

SCIENCES, TECHNOLOGIES, SANTÉ

# Master Energie solaire (Solar energy)



Niveau de  
diplôme  
BAC +5



ECTS  
120 crédits



Durée  
2 années, 4  
semestres



Langues  
d'enseignement  
Anglais

## Parcours proposés

- › Energy for solar buildings and cities (Energie pour bâtiments et villes solaires)
- › Energie pour bâtiments et villes solaires - Formation continue
- › Solar energy, law, economics and management (Droit, économie et gestion pour énergie solaire)

Entreprises IAE Savoie Mont Blanc) and School of Law (Faculté de Droit) at USMB.

Located on the Bourget-du-Lac Campus, close to INES (National Institute for Solar Energy) experimental facilities, you will participate in high quality education and multidisciplinary projects, stimulating your creativity and entrepreneurial skills.

## Présentation



The Master program **SOLAR ENERGY** is a highly innovative, new degree program preparing to tackle present and future challenges of the energy transition. It is a part of Solar Academy Graduate School recently awarded to University of Savoie Mont Blanc (USMB).

The two-year master program S3E, is composed of two tracks: ESBC (*Energy for Solar Building and Cities*), focused on engineering, and SoLEM (*Solar Energy: Law Economics and Management*) focused on economics.

This master program is jointly developed by the School of Engineering (Polytech Annecy-Chambery), School of Business and Administration (Institut d'Administration des

## Objectifs

The *Energy for Solar Building and Cities* program combines practice and theory centered on the fields of solar energy engineering, building physics and materials science, with an opening to computer science, architecture and urban planning, law, economics and sociology.

The training provides the knowledge on how to deploy the energy transition in the building sector, with a particular focus on solar energy. It provides technical tools for system sizing and management, and develops an in-depth understanding of the energy transition, including its relationship with public policies, economic and industrial transformations, business models, legal concepts and tools specific to the renewable energy sector, in particular solar energy.

The core training in *Solar Energy: Law Economics and Management* program, based on economics, management and law, provides knowledge on how to apply the main tools of economic analysis and develop an in-depth understanding of the energy transition, including its relationship with public policies, industrial transformations, business models, legal

concepts and tools specific to the renewable energy sector, in particular solar energy.

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## Dimension internationale

Courses are taught, in English, by international experts and highly recognized partners from national and international research institutions and industry as well as by academic staff of USMB.

Disciplinary and international mobility, as well as immersion in an international research environment, are an integral part of the curriculum, bringing added value to students in terms of training and research. Grants for international mobility, awards for best projects as well as scholarships awarded for excellent academic results are available.

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## Les atouts de la formation

Innovative multidisciplinary education offers common introduction to economics and law, focusing on environmental economics and energy law (important challenges in the energy transition), and to engineering sciences, focusing on solar energy (highly growing sector of renewable energy) and on energy efficiency in building sector (responsible for over 40% of world primary energy consumption)

Projects and workshops complement this unique teaching experience.

M1 internship of 2 months.

Mandatory M2 internship of 6 months (February to July).

Excellence scholarships will be awarded to selected candidates, and funded by the Solar Academy Graduate School, in order to attract students with an excellent academic level and a real motivation (more information on the website).

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## Organisation

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### Effectifs attendus

24 students for ESBC track and 12 for SoLEM (in 2021)

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## Aménagements d'études

<https://www.univ-smb.fr/en/formation/amenagements-specifiques/>

**Date de début de la formation :** Beginning of September

**Date de fin de la formation :** End of June

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## Admission

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### A qui s'adresse la formation ?

The ESBC program recruits students with a bachelor degree in Engineering, Physics, Sciences and Technologies or equivalent.

The SoLEM program recruits students with a bachelor degree in Economics, Management, Law, Humanities or Social Sciences, or equivalent.

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### Conditions d'admission

A minimum of 180 ECTS credits is required as well as a sufficient knowledge of English language

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### Candidater et s'inscrire

Applications are only made online (Campus France, E-Candidate...). [🔗 To know more about it](#)

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### Attendus de la formation

For ESBC track, general knowledge of engineering sciences and physics of transfers is desirable.

For SoLEM track, general knowledge of economics is desirable

## Et après

### Poursuite d'études

Ph.D. in Economics, Law, Management, Engineering Sciences, in particular solar energy deployment and energy efficiency, within the Solar Academy Graduate Program.

Following the master's program, it is possible to continue with a doctoral program either at USMB or at a French or foreign university.

### Métiers visés et insertion professionnelle

The objective of the ESBC program is to train future researcher and senior executives, including engineers in technical design offices. Companies in the energy and building sectors, consulting firms, government regulatory services and NGOs are interested in candidates with a dual set of skills, such as those they will be able to develop in the ESBC Master's program.

The objective of the SoLEM program is to train future researchers and senior executives from public or private institutions and companies. Firms from the energy sector, consultancy offices, government regulation offices as well as NGOs are interested in candidates with a dual set of skills, such as the ones you will develop in the SoLEM Master program.

