

1. Sound System Optimization Course (OnLine)

Sound System Optimization Course studies, through theoretical-practical examples, with virtual tools, all the key concepts to understand the behaviour of loudspeaker arrangements from FFT analysis.

RiTA and Submap tools will be used to explain the contents. Exercises are proposed at the end of each session, which consolidate the developed concepts.

All the sessions are carried out live in a virtual way and with interaction between student and teacher. In addition, once the seminar session is finished, follow-up is done via email.

2. Course Format

The course is conducted live and with interaction between student and teacher using Zoom platform. The approximate duration of each session is 3 hours.

Hours: 3:00 p.m. (UTC + 0)

Each session begins with a theoretical explanation of the content to be discussed. Exercises and doubts take place at the end of each session

All participants will receive a free version of the Submap (Prediction) software and a demo version of RiTA 2.4 (The demo version of RiTA allows you to perform all the proposed exercises, but does not allow you to make real measurements)

Once the entry has been made, The user will receive a link to Zoom that will be used for the entire seminar.

3. Prices and payment method

The seminar is structured in 8 modules and you can reserve a particular module or reserve the entire course

Prices are as follows:

- Price per module: € 25
- Full course price: € 150
- Full course + 1 license of RiTA 2.4 price: 265€

The payment is made through the website by card or bank transfer. We can also provide payment by Paypal on request

IMPORTANT: In case of a bank transfer, the payment proof must be sent to info@gudiosolutions.com

4. Study Modules

Module 1: Introduction to the Phase

The introductory module reviews all the essential concepts to understand the behaviour of the sound and lays the foundations of Phase behaviour.

- Definition of audio transmission.
- Time and frequency.
- Wavelength.
- The Waveform.
- Polarity.
- Phase
 - Signals summation
 - Phase wheel
 - Angular velocity
 - Time / distance conversion to degrees
- Signal correlation and decorrelation
- Spectral response
- Acoustic Transmission:
 - Inverse Square Law
 - Environmental effects
 - Speakers
 - Coverage

Module 2: Transfer Function and Digital Filters

In this module the transfer function is explained through digital filters. You learn to understand the visualization of magnitude and phase estimation trace and its understanding is reinforced. We also work the process of detecting speakers incompatibility due to phase distortion and how to solve it

- Transfer function
 - Convolution
 - Magnitude
 - Phase
- IIR filters
 - Butterworth
 - Linkwitz-Riley
 - Complex filters
 - All-Pass Filters
- FIR filters
 - Linear Phase
 - Latency
- Group delay
- Phase Delay
- Coverage
- Speakers
 - Phase distortion
 - Compatibility
 - Adjustments

Module 3: Amplification and Limitation

In this module we will learn to speak 2 languages, linear and logarithmic. We will study the characteristics of amplifiers and speakers and how to relate them as well as limit the sound system to protect it without giving up its dynamics.

- Ohm's law
- Crest factor
- Decibel
 - dBu / dBv / dBm / dBFS
- Amplification
 - Impedance
 - Output power
 - Maximum useful power
 - Peak power
 - Voltage Gain
 - Sensitivity
 - Harmonic Distortion (THD)
 - Slew Rate
- Speaker
- Continuous Power
 - Program power
 - Peak Power
 - Power capacity
 - Sensitivity
- Limitation
 - Calculations
 - Limitation
 - Threshold
 - Attack
 - Release
 - Ratio

Module 4: FFT Analyzer

This module works all the parameters of an FFT analyzer, how to understand them and how to take advantage of it

- FFT Analyzer:
 - The Fourier transform
 - Analyzer Basics
 - The time window
 - Linear and Logarithmic
 - Frequency resolution
 - Fixed points per octave (FPPO)
 - Window Functions
 - Averages
- Spectral response:
 - Limitations
 - Applications
- Transfer function
 - Frequency response
 - Relative amplitude
 - Relative phase
 - Polarity and relative phase
 - Envelope
 - Phase Delay
 - Pending Phase
 - Coherence
- Impulse function
 - Linear
 - Logarithmic
 - ETC
 - Exponential sweep

Module 5: Acoustic Sum

The Acoustic Sum module works the constructive and destructive interferences of any sound system and how to build arrangements from that analysis.

- Properties of acoustic sum:
 - Definition of audio sum
 - Sum criteria
 - Sum amount
 - Sum Amplitude
 - Sum phase
 - Interference
- Response ripple
 - Sum Zones
 - Comb filtering: Linear vs Logarithmic
- Acoustic Crossovers:
 - Definition of acoustic crossover
 - Crossover classes
 - Spectral Dividers
- Speaker arrangements:
 - Coupled arrangements
 - Uncoupled arrangements
 - Directivity
- Speaker / room sum
 - Sum Types
 - Effects of absorption
 - Environmental effects

Module 6: Line Array

This module reviews all the theory present in a Line Array, how it works, what are the differences with respect to traditional systems and different techniques to produce a coverage with a minimum variance of level and frequency

- Line Array:
 - Line Array Theory
 - Phase and interactions
 - Straight vs Arc Arrays
- Low frequency
 - Wavelength vs array length
- High frequency
 - Proportional directivity
 - Waveguide
- Array design
 - Symmetrical
 - Asymmetric
- Techniques
 - Array axis to 1/2
 - Array axis at 1/2 +1/3
 - APF correction
- Space averaging

Module 7: Subwoofers

- Subwoofer
 - Gradient
 - End Fired
 - Stack Front & Back
 - Straight
 - Directivity control
- Configurations
 - Physical arc
 - Electronic arc
 - Omnidirectional
 - WFS
 - Tap window

Module 8: Optimization

During module 8, a practical session is carried out with all kinds of system adjustment exercises using different techniques and they are put together to make a final review of the entire course contents

- Software
 - RiTA
 - Submap
- RiTA splMeter

5. Calendar

08/02/21	09/02/21	10/02/21	11/02/21	12/02/21	13/02/21	14/02/21
15/02/21 MODULE 1 15:00 (UTC+0)	16/02/21 MODULE 1 15:00 (UTC+0)	17/02/21 MODULE 1 15:00 (UTC+0)	18/02/21 MODULE 1 15:00 (UTC+0)	19/02/21	20/02/21	21/02/21
22/02/21 MODULE 1 15:00 (UTC+0)	23/02/21 MODULE 1 15:00 (UTC+0)	24/02/21 MODULE 1 15:00 (UTC+0)	25/02/21 MODULE 1 15:00 (UTC+0)	26/02/21	27/02/21	28/02/21
01/03/21	02/03/21	03/03/21	04/03/21	05/03/21	06/03/21	07/03/21

