



ITU Centres of Excellence Network for Asia and the Pacific
State Radio Monitoring Center - China
Online Training Course on

SPECTRUM ENGINEERING AND IMT2020
1 – 19 July 2019

COURSE OUTLINE

COURSE DESCRIPTION

Title	Spectrum Engineering and IMT2020
Objectives	This online training course aims to introduce participants to concepts of spectrum engineering and will focus on following key areas: <ol style="list-style-type: none">1. Spectrum Engineering fundamentals and Type approval2. IMT2020 (5G) research and updates
Dates	1 – 19 July 2019
Duration	3 weeks
Registration deadline	26 th June 2019
Training fees	Free
Course code	19OI24372ASP-E

LEARNING OUTCOMES

This course covers the core functions of spectrum engineering and is mainly targeted towards the staff of National Spectrum Management agencies. Inclusive of the detailed case studies from China, the course consists of detailed sessions on topics of Type Approval, radio spectrum characteristics, Modelling the three dimensional space using the sphere, Basic antenna parameters etc. amongst others.

The training course will provide an empowering learning environment through a combination of course content and discussion boards focused on sharing information with the participants.

TARGET POPULATION

This training is designed to address mid to senior level management from policy makers, regulators, corporate executives and managers responsible for Spectrum Management and monitoring.

TUTORS/INSTRUCTORS

NAME OF TUTOR(S)/INSTRUCTOR(S)	CONTACT DETAILS
Aamir Riaz	ITU
Istvan Bozsoki	ITU
Qian Zhaojun	SRMC, qianzhaojun@srrc.org.cn
Li Pengpeng	SRMC, lipengpeng@srrc.org.cn
Liang Zhaonan	SRMC, liangzhaonan@srtc.org.cn

EVALUATION

Below are the evaluation schemes:

Quiz #1:	20%
Quiz #2	40%
Participation	20%
Assignment	20%

Total Evaluation: 100%

Important: For issuance of certificates, a minimum of 60% is necessary

TRAINING SCHEDULE AND CONTENTS

Week / Session	Activity	Topics covered
Week 1 and 2	Spectrum Engineering fundamentals and Type approval	<ul style="list-style-type: none">• The radio spectrum: History (Maxwell, Hertz, Marconi), its discovery and evolution.• The radio spectrum characteristics: Reflection, refraction, scattering, diffraction and absorption, ground, sky and space waves, how it is classified.• Telecommunications units, where the dB came from, operations using logarithms, general rules, dBV, dBW, dBm.• Modeling the three dimensional space using the sphere: angle, solid angle, calculations of the solid angle of a sphere, the meaning of 4π in link budget formulas.• Basic antenna parameters: radiation patterns, beam efficiency, driving impedance, antenna operation bandwidth, directivity and gain, directivity and resolution, apertures.• Modeling the antenna with effective aperture and directivity, Link budget formula, free space loss formula, EIRP concept, antenna K Factor calculation, REC ITU-R SM.525, examples.• Polarization, antenna isolation and frequency reuse.• The Role of Enforcement and technical verification in SM

		<ul style="list-style-type: none"> • Radio Monitoring procedures and its relation with enforcement • (Inter)national regulations on Type Approval of equipment • Legal issues concerning Enforcement • Documentation and requisites for Type Approval (some examples of different countries) • Regulatory Bodies for Type Approval • Inspection procedures and technical rules for Radio services • Power measurement and technical parameters verification On site • Interference analysis and measurement • Calibration of equipment for on-site visits • Human exposure to EMF: regulation and measurement procedures
Week 3	IMT2020 (5G) research and updates	<ul style="list-style-type: none"> • Development of Global 5G Spectrum Planning Research in Millimeter Wave • 5G Industry Development Update • 5G frequency planning research in 3-6GHz frequency band. A case study from China. • Radio Regulation with respect to railway radio communications

METHODOLOGY

The training methodology will be as follows:

- Each module will be studied and discussed over the established time period;
- Training materials will be made available through online learning access page;
- Discussion forums will be organized where students are highly encouraged to participate and interact with instructors and other students;
- Quiz tests will be assigned, one per module, at the end of a given training week;
- Individual assignment would be provided at the end of week 3.

All announcements for all events (materials, quizzes and forums) will be given prior to the event by the training tutor.

COURSE COORDINATION

SRMC Focal point: Ms. Li Bingqi Tel: +86 10 6800 9082 Fax: +86 10 6800 9082 E-mail: libingqi@srrc.org.cn	ITU coordinator: Mr. Aamir Riaz Tel. +62 21 380 2321 / 380 2324 Fax +62 21 3890 5521 E-mail: aamir.riaz@itu.int
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REGISTRATION

ITU Academy portal account

Registration 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>.

Course 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/spectrum-engineering-and-imt2020>.

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