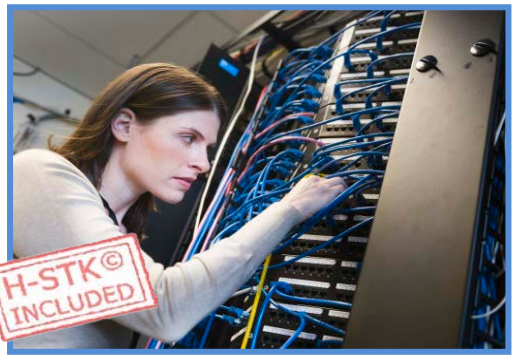
COURSE OVERVIEW IE0012

Certified Fiber Optics Professional (CFOP)
Fiber Optics Access Network Planning

Course Title
Certified Fiber Optics Professional (CFOP):
Fiber Optics Access Network Planning



Course Reference
IE0012

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	January 08-12, 2024	Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	March 03-07, 2024	Club B Meeting Room, Ramada Plaza by Wyndham Istanbul City Center, Istanbul, Turkey
3	June 02-06, 2024	Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA
4	September 01-05, 2024	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Description

This practical and highly-interactive course includes practical sessions and exercises where participants carryout fiber optic splicing, testing and troubleshooting. Theory learnt in the class will be applied using our state-of-the-art equipment.

The rapidly changing face of data communications and telecommunications has seen a continued growth in the need to transfer enormous amounts of information across large distances. The technologies that were used extensively in the past such as coaxial cable, satellite and microwave radio for transferring information were running out of capacity. With the introduction of fiber optic communications systems, the solution to the problems of transmission capacity shortage and to noisy industrial environments has been successfully found.

Fiber optic transmission has become one of the most exciting and rapidly changing fields in telecommunications engineering. An optical fiber is simply a very thin piece of glass which acts as a pipe, through which light can pass. The light that is passed down the glass fiber can be turned on and off to represent digital information or it can be gradually changed in amplitude, frequency or phase to represent analog information.

Fiber optic transmission systems have many advantages over more conventional transmission systems. They are less affected by noise, do not conduct electricity and therefore provide electrical isolation, carry extremely high data transmission rates and carry data over very long distances. These and other advantages will be discussed in detail in this course.

Fiber optic transmission systems are not perfect and there are difficulties involved in designing, implementing, and operating fiber optic communications systems. This course is designed to provide a thorough background to fiber optic communications systems and to illustrate the design and installation of these systems. The many pitfalls associated with the implementation of fiber optic systems will be discussed and workable solutions to these problems will be provided in this course.

This course will provide an extensive overview of the construction, operation and applications of optical fiber, with more emphasis on installation and troubleshooting. The course will give both the novice and the experienced participant a solid grasp of the principles and practical implementation of fiber optic cabling for industrial applications.

The course is designed to provide delegates with a detailed and up-to-date overview on the fiber optics access network planning. Participants will be provided with knowledge and skills to analyze optical fiber cables problems and adjust the splicing and termination of the optical fiber cables; employ optical fiber systems configurations and calculations; identify its components; evaluate optical fiber networks working in SDH; and follow the errors of the SDH networks.

The course will also cover the SDH fundamentals graphical introduction; SDH fundamentals revision; SDH & PHD comparison; SDH overview; network topology structures, protection classification, directional and fiber protection; SDH networks problems and its solutions; SDH networks graphical introduction; and WDM.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Get certified as a "*Certified Fiber Optics Professional (CFOP)*"
- Specify and describe fiber optic communications systems in total
- Gain **practical hands-on experience** in jointing, splicing and testing fiber optic systems and use correct procedures for cable installation and termination
- Recognize fiber optic termination patch panels and identify the various types of adapters and its merits/demerits
- Design and install a fully operational fiber optics system
- Evaluate optical fiber networks working in SDH and follow the errors of the SDH networks
- Discuss the SDH fundamentals graphical and revision and the SDH and PDH comparison and SDH overview
- Identify the network topology structures, protection classification, directional and fiber protection as well as explain the SDH networks problems and its solutions
- Explain the SDH networks graphical and WDM

