APPLIED RF TECHNOLOGY COURSE

Concept

The wireless equipment market has grown unimaginably. Smartphones, cable modems, anti-theft labels, remote data logging, embedded Bluetooth devices, wireless internet: radio frequency (RF) technology has permeated all aspects of everyday life.

Many technicians, including test and verification engineers, work with radio frequency systems. Understanding the coherence of system components is extremely important in order to be able to see the effects, causes and consequences of the influence various RF system components have on one another. Because high-frequency aspects play an increasingly important role in the design of embedded electronics, a course like this is also excellent as an introduction to digital / analog engineers who are or will be involved in the development of RF systems.

Course structure

The course Applied RF technology consists of a four-day program. The theoretical part covers 75% of the course, with the remaining part spent in hands-on sessions in our own lab.

Participants in this course are assumed to have followed higher professional education and have knowledge of basic mathematical and electronics concepts. Ready knowledge of mathematical concepts is not required, but will certainly be an advantage as the course material covers concepts requiring analysis in the complex domain. In preparation, participants will receive lecture notes with teaching materials.

Course Fee

The participation fee is € 2,297.00 per person, excluding VAT. Course material and lunch are included in the costs.

Location

ASTRON
Oude Hoogeveensedijk 4
7991 PD Dwingeloo, The Netherlands

PROGRAM OVERVIEW

- **Day 1**
  ### RF Terminology (part I)
  → Complex numbers • Complex calculation method • Basic concepts of circuit characterization • Noise   • Transmission line theory
  ### Antennas (part I)
  → Impedance • Directivity • Gain • Polarization • Wire antennas • Patch antennas • Arrays • Antenna measurement techniques

- **Day 2**
  ### RF Terminology (part II)
  → Continued transmission line theory • Reflection coefficient • Return loss • VSWR • Smith diagram • Impedance adjustment • Mismatch loss • Port description • Scattering parameters, network analyzer
  Hands-on: measurements of reflections using network analyzers

- **Day 3**
  ### RF Systems
  → Receiver architecture • Basic circuits (PLL • Oscillators • Modulators • Demodulators • Mixers • Amplifiers • Filters)
  → Linearity (IP2, IP3) • Noise Figure • Dynamic range • Sensitivity • Selectivity • Power
  Hands-on: noise and intermodulation measurements on amplifiers using spectrum analyzers

- **Day 4**
  ### Communication Systems
  → Modern communication systems and modulation techniques: ('air-interface' of) GSM • UMTS • WLAN • AM • FM • QAM • Frequency hopping • Spread spectrum • BER
  ### Antennas (part II)
  → ***Hands-on:*** • Measurement of antenna impedance • Measurement of antenna gain in anechoic chamber • Design of patch antenna for 2,4 GHz WiFi band

OBJECTIVES

Upon successful completion of this course, the participant is able to:

- better understand systems based on their high-frequency behavior
- recognize the importance of impedance matching in high-frequency systems
- describe the principles of modern communication systems
- understand specifications in data sheets
- describe various modulation techniques
- know the effects of non-linear systems
- understand the operation of various antennas
- be able to perform practical microwave measurements
- know the principles of RF measurement techniques and their limitations.
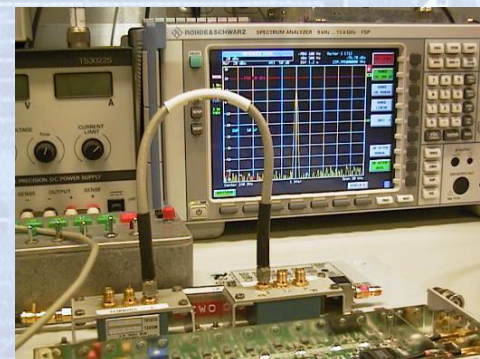
Do you need more information?

Please call Simone Kajuiter and/or Ronald Halfwerk:
T: +31 (0)521-595287
or send an email to: rfcourse@astrotec.nl.
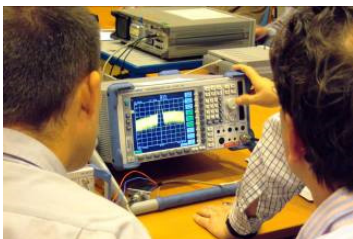
ASTRON
Netherlands Institute for Radio Astronomy

ASTRON is the Dutch institute for radio astronomy. ASTRON's mission is to generate new knowledge through radio astronomy by developing new, innovative technologies, exploiting world-class radio-astronomical equipment and conducting basic astronomical research.

ASTRON's engineers and astronomers are highly regarded internationally for technology development and basic astronomical research.
ASTRON has a long experience with RF technology, in particular with low-noise, wide band receivers and high-speed, digital data processing systems.

ASTRON's Innovations and Systems division is responsible for the development of state-of-the-art instruments and has various disciplines, including expertise in antennas, RF / IF technologies, digital signal processing and image processing.

The course is taught by professionals from ASTRON and from renowned telecommunications companies.

REGISTRATION

You can register for this course by sending an email to wdl@astron.nl.

Only after receipt of your fully completed digital registration, your registration is final and we reserve a place on the list of participants. You will receive a confirmation of your registration. Placement in the course takes place in the order of completed registrations. In case of sufficient registrations, we will contact you no later than two weeks before the start of the course. If it is clear that the course can continue, you will receive an invitation letter from us with information about course times, teachers and options for accommodation.

If you are unable to attend, your colleague can replace you without additional costs. Do you want to cancel? This is only possible in writing up to one month before the date. After that date, we have to charge the full amount. AstroTec Holding reserves the right to cancel the course if there are insufficient registrations.

ASTROTEC HOLDING

AstroTec Holding BV is responsible for organizing this course for training activities. AstroTec Holding BV is an operating company of ASTRON.

THE ACTUAL COURSE DATES ARE PUBLISHED ON OUR WEBSITE
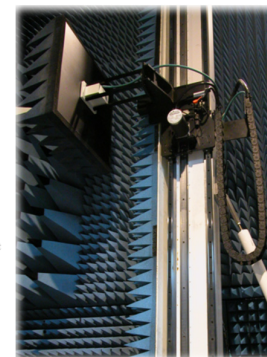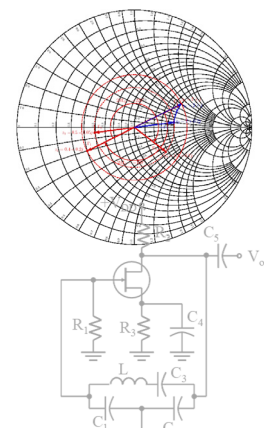**Please check https://www.astron.nl/wireless-data-lab/cursussen/**

Our *Wireless Data Lab* supports SME in the development of smart applications applying wireless technologies. Please check our website for an overview of our facilities and how we may support you.

Dit project wordt mede mogelijk gemaakt met behulp van:

SNN — Samenwerkingsverband Noord-Nederland
Ministerie van Economische Zaken en Klimaat
EUROPESE UNIE — Europees Fonds voor regionale ontwikkeling

Powered by
ASTRON

WIRELESS DATA LAB

Course

Applied RF Technology

Theory and practice of radio frequency systems