## Infos pratiques

## Contacts

Responsable pédagogique

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Gestionnaire administratif

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## Laboratoires partenaires

Centre Antoine Favre

<https://univ-droit.fr/structures-de-recherche/1224-centre-de-recherche-en-droit-antoine-favre-crdafr-chambery>

IREGE

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

LAMA

<https://www.lama.univ-savoie.fr/index.php?&lang=en>

LEPMI

<https://lepmi.grenoble-inp.fr/>

LISTIC

<https://www.univ-smb.fr/listic/en/>

CEA, Centre Antoine Favre, IREGE, LAMA, LEPMI, LISTIC, LLSETI, LOCIE

<https://www.univ-smb.fr/solaracademy/research-units/>

## Campus

 Le Bourget-du-Lac / campus Savoie Technolac

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## En savoir plus

Solar Academy Graduate School

<https://www.univ-smb.fr/solaracademy/>

# Programme

## Energy for solar buildings and cities (Energie pour bâtiments et villes solaires)

### M1 - Energy for solar buildings and cities

#### Semestre 7

	Nature	CM	TD	TP	Crédits
UE701 Core solar	UE				4
Solar resource, radiation and optics	EC	9h	12h	6h	3
Application to solar systems	EC	4,5h	6h	3h	1
UE702 Core building	UE				4
Energy needs and performance	EC	4,5h	6h		1
Building energy : envelope and HVAC	EC	6h	19,5h	3h	3
UE703 Physics and materials for solar systems and buildings	UE				4
Thermodynamics and heat transfer	EC		30h		3
Materials for energy	EC	6h	6h		1
UE704 Introduction to economics	UE				4
Introduction to economics	EC	9h	9h		2
Public economics	EC	9h	9h		2
UE705 Sustainability for energy transition	UE				8
International and european regulations	EC	9h	10,5h		2
SEMINARS Human sciences for solar energy	EC	15h			2
Sustainability analysis	EC	9h	6h	9h	2
Foreign language choice	CHOIX				
Foreign language (French)	EC		30h		2
Foreign language English	EC		30h		2
UE706 Introduction to research	UE				6
Library research tools and methods	MODULE		4h		
Literature review project	EC	6h		24h	6

#### Semestre 8

	Nature	CM	TD	TP	Crédits
UE801 Power generation	UE				6
Solar power generation	EC				2
Energy vectors & Energy storage	EC	6h	12h	3h	2
Energy grids	EC		3h	18h	2

UE802 Advanced tools - experimental	UE				4
Experimental methods	EC	6h	12h		2
Application to solar systems	EC	4,5h	16h		2
UE803 Modelling of transfers phenomena	UE				4
Computational fluid mechanics (CFD)	EC		16h		2
Building performance simulation (BPS)	EC		12h		1
Radiation modeling in complex media	EC	2h	12h		1
UE804 Introduction to management	UE				2
Strategic management	EC	9h	9h		2
UE805 Energy environment and society	UE				6
Specific energy contracts and fiscal law	EC	9h	10,5h		2
SEMINARS International energy policies	EC	18h			2
Foreign language choice	CHOIX				
Foreign language (French)	EC				2
Foreign language English	EC				2
UE806 Innovation, creativity and research	UE		22h		8
Creativity through biomimicry for solar cities	EC		22h		2
Research project	EC			24h	6
Optional Internship/Work placement	MODULE				

## M2 - Energy for solar buildings and cities

### Semestre 9

	Nature	CM	TD	TP	Crédits
UE901 Advanced solar systems	UE				6
Solar thermal systems	EC		12h	9h	2
Building integrated PV (BIPV-BIPVT)	EC		9h	6h	2
Solar power generation	EC		15h	9h	2
UE902 Tools for solar cities	UE				6
Urban metabolism: energies, anergy, geothermy...	EC	3h	9h		2
Solar cadastre, solar performance	EC	6h	12h	4h	2
Environmental regulation for buildings and systems	EC	6h	12h		2
UE903 Advanced methods	UE				4
Artificial intelligence	EC	6h	1,5h	6h	2
Operational research for urban solar development	EC	3h	3h	18h	2
UE904 Urban development	UE				6
Case study common project	EC	9h	10,5h	16h	2
Performance indicators and information processing	EC	6h	12h		1
Urban planning and architectural integration	EC	10h		3h	1
Foreign language choice	CHOIX				
Foreign language (French)	EC		30h		2

Foreign language English	EC		30h		2
UE905 Research and innovation project	UE				8
Multidisciplinary project	EC	6h		24h	6
Entrepreneurship, innovation challenge	EC	6h			2

