

EMC

Electronics

Who should attend:

The *EMC* is developed for Electronic Engineers and Technicians that work for EMC in development of electrical and electronical designs.

Prerequisites:

A basic understanding of EMC is recommended, at the level of *EMC Introduction* together with some practical experiences of electronics.

Content

EMC is the next step in the course suite after *EMC Introduction*. The *EMC* course holds basic models to bring understanding to different kinds of interference, susceptibility and crosstalk in electronic systems. Applying those models and terms make a foundation for a thorough understanding of EMC. Theories are blended with practical problems and solutions.

The course have English documentation and is delivered in English or Swedish.

Extract of the content.

Types of Signals and related Spectra

- Periodical Signals
- Time and frequency domains
- Methodology of calculation

ESD-risks and protection

- Materials, charging and dis-charging
- Models
- Signs of protection

Transmission Lines

- Characteristic Impedance
- Velocity of propagation
- Effects of mismatching
- Termination
- Placement of clock lines on PCB
- Applications on PCB's and simulations

Models of a signal in a conductor to field emission and from field emission to signal in a conductor

- Field emission from differential mode and common mode current.
- Unintended Common Mode Current
- Field emission with and without a solid ground plane
- Shielded cables and Transfer Impedance
- Field emission from shield

Conducted emission and stress

- Currents of interference in differential-mode and common-mode
- Measurements of interference currents with impedance equivalent
- Separation of Common-mode and differential-mode currents
- Interference limitation by filtering, insertion loss
- Conducted Interference
- Filter Configurations
- Simulation in Pspice

Crosstalk between Transmission Lines

- Conditions and Crosstalk paths
- Interference sources
- Crosstalk in time domain and frequency domain
- How to reduce the coupling factor
- How to ground a wire
- Twisted wires

Shielding

- Far field
- Near field
- Magnetic Field of low frequency
- Apertures and narrow openings in a shielded box

Segregation and grounding

- Topologies
- Requirements of protection
- Rules
- Filters and where to place them

Code: *EMC-2*
Length: 2 days
Fee: 1240 EUR + VAT
or according to an offer for "In-house" delivery or a group attending an open event.

The course is developed for Electronic Engineers and Technicians

A basic EMC knowledge added with some experience of electronics

The course mediate valuable base for an advanced level of understanding and methodology of how to construct for EMC.

**Next event
7th-8th
of October
in Linköping**

Special offer!

**3 for 2
or
20% discount
per seat
when order
training before
31st of Dec 2014**

**Reservation
Code:EMCE2014**

Our stance of policy regarding pricing and size of group

The Training is done towards a group of persons - and each one is expected to have benefits of the training in the daily work. It means that each participant invest in competence to be more efficient, increase quality and as a result be more comfortable to fulfil the projects.

This is reflected in our way of pricing and the group size of our training. The price for in-house training is consequently related to the number of participants and the upper limit is 12-16. An efficient training requires engaged participants and a continuing dialogue that can be hard to reach with a high number of participants.

Training methodology

This course is composed by our appreciated InfoMap methodology which requires a wide whiteboard. A screen not hiding the board give good conditions to expand subjects and illustrate on the screen at the same time as holding the main presentation on the board.

To keep in mind when to ask for an offer

For an efficient procedure of making an offer we need some information related to the questions below.

If you have access to premises we ask for answers of the following questions.

Premises for training:

- Has the premises a whiteboard with minimum size of 2.5m x 1.2m (WxH)?
- Is a PC-projector and screen accessible for use?
- Does the screen hide the whiteboard? If not can the PC-projector still be directed to screen?
- Has the premises a flipchart?

It can be good to have the possibility to a more informal way of contact than the training conditions permits. One way to make this happen is during coffee breaks and lunch. We ask if coffee and/or lunch shall be included in the price or if it is handled by participants themselves.

Coffee and lunch breaks:

- How is it expected to be arranged - individual or in common?
- How is the conditions to have coffee/lunch close by training premises?

We appreciate if we can have information about the level pre-knowledge/experience and the aim of the training for the group and if it is individuals that want to reach further. Naturally we need to know the total number to be trained.

We try to meet Your need regarding time and place of delivery. We appreciate if You can give a couple of choices regarding time of delivery. If You do not have access to premises suitable for training we appreciate a recommendation of a hotel or conference centre.

We use to start our training 8:30 AM, 1 hour lunch at 12 and end up around 4:30 PM. If You have other wishes regarding scheduling tell us and we try to adapt.

Adaptation of EMC to specific needs

If You have a need for an enhance of some part tell us and we try to adapt Your needs.

Frendus is a training company with focus in electronics, telecommunication and data communication. We offer our training services in our own premises in Sweden or internationally. We do high quality training and are open to adapt to the conditions of the group regarding level and content.

We also offer coaching to companies who want to support their employees in the role of trainer or to speak to a group.

Welcome to take contact for more information!

Pricing and number of participants

InfoMap

Keep in mind

Premises for training

Coffee & lunch

**Pre-knowledge
Aim of training
Number of participants**

**Time and place of delivery
Daily time frame**

Adaptation

**EMC and ESD
Data Communication
Radio & Transmission
Mobile Systems
Wireless Access**

Train the Trainer