

## **Software Defined Radio Workshop with Matlab and Simulink for Xilinx FPGA**

*Radio definida por Software (SDR - Software Defined Radio)  
usando Matlab - Simulink para FPGAs de Xilinx*

**Introducción:** Este taller práctico ha sido diseñado para profesionales que desean comprender en profundidad los sistemas de comunicación básicos y avanzados a través de implementaciones de hardware real utilizando placas SDR (Software Defined Radio) con FPGA Xilinx. Se introducirán los conceptos fundamentales de Radio definida por software y se llevará a cabo un amplio conjunto de prácticas de laboratorio con placas SDR comerciales. El Curso de 4 días de duración se dictará en castellano, aunque el material estará en inglés.

**Matrícula:** Coste regular del curso: 980 €. Asistentes a otros cursos/trainings ElectraTraining (-10%): 882 €. Descuentos por múltiples asistentes de la misma empresa/Institución.

**Modalidad:** Intensivo, teórico-práctico con laboratorios. 4 días consecutivos de 9 a 18 hs (32hs docentes) con pausas de cafes y comida.

**Fechas:** Consulte la web [electraining.org](http://electraining.org)

### **Lugar de realización:**

Escuela Politécnica Superior  
Universidad Autónoma de Madrid (UAM)  
Francisco Tomás y Valiente, 11  
28049 MADRID

### **Descriptorios y detalles:**

Puede consultar el temario y los requisitos en el reverso de esta página (en inglés).

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### (Workshop Detail)

**Required Background:** Analog and Digital communication systems theory. Digital processing Signals. Basic knowledge of FPGA is welcomed.

### Course Textbook:

- Software Defined Radio using MATLAB® & Simulink® and the RTL-SDR. Robert W. Stewart, Kenneth W. Barlee, Dale S. W. Atkinson, Louise H. Crockett. Department of Electronic and Electrical Engineering University of Strathclyde Glasgow, Scotland, UK.
- Software Defined Radio for Engineers, Travis F. Collins, Robin Getz, Di Pu, Alexander M. Wyglinski. Artech House Mobile Comm., 2018. Analog Devices perpetual eBook license.

### Description

This course has been designed for professional who want to understand in deep the basic and advance communication systems thought real hardware implementations using SDR boards with Xilinx FPGA. The fundamental concepts of Software Defined Radio will be introduced and an extensive set of hand-on laboratory practices will be carried out with commercial SDR boards.

**Hardware and Software:** Xilinx Vivado Design Suite, Matlab-Simulink (Communications, DSP System, Signal Processing Toolboxes). HDL coder. ADALM-Pluto & Support Package. Zynq board, ADF module, RFSoc board.

**Course Lectures:** The 4-day course will be taught in Spanish, although the material will be in English. The course is divided into the following nine sessions:

- Session 1: Intro to SDR: Walk through of SDR architectures and getting started
- Session 2: AM and FM modulator and demodulator. SDR implementations.
- Session 3: Signal and Systems review: Frequency and Time Domain.
- Session 4: Digital Communication fundamentals
- Session 5: QPSK/QAM modulator and demodulator
- Session 6: Synchronization on Digital receiver: Time and Frequency sync
- Session 7: Frame synchronization and channel coding.
- Session 8: SDR hardware and Zynq + ADFCOM: Examples on Matlab Simulink. OFDM.
- Session 9: Hardware and Software co design QPSK transceiver on Zynq
- Session 10: RFSoc and other architectures. Intro to Pynq.

### Lab Sessions:

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|-----------------------------------|---|
| Lab 0: Accessing Pluto SDR board. | Lab 5: WLAN Image transmission                      |
| Lab 1: Spectrum Analyzer.         | Lab 6: SDR examples over Zedboard & AD FCOMMS 4     |
| Lab 2: Time Synchronization       | Lab 7: Adding Interpolator/Decimator to PL on Pluto |
| Lab 3: Frequency Synchronization  | Lab 8: HW/SW co-design on Zynq                      |
| Lab 4: QPSK full transmitter      | Lab 9: Pynq into RFSOC                              |