



Universitat de Lleida

DEGREE CURRICULUM  
**SYSTEMS INTEGRATION II**

Coordination: Marcel Tresanchez Ribes

Academic year 2014-15

## Subject's general information

<b>Subject name</b>	SYSTEMS INTEGRATION II
<b>Code</b>	102131
<b>Semester</b>	2nd Q. Continued evaluation
<b>Typology</b>	Optative
<b>ECTS credits</b>	6
<b>Groups</b>	1
<b>Theoretical credits</b>	2
<b>Practical credits</b>	4
<b>Coordination</b>	Marcel Tresanchez Ribes
<b>Office and hour of attention</b>	Robotics Lab (2.04-EPS building). Monday 10:00-11:00 AM.
<b>Department</b>	Computer Science and Industrial Engineering
<b>Modality</b>	Presencial
<b>Important information on data processing</b>	Consult <a href="#">this link</a> for more information.
<b>Language</b>	Speaking: As required (Catalan, Spanish or English). Materials and resources: English. Student workload: English.
<b>Degree</b>	Degree in Automation and Industrial Electronic Engineering
<b>Distribution of credits</b>	Theoretical sessions: 1 ECTS Experimental training sessions: 3 ECTS Practical sessions: 2 ECTS
<b>Office and hour of attention</b>	Robotics Lab (2.04-EPS building). Monday 10:00-11:00 AM.
<b>E-mail addresses</b>	mtresanchez@diei.udl.cat

Marcel Tresanchez Ribes

## Learning objectives

Acquire knowledge to be able to develop integrated systems with more complexity and automatization.

Learn to use current multimedia peripherals: Signal audio processing, audio compression, display and touch screen interaction, CMOS sensing.

Learn to use advanced communication interfaces in systems integration: USB and TCP/IP Ethernet communication.

Know how to develop low cost integrated systems based on computer vision with image processing techniques.

Experiment with the design of new systems and new applications of automation and control with industrial level validity and application.

## Competences

### Strategic Competences of the UdL

UdL2 Command of a foreign language.

UdL3 Mastering ICT's.

### Cross-disciplinary competences

EPS4. To have the skills required to undertake new studies or improve the training with self-direction.

EPS9. Capacity for unidisciplinary and multidisciplinary teamwork.

### Specific competences

GEEIA21. Knowledge of the basics and applications of the digital electronics and microprocessors.

GEEIA25. Knowledge and capacity for modelling and simulation of systems.

GEEIA27. Knowledge of principles and applications of robotic systems.

## Subject contents

1. The USB OTG interfaces
2. Audio processing, playing and recording
3. MMC and SD Card interfaces
4. Ethernet TCP/IP communication
5. Embedded displays and touch systems

## 6. CMOS image sensors and image processing

### Methodology

Learning systems integration will be carried out by STMicroelectronics development tools, mainly with STM32F4 - Discovery.

Development kits will be provided entirely by the school where each student will work individually.

Practical exercises will be based on microcontroller programming using C language development environments.

### Evaluation

The course assessment will take place continuously and be based on the weighted evaluation of the reports of the activities undertaken throughout the course.

These experimental exercises should be carried out individually.

### Bibliography

#### **STM32 32-bit ARM Cortex MCUs**

<http://www.st.com/web/en/catalog/mmc/FM141/SC1169>

#### **ARM Cortex-M architecture**

<http://www.arm.com/products/processors/cortex-m/>

#### **STMicroelectronics development boards**

<http://www.st.com/web/catalog/tools/FM116/SC959/SS1532/PF252419>

<http://www.st.com/web/catalog/tools/FM146/CL1984/SC720/SS1462/PF255417>

#### **Atollic TrueSTUDIO**

<http://www.atollic.com/index.php/truestudio>

#### **KEIL MDK-ARM**

<http://www.keil.com/arm/>