

DECEL

Training activity C1



Digital courses at Polytech Tours

Porto, 25-27 January 2023



Universidade do Porto

Faculdade de Engenharia

FEUP



Funded by
the European Union



1 Engineering School – Polytech Tours

- 4 specializations (departments)
 - Electronics and Energy ←
 - Computer science
 - Mechanics and System Design
 - Urban and Territorial Planning & Environment

≈ **1200** students

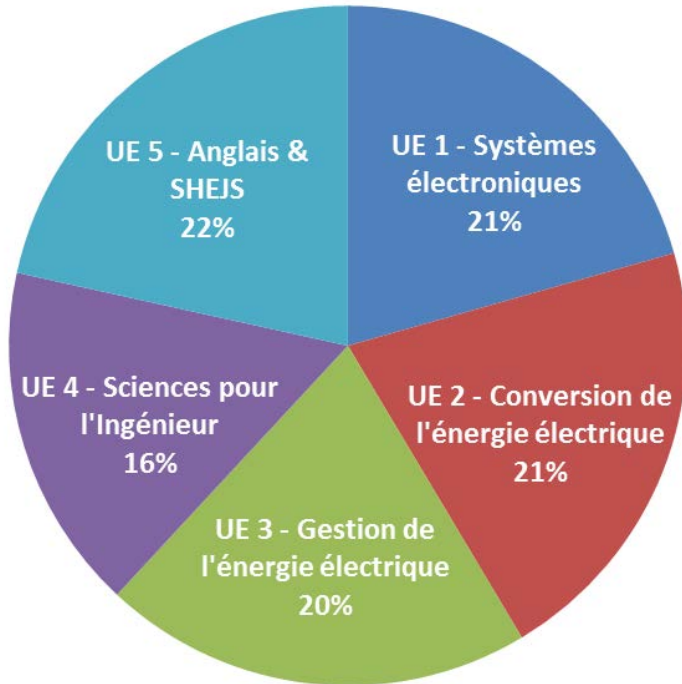
Into DECEL
scope





Electronics and Energy

Engineering course overview:



