

# Smart grids and smart cities (ECON959\_SOLEM )



Composante  
Polytech  
Annecy-  
Chambéry

## En bref

- › **Langues d'enseignement:** Anglais
- › **Méthodes d'enseignement:** En présence
- › **Forme d'enseignement :** Cours magistral
- › **Ouvert aux étudiants en échange:** Oui

## Présentation

### Description

- \* Semester 9
- \* Duration : Within one semester
- \* Type: Mandatory
- \* Student workload: Lecture (CM): 18 hours, 20 hours of self-study
- \* Applicability: ESBC course only
- \* Teaching and learning method : Lecture, case studies, discussion
- \* Module examination: 1 written exam (60%), 1 Assignment (25%), 1 individual presentation (15%)

**Responsible person for the module:** Rowena Mathew- Ph.D in economics, IREGE Laboratory, IAE, USMB

**Research fields:** Environmental economics, energy transitions, climate change mitigation, renewable energy storage, electric vehicles, household electricity, economic modelling

**Thesis:** Optimising usage of electric vehicles and solar PV in households for increased energy storage and welfare - [Resume](#)

<https://www.irege.univ-smb.fr/en/phd-students/>

### Objectifs

### Major intended learning outcomes:

- \* Upon completion of the module students will
- \* Understand the need and context for smart grids and smart cities
- \* Describe and understand the new energy paradigm and gain a holistic perspective of sustainable energy systems
- \* Describe and understand energy transitions and the role of smart technologies to facilitate it
- \* Assess the complexity of electricity systems and its transformation to a low carbon economy
- \* Contextualise applicability in different countries
- \* Be able to identify key actors, best cases and organizations

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## Heures d'enseignement

CM	Cours Magistral	18h
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## Pré-requis obligatoires

Admission to 2nd year

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## Plan du cours

### Content of the module:

- \* Classes 1 and 2 - Introduction to Climate Change, Climate Finance and Principles of Environmental Economics. Introduction to Smart Grids, Smart Cities and Context/Need of Energy Transition.
- \* Classes 3 and 4 - Energy Transition (contd.) and Electricity Markets, Smart Citizens who are 'prosumers', Types of Smart Technology.
- \* Class 5 Best Practices in Smart Cities/Smart Grids, Discussion on practical case studies.
- \* Classes 6 and 7 - Submission of Homework Assignment (25%). Business models, Renewable Energy Integration and Operation, Distributed Generation.
- \* Classes 8 and 9 - Individual presentations in class (15%). Various Applications of Smart Grids, Key financial factors, Industry trends, Introduction to Modelling.
- \* Class 10 - Energy policy and regulations at regional, national and sub-national level.
- \* Class 11 - Integrating IT, Telecom and Cyber Security.
- \* Class 12 - Final written exam (60%)

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## Bibliographie

### Suggested Readings:

- \* Calearo, L., Ziras, C., Sevdari, K., & Marinelli, M. (2021). Comparison of Smart Charging and Battery Energy Storage System for a PV Prosumer with an EV. Proceedings of 2021 IEEE PES Innovative Smart Grid Technologies Europe: Smart Grids: Toward a Carbon-Free Future, ISGT Europe 2021. <https://doi.org/10.1109/ISGTEurope52324.2021.9640120>

- \* Longo, M., Yaïci, W., & Foiadelli, F. (2017). Electric vehicles charged with residential's roof solar photovoltaic system: A case study in Ottawa. 2017 IEEE 6th International Conference on Renewable Energy Research and Applications (ICRERA), 121–125. [https://www.researchgate.net/profile/Wahiba-Yaici/publication/321816071\\_Electric\\_vehicles\\_charged\\_with\\_residential's\\_roof\\_solar\\_photovoltaic\\_system\\_A\\_case\\_study\\_in\\_Ottawa/links/5a340c8745851532e82cb062/Electric-vehicles-charged-with-residentials-roof-solar-photovoltaic-system-A-case-study-in-Ottawa.pdf](https://www.researchgate.net/profile/Wahiba-Yaici/publication/321816071_Electric_vehicles_charged_with_residential's_roof_solar_photovoltaic_system_A_case_study_in_Ottawa/links/5a340c8745851532e82cb062/Electric-vehicles-charged-with-residentials-roof-solar-photovoltaic-system-A-case-study-in-Ottawa.pdf)
- \* MEADOWS, Donella; RANDERS, Jorgen; MEADOWS, Dennis. Limits to Growth: the 30-year update. London: Earthscan, 2004.
- \* Tietenberg T. and Lewis L. : Environmental Economics and Policy, Pearson Education, 6th ed., 2010
- \* Kolstad C.D. : Environmental Economics, Oxford University Press, 2010
- \* Stern Commission Report

#### Reports, Websites:

- \* International Energy Agency (IEA) <https://www.iea.org/reports/smart-grids>
- \* United Nations Environment Program (UNEP)
- \* United States Environment Protection Agency (US EPA)
- \* European Union Commission (EC)
- \* United Nations Framework Convention on Climate Change (UNFCCC)
- \* World Economic Forum (WEF)
- \* World Business Council for Sustainable Development (WBCSD)
- \* Stern Commission Report
- \* Inter-Governmental Panel on Climate Change (IPCC)
- \* European Technology Platform for Electricity Networks of the Future
- \* UCES/IAE. 2021. Are we getting the best out of Smart Home Technologies? The role of usability. <https://userstcp.org/wp-content/uploads/2021/10/Usability-Report-Final-Oct-2021.pdf>.
- \* Energy Future Coalition. 2003. Smart Grid Working Group. ["Challenge and Opportunity: Charting a New Energy Future, Appendix A: Working Group Reports"](#)

## Infos pratiques

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### Lieux

- › Le Bourget-du-Lac (73)
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### Campus

- › Le Bourget-du-Lac / campus Savoie Technolac