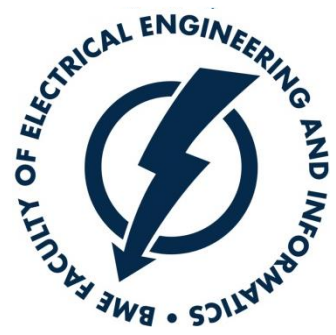# Introduction

Industrial Control

Gábor KOVÁCS

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Industrial control
BMEVIIIAC03

- Lecturers
  - Gábor KOVÁCS
    gkovacs@iit.bme.hu
  - Bálint KISS
    bkiss@iit.bme.hu
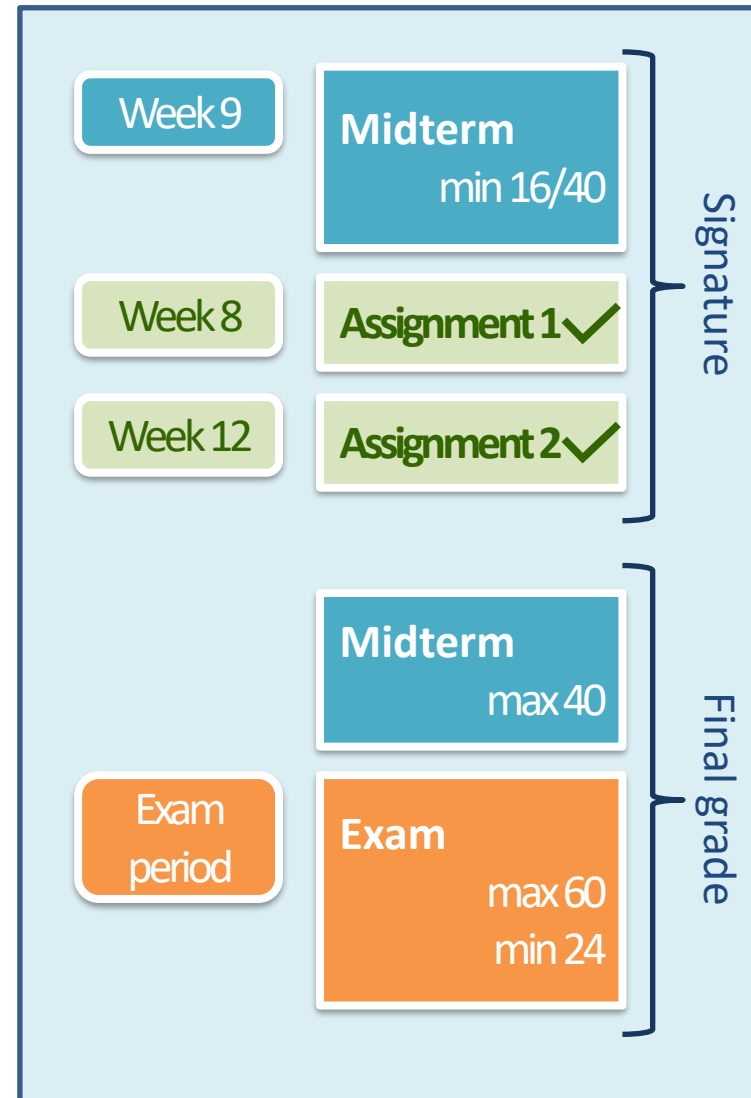
- Web page of the course:
  https://edu2.cloud.bme.hu/BMEVIIIAC03