1 918 hours (face-to-face) over the 3 years

UE1 : Electronic systems

Acquisition, Processing, Communications

UE2 : electrical engineering

Production, Distribution, Conversion, Storage

UE3 : Engineering Sciences and Projects

Physics/Control/Projects

UE4 : Mathematics and computer science

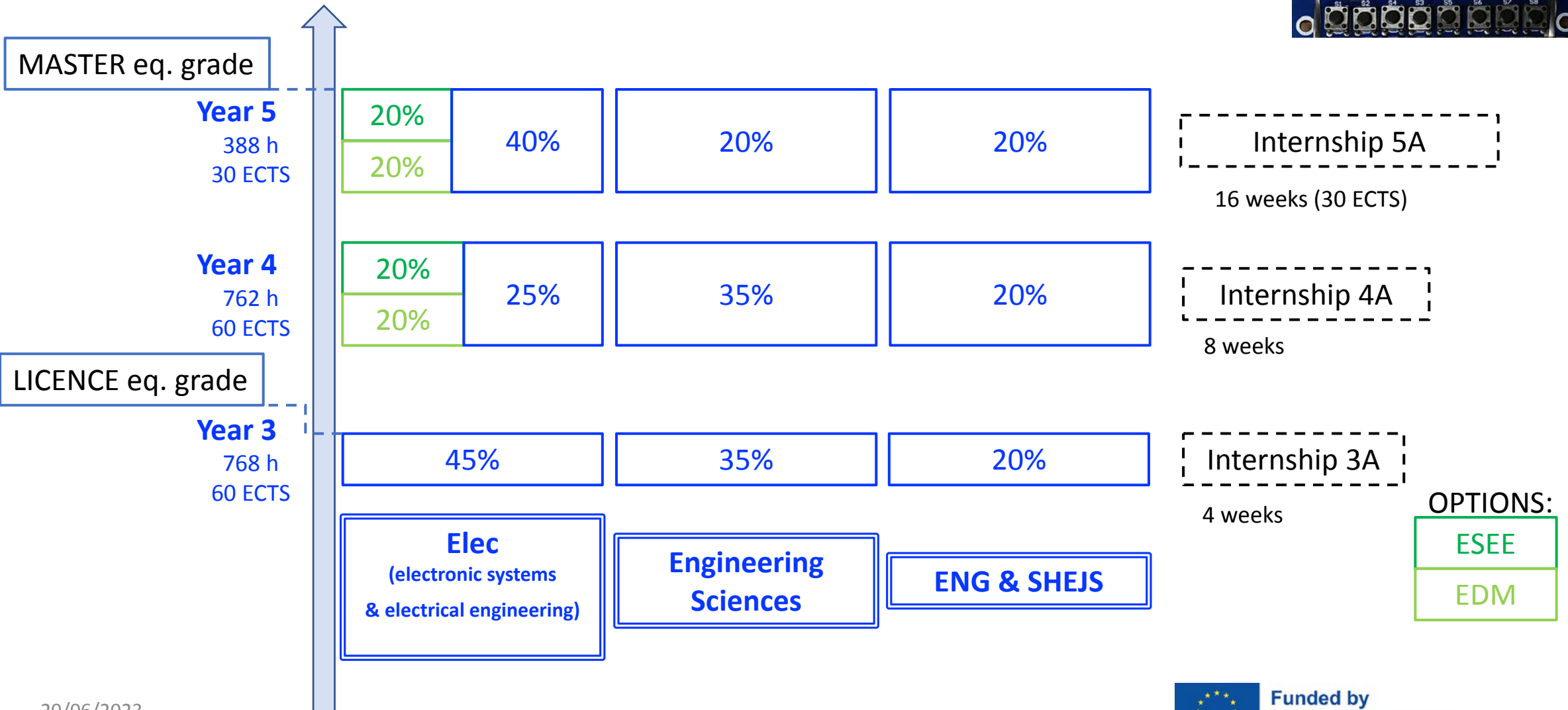
Mathematics, computer science

UE5 : English Management and Humanities (SHEJS) (common for all Polytech)

Electronic course at Polytech course



Engineering course overview:










Engineering course overview:

Licence eq. grade

MASTER Eq. grade



PREPA 1	PREPA 2	ENG 1	ENG 2	ENG 3
	Electronic LAB (S3) Arduino 16 hours 2 ECTS 	Integrated digital systems (S5) Quartus Altera, Cyclone2 30 hours 2 ECTS 	Embedded systems (S8) STM32 Nucléo + Cube 22 hours 1 ECTS 	Digital Circuit Architecture (S8) Altera, Cyclone 2, 32 hours 1,5 ECTS
		Simulation of electronic circuits (S5) Cadence, Verilog A 30 hours 2 ECTS	Embedded operating systems (S8) RPi 28 hours 1,5 ECTS 	FPGA advanced (S9 - optionnal) Altera, Cyclone 5, SoC 24 hours 3 ECTS
		Microcontrollers (S6) EasyPIC v7 38 hours 2 ECTS 	IoT (S8) STM32 Nucléo + Cube + Dongle (LoRa, 20 hours 1 ECTS 	



Digital electronic course at Polytech Tours



Lab activities (examples):

- Basics logics and 7 segments displays => Integrated digital systems (DE2-115 , S5)
- Interrupt and register handling => Microcontrollers (PIC16F, S5)
- **Pedometer** => Embedded systems (STM32, S8)
- **Pulse oximeter** => Embedded operating systems (Rpi, S8)
- **Video decoder** => Digital Circuit Architecture (DE2-215, S8)
- **Spectrum analyser** => FPGA Advanced (DE-10, S9)

Digital electronic course at Polytech Tours



- Online platform: Moodle (Célène) - > course repositories, exercise correction, lab activities, datasheets, etc.
- Organization of the teaching activities (for digital electronics):
 - ⇒ 2 to 6 hours of lectures (few hours)
 - ⇒ 12 to 36 hours of labs (maximize practical hours)
- Group size : max. 30 students
- Evaluation process : paper exam (60%) + grading of lab activities (40%).
- Non-traditional teaching activities and methodologies:
 - online teaching : No
 - remote labs : No
 - International collaboration : No (up to now, it might change with DECEL)

Digital electronic course at Polytech Tours



A lot of projects...

Projects including digital electronics:

- PEIP (Year1&2, Prépa, 30h)
 - Arduino based robot
 - Various PEIP projects includes sometimes digital electronics (RFID data logging system, etc.)
- PCI (Year4, 80h)

Examples:

 1. « smart river » automous data logger recording ultrasound signature of sedimentation into rivers (MHz signals)
 2. Energy Meter node for measuring energy consumption or production and activate access to electricity at each lab table
 3. Robotic National Cup
 4. Airship National cup : Remote control of a 7 meter long airship
 5. ...