



## ITU CENTRES OF EXCELLENCE NETWORK FOR ASIA PACIFIC REGION

### Online Training Course on “Human Exposure to 5<sup>th</sup> Generation Electromagnetic Fields: Guidelines, Measurements and Case Studies ” 4<sup>th</sup> to 17<sup>th</sup> October 2021

#### COURSE OUTLINE

#### COURSE DESCRIPTION

Title	<b>Human Exposure to 5<sup>th</sup> Generation Electromagnetic Fields: Guidelines, Measurements and Case Studies</b>
Method of delivery	Online Instructor Led
Objectives	<p>5<sup>th</sup> Generation (5G) network is currently in implementation phase. The implementation of key 5G radio technologies such as millimetre wave, beamforming and small cell requires specific guidelines, standards and measurement and methodology if compared to legacy technology. Meanwhile, misunderstanding of the public regarding human exposure to 5G EMF results in public resistance to 5G roll-outs. The course aims to provide a systematic view of the 5G EMF covering guidelines, standards, measurement methodology and case studies in order to address the misunderstanding of the human exposure to 5G EMF. Specifically, the training course is designed:</p> <ul style="list-style-type: none"><li>• To equip participants with an understanding of the fundamental of EMF emission from mobile communication base stations and devices.</li><li>• To equip participants with an understanding of the relation between the 5G radio technology and EMF.</li><li>• To equip participants with an understanding of international guidelines and standards on human exposure to 5G EMF.</li><li>• To equip participants with practical 5G EMF laboratory measurement and simulation techniques.</li><li>• To equip participants with practical on-site 5G EMF measurement and monitoring techniques.</li><li>• To equip participants with best practices and lesson learned through case studies from selected countries.</li><li>• To expose participants on the public education strategy related to 5G EMF exposure and health concern.</li></ul>
Dates	4 <sup>th</sup> to 17 <sup>th</sup> October 2021
Duration	2 weeks
Registration deadline	27 <sup>th</sup> September 2021

Training fees	International Participants: USD 150 per participant Local Participants: MYR 650 per participant
Course code	21OI27704ASP-E

## LEARNING OUTCOMES

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Upon completion of this training, participants will be able to

- describe the mobile base stations and devices EMF emission
- explain the relationship between 5G radio technology and EMF
- specify international guidelines and standards on 5G EMF exposure limits
- stipulate the lab measurement and simulation methodology
- establish the on-site measurement methodology
- identify best practices and lesson learned through EMF measurement and monitoring case studies
- discuss public education strategy for public acceptance of 5G

## TARGET POPULATION

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This short course will bring together leading specialists in the field; executives, managers, officials, engineers, employees from policy makers, regulators, government organisation, telecom operators, vertical industries, telecom investment companies, researchers and academia in the field of 5G and EMF. Other institutions and individuals are also welcomed to participate.

## FACILITATOR/EXPERTS

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The experts for the training include experts from UTM, ITU and invited industry speakers.

## EVALUATION

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The assessment of the participants shall be based on the - time spent on the training and the following parameters:

<b>Evaluation Parameter</b>	<b>Weightage ( in %)</b>
Quizzes	60 %
Assignment	10 %
Participation in Discussion Forum	15 %
Participation in live video lecture and interaction sessions	15 %

The minimum passing requirement for certificate is 60%.

## TRAINING SCHEDULE AND CONTENTS

Date and Time (Kuala Lumpur Time Zone GMT +8)	Module	Scope/Activity
4 Oct 2021 (Mon) 2.30pm to 4.00pm	1. Fundamental of Base Stations and Devices EMF Emission  By Prof. Dr. Jafri Din, UTM	<ul style="list-style-type: none"> <li>• Mobile base stations radiated power</li> <li>• Device radiated power</li> <li>• Near field vs far field</li> <li>• Antenna Array</li> <li>• E-Field and H-Field</li> <li>• Power density</li> <li>• Ionizing and non-ionizing radiation</li> </ul>
5 Oct 2021 (Tue) 2.30pm to 4.00pm	2. Key 5G Radio Technology and EMF Emission  By Assoc. Prof. Dr. Chee Yen (Bruce) Leow, UTM	<ul style="list-style-type: none"> <li>• 5G FR 1 and FR2</li> <li>• Millimetre wave</li> <li>• Beamforming</li> <li>• Cell densification</li> <li>• 5G vs 4G</li> </ul>
6 Oct 2021 (Wed) 2.30pm to 4.00pm	3. 5G EMF Policies, Guidelines and Standards Overview  By Mr. Aamir Riaz, ITU	<ul style="list-style-type: none"> <li>• Overview of International Organizations involved in EMF related activities (ITU, ICNIRP, WHO, IEEE)</li> <li>• Safety factors</li> <li>• Exposure Limits</li> <li>• ITU standards, reports and guidelines</li> <li>• Report ITU-D Question 23/1, Question 7/2</li> <li>• ITU-R Handbook - Spectrum Monitoring</li> <li>• ITU-R Report SM.2452</li> </ul>
7 Oct 2021 (Thu) 2.30pm to 3.30pm	4.1 EMF Lab Measurement: Field Strength and Power Density  By Assoc. Prof. Dr. Mohd Haizal Jamaluddin, UTM	<ul style="list-style-type: none"> <li>• IEC Measurement standard</li> <li>• Measurement equipment and setup</li> <li>• RF field strength and Power Density measurement methodology &amp; procedure</li> </ul>
3.30pm to 4.30pm	4.2 EMF Lab Measurement: Specific Absorption Rate  By Assoc. Prof. Dr. Norhudah Seman, UTM	<ul style="list-style-type: none"> <li>• IEC Measurement standard</li> <li>• Body tissue dielectric parameters</li> <li>• SAR Measurement equipment and setup</li> <li>• SAR measurement methodology &amp; procedure</li> <li>• SAR and its relation to EMF exposure to human</li> </ul>
8 Oct 2021 (Fri)	e-learning Activity: Quiz 1 (30%)  1 hour	Participants to attempt the multiple choice questions quiz for Module 1-4 on ITU Academy e-learning page.