Schedule

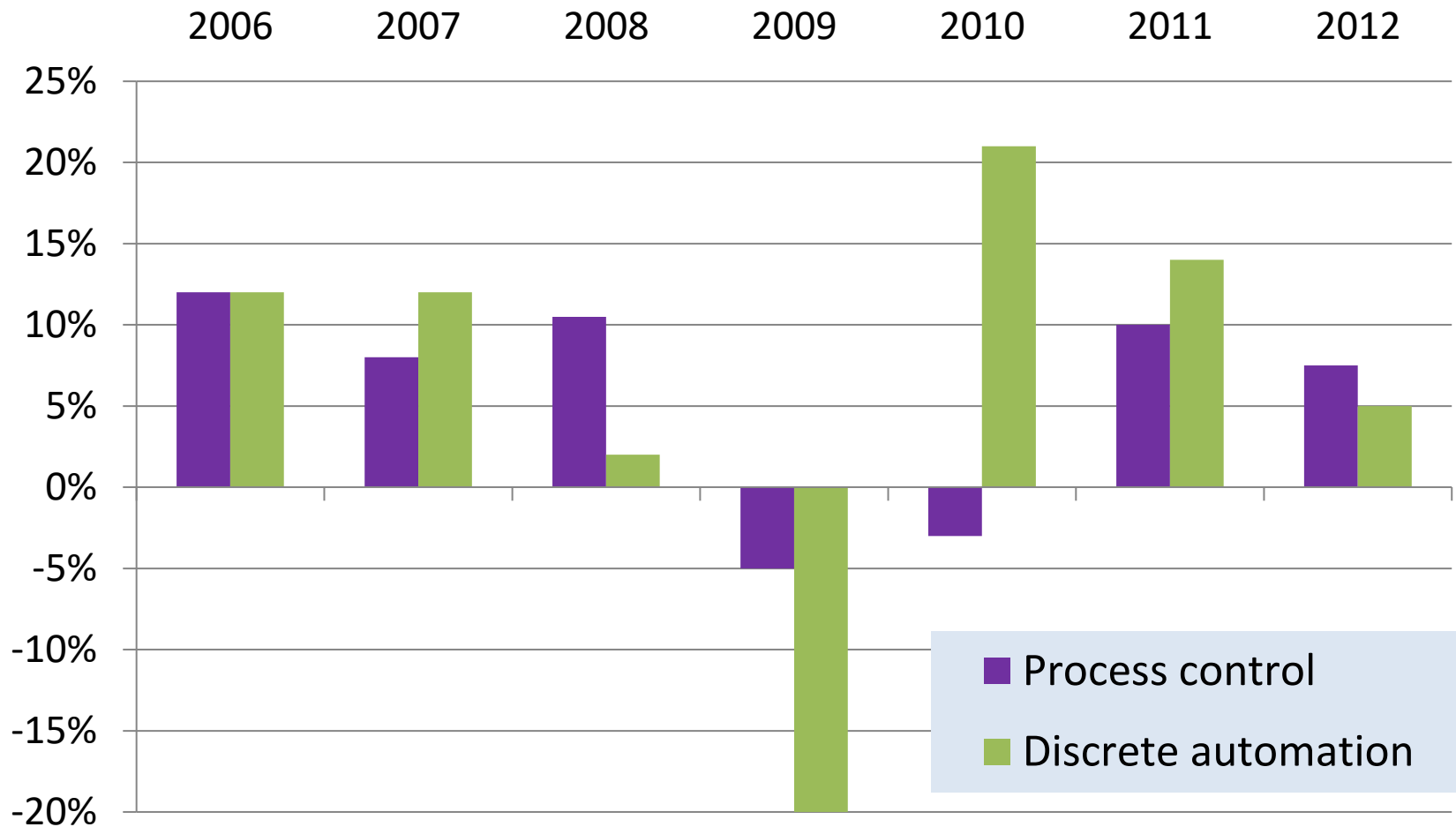| Academic week	Monday 14:15-15:45 I.L408	Tuesday 8:30-10:00 I.B410
1		LECTURE
2	PRACTICE	LECTURE
3		LECTURE
4	DAY OFF	PRACTICE @ I.L408
5		LECTURE
6	PRACTICE	LECTURE
7		LECTURE
8	PRACTICE	LECTURE
9		HOLIDAY (1st November)
10	PRACTICE	LECTURE
11		LECTURE
12	PRACTICE	LECTURE
13		LECTURE
14	PRACTICE	LECTURE