## Semestre 10

	Nature	CM	TD	TP	Crédits
UE001 Internship	UE				30
Internship	EC				30

## Energie pour bâtiments et villes solaires - Formation continue

### M2 - Energie pour bâtiments et villes solaires - Formation continue

## Semestre 9

	Nature	CM	TD	TP	Crédits
UE901 Performance Energétique des Bâtiments	UE				6
Physique du bâtiment	EC	14,5h		14h	3
Intégration des systèmes énergétiques	EC	10,5h	21h		3
UE902 Outils de la Transition Energétique & Environnementale	UE				6
Conception Environnementale des Bâtiments	EC	14h	3,5h		2
Réglementation Environnementale des Bâtiments	EC		42,5h		4
UE903 Solaire Thermique	UE				6
Solaire Thermique Réseaux énergétiques urbains et process industriels	EC	17,5h		4h	2
Eau chaude sanitaire solaire collective	EC	21h	17,5h		4
UE904 Solaire Photovoltaïque	UE				6
Solaire PV raccordé au réseau	EC	35h		4h	4
Conception et ingénierie de projets photovoltaïques	EC	4h	17h		2
UE905 Management de projets en énergie solaire et efficacité énergétique	UE				6
Collectivités et Transition Environnementale	EC	3,5h	14h		2
Analyse économique de projets Energies Renouvelables	EC		20,5h		2
Droit public et privé & Projets solaires	EC	22h			2

## Semestre 10

	Nature	CM	TD	TP	Crédits
UE001 Stage	UE				30
Stage d'insertion professionnelle	EC				30

## Solar energy, law, economics and management (Droit, économie et gestion pour énergie solaire)

### M1 - Solar energy, law, economics and management

#### Semestre 7

	Nature	CM	TD	TP	Crédits
UE701 Core Law	UE				4
Legal issues related to renewable energies	EC	7,5h			2
Bases of contract law	EC	10,5h			2
UE702 Core Economics	UE				4
Environmental economics and Externalities	EC	21h			2
Economics of energy and climate policies	EC	21h			2
UE703 Quantitative analysis	UE				4
Advanced data analysis	EC	15h	15h		2
Introduction to econometrics	EC	10,5h	10,5h		2
UE704 Introduction to Solar Energy	UE				4
Solar Thermal and Photovoltaic	EC	12h	4,5h		2
Projet	EC			4h	2
UE705 Sustainability for energy transition	UE				8
International and european regulations	EC	9h	10,5h		2
SEMINARS Human sciences for solar energy	EC	15h			2
Sustainability analysis	EC	9h	6h	9h	2
Foreign language choice	CHOIX				
Foreign language (French)	EC		30h		2
Foreign language English	EC		30h		2
UE706 Introduction to research	UE				6
Library research tools and methods	MODULE		4h		
Literature review project	EC	6h		24h	6

#### Semestre 8

	Nature	CM	TD	TP	Crédits
UE801 Market and Energy Prices	UE				2
Price dynamic modelling	EC	12h	9h		1
International energy markets	EC	21h			1
UE802 Adoption of renewables	UE				4
NPV Computation	EC	10,5h			1
Intertemporal optimization under uncertainty	EC	10,5h			1
Adoption of environmental innovations	EC	10,5h			2



UE803 Urban planning and city	UE				2
Urban Planning	EC	18h			1
Urban Law	EC	18h			1
UE804 Energy transition and public policies	UE				4
Public policies assessment in econometrics	EC	10,5h			1
Modelisation and economic prospective	EC	10,5h			1
Law in Construction and Energy	EC	9h			1
Energy and territorial development	EC	10,5h			1
UE805 Introduction to Energy use in Buildings and Cities	UE				4
Energy use in Buildings	EC	6h	15h		3
Sustainable Urban Energy	EC			4h	1
UE806 Energy Environment and Society	UE				6
Specific energy contracts and fiscal law	EC	9h	10,5h		2
SEMINARS International energy policies	EC	18h			2
Foreign language choice	CHOIX				
Foreign language (French)	EC				2
Foreign language English	EC				2
UE 807 Innovation, creativity and research	UE				8
Creativity through biomimicry for solar cities	EC		22h		2
Research project	EC			24h	6
Optional Internship/Work placement	MODULE				

## M2 - Solar energy, law, economics and management

### Semestre 9

	Nature	CM	TD	TP	Crédits
UE901 Advanced Business Models	UE				4
Legal regim : production, use solar electricity	EC	18h			2
New Business models in energy industry	EC	18h			2
UE902 Energy Efficiency	UE				4
Energy efficiency in buildings	EC	18h			2
Empirical case studies in energy efficiencies	EC	10,5h	9h		2
UE903 Energy transition and development	UE				4
Long run optimization (dynamic control)	EC	9h			2
100% renewable objective	EC	9h			1
Renewables in developing countries	EC	9h			1
UE904 Smart grids and smart city	UE				4
Modeling in the literature	EC			21h	2
Smart grids and smart cities	EC	18h			2
UE905 Urban development	UE				6

Case study common project	EC	9h	10,5h	16h	2
Urban planning and architectural integration	EC	10h		3h	1
Performance indicators and information processing	EC	6h	12h		1
Foreign language choice	CHOIX				
Foreign language (French)	EC		30h		2
Foreign language English	EC		30h		2
UE906 Research and innovation project	UE				8
Multidisciplinary project	EC	6h		24h	6
Entrepreneurship, innovation challenge	EC	6h			2

## Semestre 10

	Nature	CM	TD	TP	Crédits
UE001 Internship	UE				30
Internship	EC				30