



**ITU Centres of Excellence Network for Arab Region
Smart Tunisian Technoparks
(S2T)**

**Face-to-Face Training on
“Fundamentals of Fiber and Optical Networks”
Tunis - Tunisia, 30 March – 3 April 2020**

COURSE OUTLINE

COURSE DESCRIPTION

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| Title | Fundamentals of Fiber and Optical Networks |
| Objectives | <p>This course is designed for technical professionals who require an introduction to fiber optics technology. This course will help professionals who will be involved in installation, deployment, and maintenance of optical fiber network.</p> <p>As data rates increase and systems become more complex there are more factors that can impair system performance. This course is designed to help you master the fiber optic tests that are required to prove that advanced fiber infrastructures can support high data rate applications (10, 40, 100 and 400 Gb/s) as well as extended wavelength range operation for DWDM and CWDM systems. Typically, it is necessary to characterize fibers when dark fiber contracts are signed, to prove that the fibers will operate satisfactorily for the duration of the contract period.</p> <p>You will learn to apply the full power of multi-purpose test platforms with their powerful array of measurement capabilities to carry out these tests including bi-directional OTDR testing, chromatic dispersion, Polarization Mode Dispersion (PMD) and spectral attenuation. You will be able to process the results swiftly and efficiently, using test report software, to provide full system documentation.</p> |
| Dates | 30 March – 3 April 2020 |
| Duration | 5 Days |
| Registration deadline | 20 March 2020 |
| Training fees | 500 USD |
| Course code | 20WS24932ARB-A |

LEARNING OUTCOMES

This training is supposed to provide all participants with extensive insights and practices about “Fundamentals of Fiber and Optical Networks”.

The main purpose of this training is to:

- ✓ Understand the technical concepts of a fiber optic network.
- ✓ Have a working methodology for installers on preparation, connection and control.
- ✓ Explain the terminology and principles of technical bases connections and measures used on optical networks.
- ✓ Acquire knowledge to be able to connect, monitor, analyze and interpret the results of measurements on fiber optic networks.

TARGET POPULATION

This training is intended for manufacturers, installers, infrastructure operators, Internet service providers, content and services providers, local authorities and any person involved in a project around the receipt of fibre optical among enterprises, data centers, individuals, local authorities, etc.

TUTORS/INSTRUCTORS

| NAME OF TUTOR(S)/INSTRUCTOR(S) | CONTACT DETAILS |
|---|-----------------------|
| Mourad MENIF is an engineer and Professor and a researcher at Sup'Com (Higher School of Communication of Tunis) Dr. Mourad MENIF is delivering seminars in wide variety of subjects related to telecom and network at an international level with ITU (International Telecommunication Union). | Mourad.mnif@supcom.tn |

EVALUATION

- I. Post Test.
- II. Case Study.
- III. Field work assignment.

TRAINING SCHEDULE AND CONTENTS / AGENDA

| Date for 1 st day | Time; Start time | Topics/Activities |
|------------------------------|------------------|---|
| 30/03/2020 | 08:00 - 8:30 | Registration |
| | 09:00 - 12:00 | LIGHT IN OPTICAL FIBRES <ul style="list-style-type: none">– How fibers work– Single mode fiber– Launch conditions– Attenuation– Dispersion– Bend loss performance |
| | 12:00 - 14:00 | Lunch time |
| | 14:00 - 17:00 | OPTICAL FIBRES <ul style="list-style-type: none">– Optical fibers for telecoms |

| | | <ul style="list-style-type: none"> – Fiber standards (G652, G653, G654, G655, G656, G657) |
|------------------------------|------------------|--|
| Date for 2 nd day | Time; Start time | Topics/Activities |
| 31/03/2020 | 09:00 - 12:00 | PREPARING FOR FIBRE CHARACTERISATION <ul style="list-style-type: none"> – Specification of parameters – Fiber characterization systems and resources checklists – Management of test results – Reference procedures – Measurement procedures |
| | 12:00 - 14:00 | Lunch time |
| | 14:00 - 17:00 | INSPECT & CLEAN CONNECTORS <ul style="list-style-type: none"> – Why do we inspect & clean? – Inspection standards – Inspection equipment – Cleaning equipment – Connector care |
| Date for 3 rd day | Time; Start time | Topics/Activities |
| 01/04/2020 | 09:00 - 12:00 | ILM & SPECTRAL ATTENUATION <ul style="list-style-type: none"> – Continuity checking – Power & loss budgets – Insertion loss measurements – Spectral attenuation – Live fiber identifiers |
| | 12:00 - 14:00 | Lunch time |
| | 14:00 - 17:00 | OTDR TESTING <ul style="list-style-type: none"> – What is OTDR testing? – Distance measurements – Fiber loss measurements – Bending losses – Splice loss measurement – Connector losses – Link return loss (ORL) |
| Date for 4 th day | Time; Start time | Topics/Activities |
| 02/04/2020 | 09:00 - 12:00 | OTDR LIMITATIONS <ul style="list-style-type: none"> – Dynamic range – Dead zone – Resolution – Ghosts – Fiber mismatches |
| | 12:00 - 14:00 | Lunch time |

