn how to pack different gemstones.	-Methods adopted during Packing of rough gemstones and cut gemstones.	01 hrs 05 hrs	Packing material and labeling machines.	Lab

		<p>-Use of different kinds of packing material</p> <p><u>Ability to:</u></p> <p>Pack gemstones.</p>			
Price determination	The learner will learn to assign a price to gemstones.	<p>Pricing on the basis of 4C's and different expenses involved in packing</p> <p><u>Ability to:</u></p> <p>Assign an appropriate price to gemstones.</p>	<p>01 hrs</p> <p>05 hrs</p>	Note Book	Class Room
Advertisement	The learner will learn to market different gemstones.	<p>Different means of marketing, for example: electronic, print etc</p> <p><u>Ability to:</u></p> <p>Market gemstones.</p>	<p>01 hrs</p> <p>05 hrs</p>	Note Book	Class Room
Regular Market visits.	The learner will learn to collect information from the local gemstone market.	<p>-Visiting local markets and attending local gem bazaar exhibitions to guide the students in updating marketing information.</p> <p><u>Ability to:</u></p> <p>-Buy gemstones at reasonable prices.</p>	<p>01 hrs</p> <p>05 hrs</p>		Gemstone Market.

Module 5 (Marketing Gemstones)

Duration:- **30 hours**

Theory:- **05 hours**

Practice:- **25 hours**

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
Care of gemstones	01 hrs	05 hrs	Techniques for proper care	Observation	
Packing of gemstones	01 hrs	05 hrs	Packing techniques	Observation	
Price determination	01 hrs	05 hrs	Pricing techniques	Observation	
Advertisement	01 hrs	05 hrs	Different techniques for advertisement	MCQ's	
Regular Market visits.	1 hrs	5 hrs	Visiting the market	Observation	

- Assessment context
- Critical aspect
- Assessment condition
- Resources required for assessment

2. List of Tools, Machinery & Equipment

Name of Trade	Gemology
Duration	Six Months

Sr. No.	Name of Item/ Equipment / Tools	Qty.
1.	Tweezers	1
2.	10 X Loupes	1
3.	Poloriscope	1
4.	Refractometer	1
5.	Hardness Pencil	1
6.	Specific Gravity Balance	1
7.	Spectroscope	1
8.	Dichroscope	1
9.	Chelsea Colour Filter	1
10.	UV Lamp	1
11.	Gemological Microscope	1
12.	Ultrasonic Machine for cleaning gemstones.	1
13.	Labeling Machine	1
14.	Diamond Tester (Thermal conductivity test)	
	List of Stones	

1.	Actinolite	10
2.	Aquamarine	10
3.	Amber	10
4.	Andalusite	10
5.	Apatite	10
6.	Chalcedony	5
7.	Cathaystone	5
8.	Chrysoberyl	10
9.	Chrysoberyl. Cats-eye	5
10	Chrysoberyl (Syn.)	10
11	Chrysocolla	10
12	Coral. Imitation (Gilson)	10
13	Coral. Black & Gold	10
14	Syn. Ruby (FF)	10
15	Syn. Ruby (Flux)	10
16	Sapphire (Natural)	10
17	Syn. Blue Sapphire	10
18	Syn. CC Sapphire	10
19	Syn. O Sapphire	10
20	Sapphire - Surface Diffused	10
21	Corundum Doublet	5
22	Danburite	5
23	Diamond & Simulants	5
24	GGG	5
25	Strontium titanate	5
26	Syn. CZ/Rutile	5
27	Syn. Moissanite	5
28	YAG	5
29	Diopside	10
30	Emerald (syn.)	10

31	Enstatite	5
32	Garnet	10
33	Pyrope / Almandine	10
34	Pyrope / Spessartine	10
35	Spessartine / Almandine	10
36	Garnet Doublet	5
37	Idocrase	10
38	Iolite	10
39	Ivory	10
40	Jadeite	10
41	Jet	10
42	Labradorite	10
43	Lapis Lazuli. Imitation (Gilson)	10
44	Quartz (Microcrystalline, Tiger's eye)	10
45	Quartz (Syn.)	10
46	Rhodochrosite	10
47	Scapolite	10
48	Serpentine	10
49	Shell	10
50	Slocum Stone	5
51	Sodalite	10
52	Spinel (Syn.)	10
53	Sugilite	10
54	Tektite	10
55	Zoisite	10
56	Nephrite	10
57	Obsidian	10
58	Oligoclase Feldspar (Sunstone)	10
59	Opal Doublet	5
60	Opal Triplet	5

61	Opal Syn.	10
62	Pearl (Cultured)	5
63	Pearl (Natural)	5
64	Natural Emerald	10
65	Natural Ruby	10

3. List of Consumable Supplies

Name of Trade	Gemology
Duration	Six Months

Sr. No.	Name of Consumable Supplies
1.	R.I liquids
2.	Oil and Detergent
3.	Packing material.