



COURSE OVERVIEW IE0008

Certified Fiber Optics Technology & Access Network Planning

Course Title

Certified Fiber Optics Technology & Access Network Planning

Course Date/Venue

Session 1: September 08-12, 2024/Club B Meeting Room, Ramada Plaza by Wyndham Istanbul City Center, Istanbul, Turkey

Session 2: December 09-13, 2024/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE



Course Reference

IE0008



Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

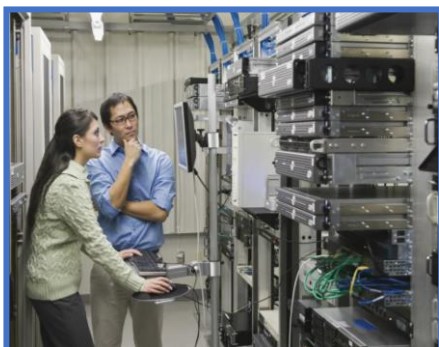
Course Description



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 a state-of-the-art fiber optics technology and equipment suitable for in-class training.



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 fiber optic communication systems, the solution to the problems of transmission capacity shortage and to noisy industrial environments has been successfully found.



The course is designed to provide delegates with a detailed and up-to-date overview on the fiber optics technology in general and the fiber optics access network planning in particular. 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; 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 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)*”
- Apply state of the art fiber optics technology, installation practices and access network planning
- 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
- Implement the latest approaches in troubleshooting fiber optics
- Discuss communication basics covering analog and digital signals, standard voice channel, pulse code modulation, sampling, bit rate, band width, PDH and standard E1 frame
- Explain SDH standards, SDH multiplexing principle, SDH frame and SDH network elements
- Describe SDH hierarchy, SDH frame details and transport modules
- Differentiate the SDH fundamentals graphical, SDH fundamentals revision, SDH & PHD comparison and SDH overview
- Illustrate network topology structures, protection classification and directional & fiber protection
- Recognize SDH networks revision, problems and its solutions
- Identify the SDH networks graphical introduction and WDM

Who Should Attend

This course covers systematic techniques and methodologies on fiber optics technology in general and the fiber optics access network planning in particular. It is suitable for communications and IT engineers and other engineers and technical staff who are working with optical fiber and SDH networks and who are involved in fiber optics including instrumentation, control, electronics and electrical.

Course Fee

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.
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.





Course Certificate(s)

(1) Internationally recognized Wall Competency Certificates and Plastic Wallet Card Certificates will be issued to participants who have successfully completed the course and 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)

CEUs

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CEU Official Transcript of Records

TOR Issuance Date: 14-Nov-19

HTME No. 8667-2014-9020-2555

Participant Name: Abdulsatar Al Otaibi

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
IE0008	Certified Fiber Optics Technology & Access Network Planning	November 10-14, 2019	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), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, 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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Course Accreditations


Certificates are accredited by the following international accreditation organizations: -

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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.

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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.

Accommodation

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





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 in Circuit Breaker, HV Switchgear Operation & Maintenance, HV/LV Equipment, High Voltage Electrical Safety, LV & HV Electrical System, HV Equipments Inspection & Maintenance, LV Distribution Switchgear & Equipment, 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.



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 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 and 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 and Copper Systems • Data Communications • Communications Channels • Transmission Modes • The Electromagnetic Spectrum • Revisiting Copper
0930 – 0945	Break
0945 – 1100	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
1100 – 1215	Theory of Fiber Optics Transmission (cont'd) Bandwidth of Fibers • Modal and Chromatic Dispersion • Absorption/Scatter/Bending/Radiation/Mismatches • Other Types of Fibers
1215 – 1230	Break
1230 – 1420	Construction of Fiber Optic Cables Cable Objectives • Tensile Ratings • Structural Elements • Housings – Loose Tube/Slotted Core/Tight Buffered • Sheaths and Moisture Barriers • Classes of Cables – Aerial/Underground/Sub Aqueous/Indoor
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One