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|------------------------------------|-------------------------|--|
| | 14:00 - 17:00 | Practical session: OTDR <ul style="list-style-type: none"> – Setting OTDR test parameters – Lunch cable – Dead zone – Ghosts and Gainers |
| Date for 5th day | Time; Start time | Topics/Activities |
| 03/04/2020 | 09:00 - 12:00 | CHROMATIC DISPERSION <ul style="list-style-type: none"> – CD characteristics of common fiber types – Group delay and dispersion – Phase Shift Techniques POLARISATION MODE DISPERSION <ul style="list-style-type: none"> – Polarisation in fibres – PMD & system performance – Second order PMD – Dynamics of PMD |
| | 12:00 - 14:00 | Lunch time |
| | 14:00 - 16:00 | Practical session: Link acceptance <ul style="list-style-type: none"> – Fiber distances – Cabling losses – Reflections – Chromatic dispersion – PMD |
| | 16:00 - 17:00 | Test Evaluation |

METHODOLOGY

The course's methodology is based on the following types of sessions:

- Theory sessions: Part deal with both basic and advanced concepts, those are directly applicable to professional practices.
- Practical sessions. In these sessions, a set of practical labs will be done to experiment and be familiar with optical fiber concepts.
- This training for maximum 12 people will be held mainly in laboratory as practical training, to ensure trainer availability and ease access to handling materials in optimal conditions (course material included).

COURSE COORDINATION

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| Training Coordinator: Mrs. Houda JARRAYA Focal Point S2T Tel: + 216 70 834 870 Mobile: +216 28 300 878 – +216 97 879 228 | ITU Coordinator: Eng. Mustafa Al Mahdi Programme Administrator Arab Regional Office-ITU Tel: +202 3537 1777 Mobile: +201141177573 |
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| Fax: +216 71 857 803 Email : houda.jarraya@s2t.tn houda.jarraya@gmail.com | Fax : +202 3537 1888 Email : mustafa-ahmed.al-mahdi@itu.int |
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REGISTRATION AND PAYMENT

ITU Academy portal account

Registration and payment should be made online at the ITU Academy portal.

To be able to register for the course you MUST first create an account in the ITU Academy portal at the following address:

<https://academy.itu.int/index.php/user/register>

Training registration

When you have an existing account or created a new account, you can register for the course online at the following link: <https://academy.itu.int/index.php/training-courses/full-catalogue/fundamentals-fiber-and-optical-networks-0>

You can also register by finding your desired course in our training catalogue <https://academy.itu.int/index.php/training-courses/full-catalogue>

Payment

1. On-line payment

A training fee of USD 500 per participant is applied for this training. Payments should be made via the online system using the link mentioned above for training registration at <https://academy.itu.int/index.php/training-courses/full-catalogue/fundamentals-fiber-and-optical-networks-0>

2. Payment by bank transfer

Where it is not possible to make payment via the online system, select the option for offline payment to generate an invoice using the same link as above. Download the invoice to make a bank transfer to the ITU bank account shown below. Then send the proof of payment/copy of bank transfer slip and the invoice copy to Hcbmail@itu.int and copy the course coordinator. All bank transaction fees must be borne by the payer.

Failure to submit the above documents may result in the applicant not being registered for the training.

3. Group payment

Institutional Contacts are users that represent an organization. Any student can request to be an institutional contact or to belong to any existing organization.

To do this, head to your profile page by clicking on the **“My account”** button in the user menu. At the bottom of this page you should see two buttons:

- If you want to **become an institutional contact**, click on the **“Apply to be an Institutional Contact”** button. This will redirect you to a small form that will ask for the organization name. After you fill the name of the organization you want to represent, click on **“continue”** and a request will be created. An ITU Academy manager will manually review this request and accept or deny it accordingly.
- If you want to **belong to an existing organization**, click on the **“Request to belong to an Institutional Contact”** button. This will redirect you to a small form that will ask you to select the organization you want to join from an organization list. After you select the correct organization,

click on “**continue**”, a request will then be created. The Institutional Contact that represents that organization will manually accept or deny your request to join the organization.

ITU BANK ACCOUNT DETAILS:

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|---------------------------|--|
| Name and Address of Bank: | UBS Switzerland AG Case postale 2600 CH 1211 Geneva 2 Switzerland |
| Beneficiary: | Union Internationale des Télécommunications |
| Account number: | 240-C8108252.2 (USD) |
| Swift: | UBSWCHZH80A |
| IBAN | CH54 0024 0240 C810 8252 2 |
| Amount: | USD 500 |
| Payment Reference: | CoE-ARB [24932]-[WBS No. P.40592.1.03] |

4. Other method of payment

If due to national regulations, there are restrictions that do not allow for payment to be made using options 1 & 2 above, please contact the ITU Coordinator for further assistance.