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor's actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of fiber optics technology and fiber optics access network planning for engineers and other technical staff within instrumentation, control, communications, telecommunications, electrical and IT fields. This includes project, maintenance and consulting staff, systems and applications engineers.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

Abu Dhabi	**US$ 6,000** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Istanbul	**US$ 6,500** per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Al Khobar	**US$ 6,000** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	**US$ 6,000** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

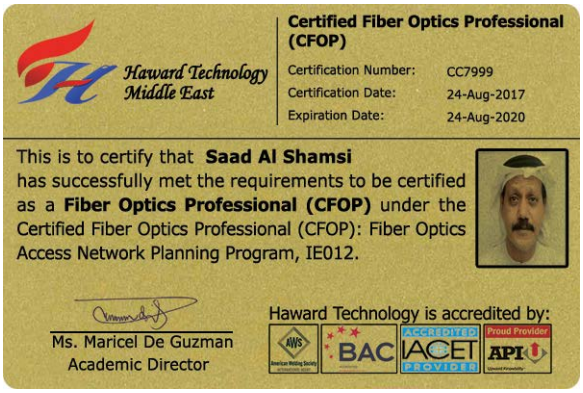
Course Certificate(s)

(1) Internationally recognized Wall Competency Certificates and Plastic Wallet Card Certificates will be issued to participants who completed a minimum of 80% of the total tuition hours and successfully passed the exam at the end of the course. Successful candidate will be certified as a *"Certified Fiber Optics Professional (CFOP)"*. Certificates are valid for 5 years.

Recertification is FOC for a Lifetime.

Sample of Certificates

The following are samples of the certificates that will be awarded to course participants:-



(2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.

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Haward Technology Middle East

Continuing Professional Development (HTME-CPD)

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CEU Official Transcript of Records

TOR Issuance Date: 24-August-17

HTME No. PAR213687

Participant Name: Saad Al Shamsi

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
IE012	**Certified Fiber Optics Professional (CFOP): Fiber Optics Access Network Planning**	August 20-24, 2017	30	3.0

Total No. of CEU's Earned as of TOR Issuance Date **3.0**

TRUE COPY

Maricel De Guzman
Academic Director

Haward Technology has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 1760 Old Meadow Road, Suite 500, McLean, VA 22102, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2013 Standard which is widely recognized as the standard of good practice internationally. As a result of their Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for programs that qualify under the ANSI/IACET 1-2013 Standard.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking Continuing Education Units (CEUs) in accordance with the rules & regulations of the International Association for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology is accredited by

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Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Dr. Mike Tay, PhD, MSc, BSc, is a **Senior Electrical**, **Instrumentation & Communications Engineer** with over **35 years** of extensive experience. His expertise widely covers **Protection Relay Maintenance**, **Application** & **Testing**, **System Analysis**, **Power System Faults**, **Protection Scheme Components, Current** & **Voltage Transformers**, **Power System Neutral Grounding**, **Feeder Overcurrent Protection**, **Electrical Protection Systems**, **Bus Protection**, **Motor Protection**, **Starting** & **Control**, **Transformer Protection**, **Generator Protection**, **Capacitor Protection**, **Numerical Relays**, **SCADA Security**, **ESD System Analysis** & **Control**, **Electrical** & **Instrumentation**, **Installation & Inspection**, **Custody Measurement**, **Loss Control** for **Petroleum Products**, **Process Control** & **Instrumentation**, **Fiber Optics Access Network Planning**, **Safety Instrumented System** (**SIS**), **Safety Integrity Level** (**SIL**), **PLC Design**, **Power System**, **Power Supply Design Management**, **Basic Electronics & Transformers**, **Diesel Generator**, **Electric Motors**, **Electrical Fundamentals**, **Basic Electricity** & **Electrical Codes**. Further, he is also well-versed in **Communications**, **Telecommunications**, **Mobile Protocols**, **4G LTE**, **GSM/UMTS**, **CMDA2000**, **WIMAX Technology**, **HSPA+**, **Alarm Management System**, **Computer Architecture**, **Logic & Microprocessor Design**, Embedded Systems Design plus **Computer Networking** with **CISCO**, **Network Communication**, **Industrial Digital Communication**, **Designing Telecommunications Distribution System**, **Electrical Engineering**, **WiMAX Broadband Wireless System**, **TT Intranet** & **ADSL Network**, **TT Web** & **Voicemail**, **Off-site ATM Network**, **IT Maintenance**, **Say2000i**, **IP Phone**, **National Address** & **ID Automation**, **Electricity Distribution Network**, **Customs Network** & **Maintenance**, **LAN** & **WAN Network**, **UYAP Network**, **Network Routing Protocols**, **Multicast Protocols**, **Network Management Protocols**, **Mobile** & **Wireless Networks** and **Digital Signal Processing**. **Currently**, he is the **Technical Advisor** of **Izmir Altek**.

