

# ENERGY EFFICIENCY & RENEWABLE ENERGIES: LEVERS FOR ENERGY TRANSITION SUMMER SEMINAR

**Certificate awarded by:** ECE Paris: Graduate School of Engineering

**Welcome event:** July 2<sup>nd</sup>, 2018 (morning) **Start date of courses:** July 2<sup>nd</sup>, 2018 (afternoon)

**End date:** July 26<sup>th</sup>, 2018 **Certificate Ceremony:** July 26<sup>th</sup>, 2018

**Total ECTS:** 9 **Total contact hours:** 72

**Program requirement:** a minimum 18 years of age

**Program location:** ECE Paris – 37 quai de Grenelle, 75015 Paris, France

**Language of instruction:** English

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**PROGRAM FEE: 1,850€**

## FEE INCLUDES:

- Orientation/Welcome Event
- Weekly cultural visits/activities
- Computer accounts at the school (WIFI access)
- Access to the school's MediaCenter
- Official transcript of grades
- Program Certificate
- Certificate Ceremony

## PROGRAM OVERVIEW/OBJECTIVE:

The seminar is composed of a set of 3 courses (3 x 24h, 3 x 3 ECTS). Its main objective is to provide students with engineering knowledge and techniques for understanding, assessing, and mitigating environmental issues associated with energy production, efficiency rating, storage, transmission, distribution, integration in existing portfolio, and consumption. The focus of this course is concentrated on the key role that energy efficiency and renewable energy are playing into the context of global energy transition.

Students will learn:

- Basic knowledge needed in order to understand today's energy and climate challenges;
- Basic theories of different technologies for energy efficiency and different sources of renewable energy technologies, energy transmission and storage;
- Basic theories and tools to perform feasibility studies related to implementation of energy efficiency solution and renewable energy production;
- Basic knowledge needed to quantify and evaluate any economic and environmental benefits associated to energy efficiency programs and solutions and renewable energy production project depending on the considered available source of renewable energy.

Successful student will be granted with a certificate

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### PROGRAM COURSE LIST

Course Title	ECTS (credits)	Contact hours	Level (undergraduate or graduate)
Energy Efficiency and Renewable Energies in the context of Global Energy Transition	3	24	undergraduate
Energy Efficiency Technologies Portfolio	3	24	undergraduate
Renewable Energy Technologies Portfolio	3	24	undergraduate

### COURSE 1

Course Title	Energy Efficiency and Renewable Energies in the context of Global Energy Transition
Learning outcomes	<p>Students will learn basic knowledge needed in order to understand today's energy challenge.</p> <p>This course provide students with the basic knowledge needed for understanding, assessing, and mitigating environmental issues associated with energy production, efficiency rating, storage, transmission, integration in existing portfolio, and consumption.</p>
Pre-requisites	Fundamentals of Physics, Mathematics, Chemistry, Technology and basic knowledge in Socio-Geopolitics
Recommended readings	<p>The Politics and Institutions of Global Energy Governance by Thijs Van de Graaf.</p> <p>The Political Economy of Sustainable Energy by Catherine Mitchell.</p> <p>Energy and the Environment by Robert A. Ristinen &amp; Jack P. Kraushaar.</p>

### COURSE CONTENT:

The course will be composed of 24h of face-to-face (lectures, tutorials or labs).

- Introduction: Getting Power to the People
- Universal access to energy as a path to sustainable development
- Global Energy Supply and Use in the Context of World Energy and Environment Transition
- Environmental and Economic Impacts of Fossil Fuels Consumption
- Energy Efficiency and Renewables as Levers for Energy and Environment Transition

### COURSE 2

Course Title	Energy Efficiency Technologies Portfolio
Learning outcomes	<p>Students will learn basic knowledge needed to quantify and evaluate any economic and environmental benefits associated to energy efficiency in the different sectors (i.e. industry, transport, services, and building).</p> <p>This course provides students with engineering knowledge and technique for understanding, assessing, and mitigating environmental issues associated with energy consumption. It presents the major regulation tools, policy and tool and incentive programs for accelerating penetration of energy-efficiency solutions.</p>
Pre-requisites	Fundamentals of Physics, Mathematics and Chemistry
Recommended readings	Electric Power Generation, Transmission, and Distribution, Third Edition (Electric Power Engineering Series) Hardcover edited by Leonard L. Grigsby.

### COURSE CONTENT:

**The course will be composed of 24h of face-to-face (lectures, tutorials or labs).**

- Definition of Energy Efficiency
- Planning, Implementing and Evaluating Energy Policies and Solutions
- Implementing Energy Efficiency Action Plan with ISO 50001 International Standard
- Energy Efficiency Trends and Policies in Europe

### COURSE 3

Course Title	Renewable Energy Technologies Portfolio
Learning outcomes	<p>Students will learn basic knowledge needed to quantify and evaluate any economic and environmental benefits associated to renewable energies in the different sectors (i.e. industry, transport, services, and building).</p> <p>This course provides students with engineering knowledge and technique for understanding, assessing, and mitigating environmental issues associated with renewables. It presents the major regulation tools, policy and tool and incentive programs for accelerating penetration of renewables. It also covers the challenges of high level of integration of renewables in the existing energy mix.</p>
Pre-requisites	Fundamentals of Physics, Mathematics, Chemistry, Technology and basic knowledge in Socio-Geopolitics
Recommended readings	<p>“The Geopolitics of Renewable Energy” by Meghan O’Sullivan et al,</p> <p>“Electric Power Generation, Transmission, and Distribution” by Leonard L. Grigsby,</p> <p>“Synergies Between Renewable Energy and Energy Efficiency” by IRENA</p> <p>“Adapting Market Design to High Shares of Variable Renewable Energy” by IRENA.</p>

### COURSE CONTENT:

The course will be composed of 24h of face-to-face (lectures, tutorials or labs).

- Renewable Energy Panorama and Perspectives
- Thermodynamic Principles and Energy Conversion
- Understanding Renewable Energy Systems : production, transmission, distribution and storage
- Integrating Renewables in the Energy System : Moving towards Smart Grids and Smart Networks
- The Cost of Renewable Energies and CO2 Emissions Intensity Comparison with Fossil Fuels
- Policies, Regulation and Market Design for Renewable Energies