

IPL Summer School 2022 Science & Engineering program

Most of the largest challenges we will face in the future (global warming, increasing scarcity of fossil fuels, the impact of production methods and materials, etc.) are related to how we produce and use energy and the consequences of those actions. The course aims to teach future engineers the industrial and regulatory context, the technical concepts and tools needed to comprehend these challenges, and explore the solutions of tomorrow.

Drawing from ECAM LaSalle’s expertise in the areas of energy, electrical and mechanical engineering, as well as materials science, this program is composed of a series of lectures and practical courses that will include case studies, labs and individual work on the themes covered. Students will also be asked to work on a team project that will be presented at the end of the course.

For program and application details, go to: <http://www.iplsummerschool.com/index.php>

Total credits: 6 ECTS¹, European Transfer System

	Session - Course content ²	Instructor	Hours
1	Energy and climate issues	Prof. Rafika BEN HAJ SLAMA Professor-Researcher in the Energy Department	4h
	<ul style="list-style-type: none"> • Energy and climate issues “main messages”. • Fundamentals and basics related to greenhouse gases emission • Carbon footprint method • Case study 		
2	Fuel Cells and Hydrogen	Prof. Mohamed Moussa EL IDI, Professor-Researcher in the Energy Department	3h
	<ul style="list-style-type: none"> • Introduction to Fuel Cells: Operating principle of a fuel cell, main characteristics, performance and applications examples • Hydrogen generation and stocking • Sizing Stack of a Fuel Cell : case study 		
3	Thermal Energy Storage	Prof. Mohamed Moussa EL IDI, Professor-Researcher in the Energy Department	3h
	<ul style="list-style-type: none"> • Introduction to energy storage • Thermal energy storage (TES) with phase change materials (PCM) • Application: Passive thermal management using PCM for Li- ion batteries 		
4	Efficiency and Control System	Prof. Hassan Hariri Professor-Researcher in the Automation and IT Department	3h
	<ul style="list-style-type: none"> - Presentation of an industrial programmable logic controller PLC, performances and industrial applications. Drivers & controllers of actuators. Rules of regulation. - Test bench of a device with on-off inputs and outputs and of a small process control, small controller programming and analysis of the system response. 		
5	Production of Electrical Energy 3: Fuel Cells	Prof. Christophe Jouve, Head of the Automation & IT Department	3h
	<ul style="list-style-type: none"> - Operating principle of a fuel cell, main characteristics, performance, hydrogen generation and stocking means, applications examples (e.g. electric vehicles) - Test bench of a 500W fuel cell 		

¹ Equivalent to 3 or 4 US credits, depending on your program and university.

² The school reserves the right to modify the course modules and/or their content for updating or improvement purposes.

8	Materials for sustainable energy	Prof. Aurélien Etienne, Professor- Researcher, Materials and Structures Department	6h
<ul style="list-style-type: none"> - Introduction to materials science: classification of materials and common properties. - Materials in energy conversion and storage devices. - Laboratory work: Characterization of materials for photovoltaic solar cell and Li-ion batteries. 			
9	Group Project	ECAM LaSalle instructors	15h
<ul style="list-style-type: none"> - Research project related to one of the subjects covered during the course - Students work in teams; regular contact with supervising professors 			
10	Final evaluation + oral presentation	ECAM LaSalle instructors	3h
<ul style="list-style-type: none"> - Final exam covering the taught classes and laboratory work - 20-minute oral presentation of the group project followed by questions from the panel of professors 			