During his career life, Dr. Tay worked with various companies such as the **KOC Sistem**, **Meteksan Sistem**, **Altek BT**, **Yasar University**, **Dokuz Eylul University**, **METU** and occupied significant positions like the **Aegean Region Manager**, **Group Leader**, **Technical Services Manager**, **Field Engineer**, **Research Assistant**, **Instructor**, **Technical Advisor** and the **Dr. Instructor**.

Dr. Tay has **PhD**, **Master** and **Bachelor** degrees in **Electrical & Electronic Engineering** from the **Dokuz Eylul University** and the **Middle East Technical University** (**METU**) respectively. Further, he is a **Certified Instructor/Trainer**, **Technical Trainer (Australia)**, **Trainer** for **Data-Communication System (England & Canada)**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), a **Certified CISCO** (**CCSP**, **CCDA**, **CCNP**, **CCNA**, **CCNP**) **Specialist**, a **Certified CISCO IP Telephony Design Specialist**, **CISCO Rich Media Communications Specialist**, **CISCO Security Solutions** & **Design Specialist** and **Information Systems Security** (**INFOSEC**) **Professional**. He has delivered and presented innumerable training courses and workshops worldwide.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Fiber Optics Systems*** *Introduction • Outline of Course • Historical Background to Fiber Optic • Comparison of Fiber Optics & Copper Systems*
0930 – 0945	*Break*
0945 – 1100	***Definitions, Basic Principles*** *Data Communications • Communications Channels • Transmission Modes • The Electromagnetic Spectrum • Revisiting Copper*
1100 – 1230	***Theory of Fiber Optics Transmission*** *Fundamental Principals of Operation • Light Transmission Nature of Glass • Numerical Aperture • Modal Propagation in Fibers • Multimode/Single Mode/StepIndex/Graded Index • Bandwidth of Fibers • Modal & Chromatic Dispersion • Absorption/Scatter/Bending/Radiation/Mismatches • Other Types of Fibers*
1230 – 1245	*Break*
1245 - 1330	***Construction of Fiber Optic Cables*** *Cable Objectives • Tensile Ratings • Structural Elements • Housings – Loose Tube/Slotted Core/Tight Buffered • Sheaths & Moisture Barriers • Classes of Cables – Aerial/Underground/Sub Aqueous/Indoor*
1330 - 1420	***Connecting Fibers*** *Optical Connection Issues • Fiber End Preparation • Splicing Fibers – Fusion/Mechanical • Connectors • Optical Couplers*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Practical Session #1 - Optical Connectors*** *Each Delegate to Fit One ST & One SC Connector to a Cable & Inspect the Connectors*
0830 - 0930	***Practical Session #2- Fusion Splicing*** *Each Student to Make a Fusion Splice in their Cable*
0930 – 0945	*Break*
0945 – 1100	***Optical Drivers & Detectors*** *Light Emitting Diodes • Lasers • Transmitters Modules • Safety Considerations• PIN Photodiodes • Receiver Modules • Optical Amplifiers*