Day 2

0730 – 0930	Connecting Fibers <i>Optical Connection Issues • Fiber End Preparation • Splicing Fibers – Fusion/Mechanical • Connectors • Optical Couplers</i>
0930 – 0945	<i>Break</i>
0945 – 1100	Practical Session #1 - Optical Connectors <i>Each Delegate to Fit One ST & One SC Connector to a Cable and Inspect the Connectors</i>
1100 – 1215	Practical Session #2- Fusion Splicing <i>Each Student to Make a Fusion Splice in their Cable</i>
1215 – 1230	<i>Break</i>
1230 – 1420	Optical Drivers and Detectors <i>Light Emitting Diodes • Lasers • Transmitters Modules • Safety Considerations • PIN Photodiodes • Receiver Modules • Optical Amplifiers</i>
1420 – 1430	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow</i>
1430	<i>Lunch & End of Day Two</i>

Day 3

0730 – 0930	Fiber Optic Termination Patch Panels <i>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</i>
0930 – 0945	<i>Break</i>
0945 – 1100	Types of Adapters & its Merits/Demerits <i>Optical Fiber Connectors – Duplex 568SC Adapter • Optical Fiber Connectors – simplex ST - ST Adapter • Other Fiber Optic Adapters</i>
1100 – 1215	Installing Fiber Optic Cables <i>Initial Preparation – Site Survey/Design • General Installation Rules and 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</i>
1215 – 1230	<i>Break</i>
1230 – 1300	Fiber Optics System Design <i>Initial Design Considerations • Future Capacity/Reliability/Operation Wavelength • Repeaters and Amplifiers • Design Loss Calculations/Link Loss Budgets • Design Bandwidth Calculations</i>
1300 – 1330	Testing of Fiber Optic Systems <i>Concepts of Optical Measurement • Continuity Testing • Insertion Loss Testing • Optical Time Domain Reflectometry (OTDR) • Bit Error Rate (BER) Testing • Eye Diagrams • Laboratory Fiber Tests</i>
1330 - 1430	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow</i>
1430	<i>Lunch & End of Day Three</i>



Day 4

0730 – 0930	Practical Session #3- Insertion Loss Testing <i>Students to Measure the Insertion Loss of their Cable</i>
0930 – 0945	Break
0945 – 1100	Communication Basics <i>Analog and Digital Signals • Standard Voice Channel • Pulse Code Modulation • Sampling • Bit Rate • Band Width • PDH • Standard E1 Frame</i>
1100 – 1215	SDH <i>SDH Standards • SDH Multiplexing Principle • SDH Frame • SDH Network Elements</i>
1215 – 1230	Break
1230 – 1300	SDH Hierarchy <i>SDH Hierarchy Details • Frame Components</i>
1300 – 1330	SDH Frame Details & Transport Modules <i>Path Overheads • Section Overheads • STM-1 • STM-n</i>
1330 – 1400	SDH Fundamentals Graphical
1400 - 1430	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow</i>
1430	Lunch & End of Day Four

Day 5

0730 – 0930	SDH Fundamentals Revision
0930 – 0945	Break
0945 – 1000	SDH & PDH Comparison & SDH Overview
1000 - 1100	Network Topology Structures <i>Classification of Topology Structures (Chain, Star, Tree, Ring & Mesh) • Sub Network • Survival Networks</i>
1100 – 1215	Protection Classification <i>Linear Protection • Protection Rings • PP Ring • MSP Ring • SNCP</i>
1215 – 1230	Break
1230 – 1245	Directional & Fiber Protection <i>Unidirectional and Bidirectional Rings • 2 & 4 Fibers Protection Rings</i>
1245 - 1300	SDH Networks Revision, SDH Networks Problems and Its Solutions
1300 - 1315	SDH Networks Graphical
1315 - 1330	WDM
1330 – 1345	Course Conclusion <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course</i>
1345 – 1400	COMPETENCY EXAM
1400 – 1430	<i>Presentation of Course Certificates</i>
1430	Lunch & End of Course

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



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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