Assessment

- Midterm
  - date: November 4, Friday (week 9)
  - required to pass: min. 40%
  - retake: November 22, Friday (week 11)

- Assignments
  - due: week 8 and week 12
  - required to pass: correct solution for both assignments

- Exam
  - written exam during the exam period
  - grade: exam (60%) + midterm (40%)
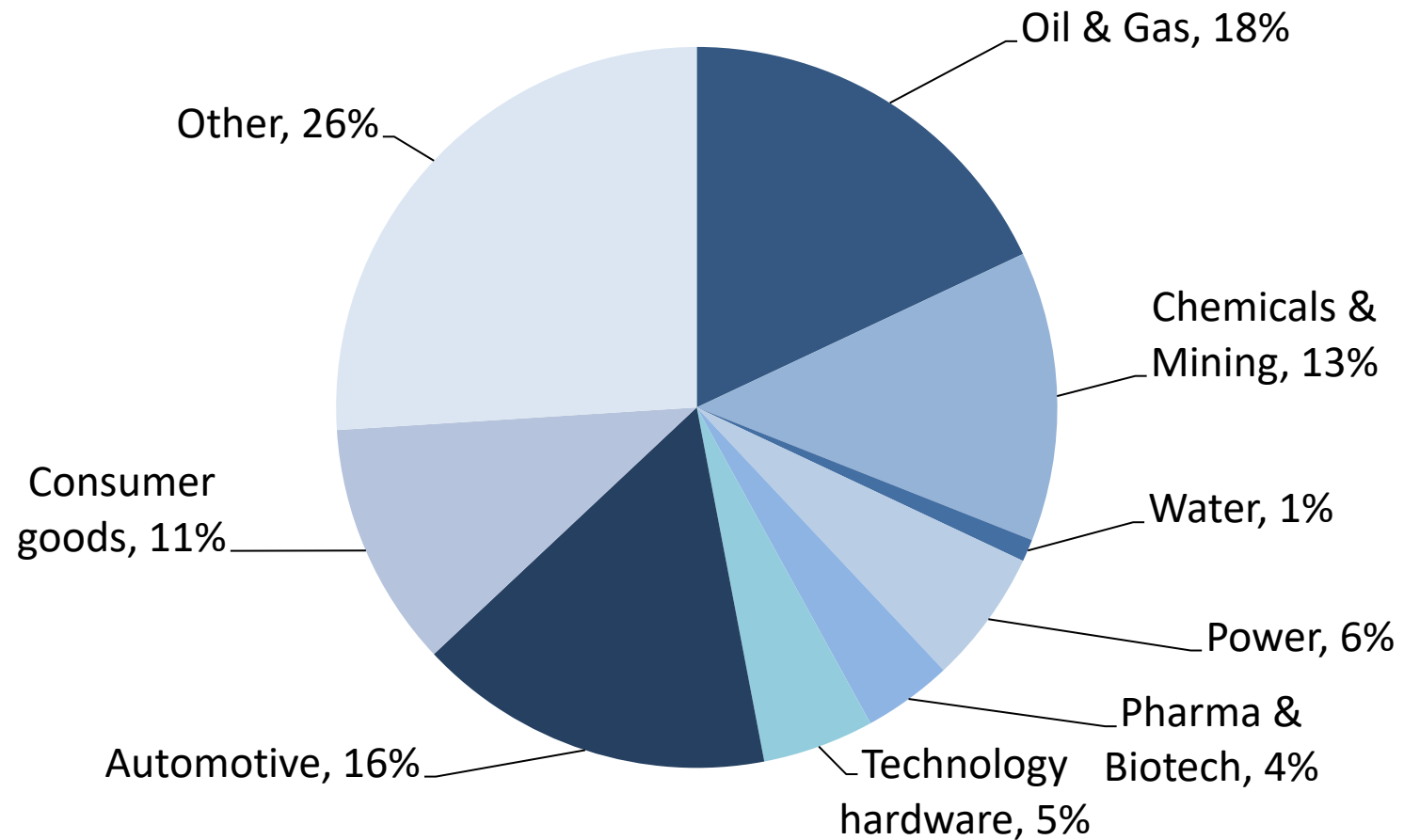 - required to pass: min. 40% of exam points