1100 – 1230	***Fiber Optic Termination Patch Panels*** *Compact Fiber Optic Patch Panel • Wall Mounted Optical Fiber Patch Panels • Rack Mounted Optical Fiber Termination Panel • Splice Trays • Terminal Blocks & Patch Panels • Enclosures, Racks & Equipment Housings • Faceplate Slide-Out Mechanism*
1230 - 1245	*Break*
1245 – 1420	***Types of Adapters & its Merits/Demerits*** *Optical Fiber Connectors – Duplex 568SC Adapter • Optical Fiber Connectors – simplex ST - ST Adapter • Other Fiber Optic Adapters*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Installing Fiber Optic Cables*** *Initial Preparation – Site Survey/Design • General Installation Rules & Procedures • Bending Radius/Cable Tension/Cable Reels • Cable Trays/Conduits/Lubricants •Indoor Cable Installation/Leaving Extra Cable • Outdoor Cable Installation/Environmental Conditions • Splicing Trays / Organizers /Termination Cabinets/Patch Panels / Distribution Panels / Breakout Boxes*
0830 – 0930	***Fiber Optics System Design*** *Initial Design Considerations • Future Capacity/Reliability/Operation Wavelength • Repeaters & Amplifiers • Design Loss Calculations/Link Loss Budgets • Design Bandwidth Calculations*
0930 – 0945	*Break*
0945 – 1145	***Testing of Fiber Optic Systems*** *Concepts of Optical Measurement • Continuity Testing • Insertion Loss Testing • Optical Time Domain Reflectometry (OTDR) • Bit Error Rate (BER) Testing • Eye Diagrams • Laboratory Fiber Tests*
1145 – 1200	*Break*
1200 – 1300	***Practical Session #3- Insertion Loss Testing*** *Students to Measure the Insertion Loss of their Cable*
1300 – 1420	***Communication Basics*** *Analog & Digital Signals ● Standard Voice Channel ● Pulse Code Modulation ● Sampling ● Bit Rate ● Band Width ● PDH ● Standard E1 Frame*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 - 0830	***SDH*** *SDH Standards ● SDH Multiplexing Principle ● SDH Frame ● SDH Network Elements*
0830 – 0930	***SDH Hierarchy*** *SDH Hierarchy Details ● Frame Components*
0930 - 0945	*Break*
0945 – 1100	***SDH Frame Details & Transport Modules*** *Path Overheads ● Section Overheads ● STM-1 ● STM-n*
1100 – 1230	***SDH Fundamentals Graphical Introduction & Revision***
1230 - 1245	*Break*
1245 - 1420	***SDH & PDH Comparison & SDH Overview***
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5

0730 – 0830	***Network Topology Structures*** *Classification of Topology Structures (Chain, Star, Tree, Ring & Mesh) ● Sub Network ● Survival Networks*
0830 – 0930	***Protection Classification*** *Linear Protection ● Protection Rings ● PP Ring ● MSP Ring ● SNCP*
0930 – 0945	*Break*
0945 – 1045	***Directional & Fiber Protection*** *Unidirectional & Bidirectional Rings ● 2 & 4 Fibers Protection Rings*
1045 - 1130	***SDH Networks Revision, SDH Networks Problems & Its Solutions***
1130 - 1230	***SDH Networks Graphical***
1230 - 1245	*Break*
1245 - 1300	***WDM***
1300 – 1315	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1315 – 1415	***COMPETENCY EXAM***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout fiber optic splicing, testing and troubleshooting exercises using the following state-of-the-art fiber optics technology and equipment, suitable for classroom training.

FSM-50S PROFILE ALIGNMENT FUSION SPLICER

Features & Capabilities:

- Fully automatic core alignment with 9 second splice time for SM fibre
- Reduced splice protector shrink time – now only 35 seconds
- Extremely compact & lightweight – just 2.8kg
- Automatic fibre-type identification
- Multi-position monitor for front or top mounting
- Real-time arc calibration
- Fibre clamps integrated into wind protector to reduce operation time

OptiFiber® OTDR

Features & Capabilities:

- Integrates power/loss, fiber length measurement, OTDR analysis and fiber connector end-face imaging
- allows network owners of any experience level to certify fiber to industry specifications and standards, troubleshoot links, and thoroughly document results
- makes dual wavelength OTDR measurements - 850/1300 nm or 1310/1550 nm
- identifies and characterizes the fiber link and its events
- compares the results to user-defined limits for immediate pass/fail link and event certification

Course Coordinator

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