Date and Time (Kuala Lumpur Time Zone GMT +8)	Module	Scope/Activity
11 Oct 2021 (Mon) 3.30pm to 5.00pm	5. EMF compliance of 5G radio base stations  By Dr Bo Xu, Ericsson	<ul style="list-style-type: none"> <li>• 5G base station compliance</li> <li>• Implications of massive MIMO, beamforming.</li> <li>• Case study</li> </ul>
12 Oct 2021 (Tue) 2.30pm to 4.00pm	6. On-site EMF Measurement  By Mr. Anwar Faizd Osman, IMT and Future Network Working Group Malaysia.	<ul style="list-style-type: none"> <li>• IEC Measurement standard</li> <li>• Measurement equipment and measurement setup</li> <li>• Broadband in-situ measurement methodology</li> <li>• Frequency selective measurement methodology</li> <li>• Code selective measurement methodology</li> <li>• Evaluation location selection criteria</li> <li>• Ambient field level determination</li> <li>• Postprocessing: extrapolation, interpolation &amp; scaling</li> <li>• Averaging: spatial and time</li> <li>• Measurement demo</li> </ul>
13 Oct 2021 (Wed) 3.30pm to 5.00pm	7. Measurements around 5G Base stations - Experiences from Germany  By Prof. Dr.-Ing. Matthias Wuschek, Deggendorf Institute of Technology, Germany.	Sharing of 5G EMF measurement case study in Germany
14 Oct 2021 (Thu) 2.30pm to 4.00pm	8. Public Education on 5G EMF Exposure and Public Health Concerns  By Mr. Tien Han Chua, UTM	<ul style="list-style-type: none"> <li>• Reasons for Public Resistance</li> <li>• Public education strategy</li> <li>• Myths of EMF exposure and its impact on public health</li> <li>• Case study</li> </ul>
15 Oct 2021 (Fri)	e-learning Activity: Quiz 2 (30%)  1 hour	Participants to attempt the multiple choice questions quiz for Module 5-8 on ITU Academy e-learning page.
17 Oct 2021 (Sun)	e-learning Activity: Individual Assignment Submission (15%)	Participants to submit the individual assignment on ITU Academy e-learning page.

## METHODOLOGY

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The online training course will include:

- Instructor-led live streamed lectures
- Multimedia presentations
- Discussion forums
- Case studies
- Demonstrations
- Invited industry talks

The lectures will be presented by modules. Live lectures will be scheduled throughout the weeks. Recorded lectures will be made available for those who cannot attend the live sessions. Each session will last up to 2 hours including Q&A interaction. The exact schedule for live lectures will be published on the course elearning page on ITU Academy.

Discussion forums will be used to allow participants to interact with the trainers and also allow participants to exchange knowledge. Discussion topics can be posted by trainers and also participants.

Assignment shall be uploaded to the elearning website before the due date.

All official announcements will be made through the Announcement Forum in the elearning course page.

## COURSE COORDINATION

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### **ITU coordinator:**

Mr. Sean Doral

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### **Universiti Teknologi Malaysia's Coordinator**

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Email: [hasline@utm.my](mailto:hasline@utm.my)

## REGISTRATION AND PAYMENT

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### 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/training-courses/full-catalogue/human-exposure-fifth-generation-5g-electromagnetic-fields-guidelines-measurements-case-studies>

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 150** 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>)

#### 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](mailto: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

Should you wish to pay for more than one participant using bank transfer and need one invoice for all of them, create an account as **Institutional Contact**. **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:

- a. 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.
- b. 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:

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 150
Payment Reference:	CoE-ASP- 21OI27704ASP-E- P.40593.1.10

#### 4. Other Method of Payment

For local participants who would like to pay in local currency, training fee of **MYR 650** can be made directly to through the online payment gateway <https://seminar.utmspace.edu.my/pageMain.aspx?&sem=6159> or UTMSpace bank account as follow,

1. Account Name: UTMSPACE
2. Account no: 8601518228
3. Bank Name: CIMB ISLAMIC BANK BERHAD
4. Payment Reference: Invoice Number (Kindly request local invoice from UTM secretariat).