Week 9	**Midterm** min 16/40	Signature
Week 8	Assignment 1 ✓	
Week 12	Assignment 2 ✓	
	Midterm max 40	Final grade
Exam period	**Exam** max 60 min 24	

Global industrial automation market 2015

198 B USD
55 333 B HUF

122.8 B USD
34 324 B HUF

Yearly growth

Credit Suisse Global Industrial Automation Report, 2012

Industrial automation end market

Oil & Gas, 18%

Other, 26%

Chemicals & Mining, 13%

Water, 1%

Consumer goods, 11%

Power, 6%

Automotive, 16%

Pharma & Biotech, 4%

Technology hardware, 5%
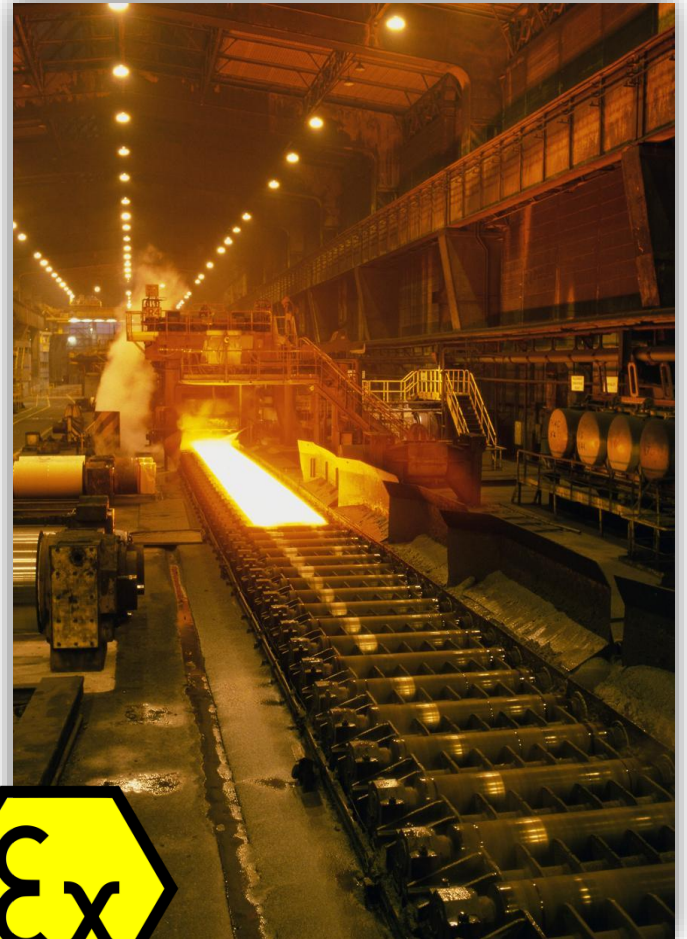
Industrial control

Think

Sense

Act

The technology under control

- Expensive
  - cost of the technology
  - cost of raw material
  - outage cost
- Non-stop operation
- Long lifespan
- Harsh environment

Types of manufacturing and control

Discrete manufacturing

- Parts can be identified
- Repetition of the same operations on each part
- Sequential control
- Controllers in use: PLCs
- Typical industries: factory automation (automotive, consumer goods)

Process manufacturing

- Continuous operation
- Continuous input of raw material and energy, continuous output of product
- Controllers in use: DCS *(Distributed Control System)*
- Typical industries: power, oil & gas, chemicals

Batch or Hybrid manufacturing

- A combination of discrete and process
- Steps of manufacturing carried out in batches
- Manufacturing is stopped and started by batches
- Typical industries: pharmaceutical, food & beverage

The automation pyramid
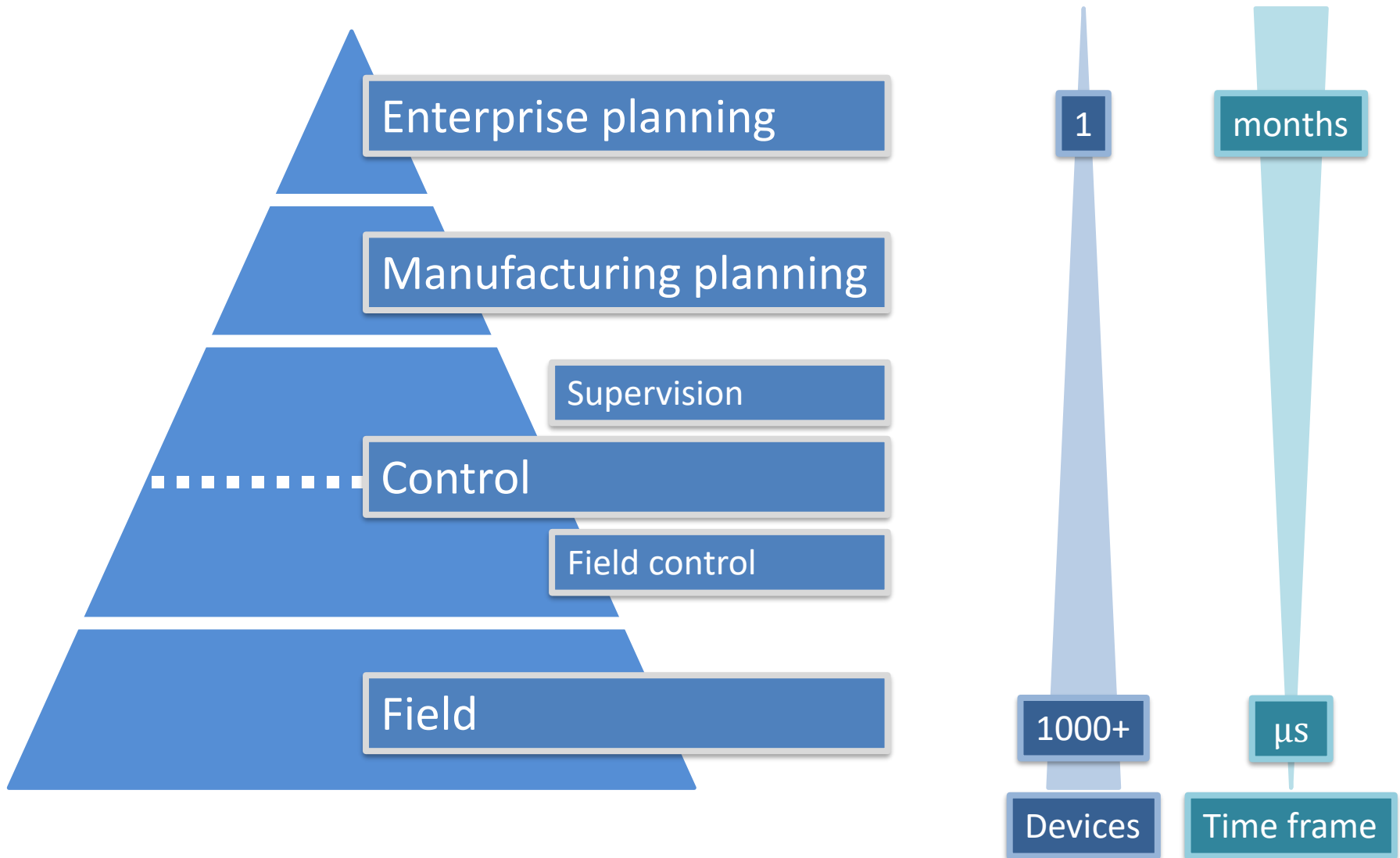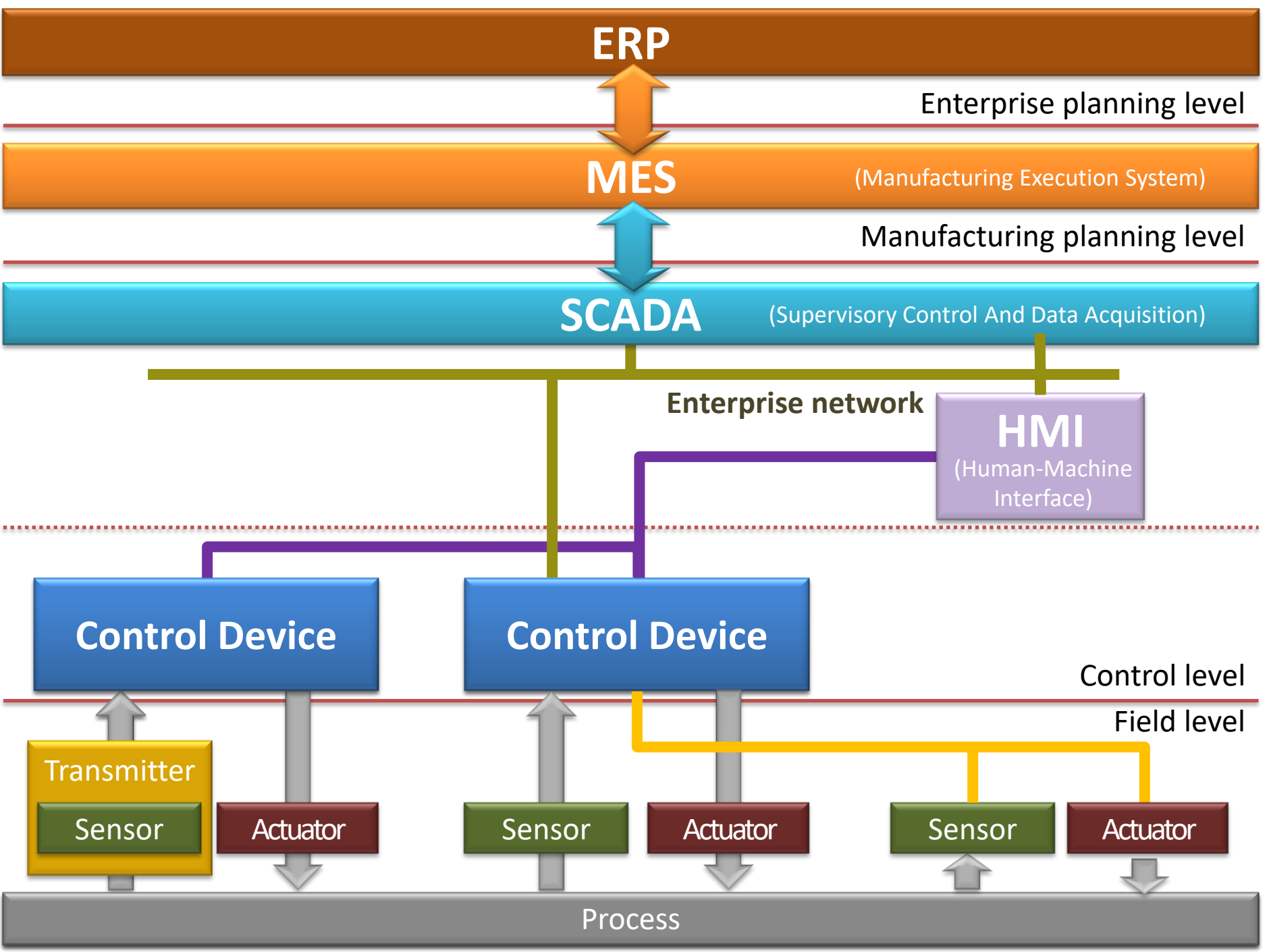
Course outline

Lectures

PLCs
- Features, operating mode
- Software model

Process instrumentation (sensors)
- Temperature
- Displacement, proximity, level
- Force, pressure
- Flow metering

Transmitters & IO modules

Practices

PLC programming