

PRE-REQUISITES

Basics on LCA methodology and practice of an LCA software

Basics in Statistics

English

Familiarization with the programming language

OBJECTIVES

Life Cycle Assessment (LCA) is one of the most widespread environmental management tools and can provide relevant information for the debate on the concerns of certain technologies in diverse production sectors. Providing environmental information for policy makers is necessary to answer the questions on major concerns such as resource depletion, global warming or social acceptance.

However, LCA requires the collection of a large amount of data with different levels of reliability. These uncertainties are propagated to LCA results and may affect the interpretation and conclusions of the analysis. Moreover, real systems are affected by inherent variability as a result of geographical, temporal and technological specificities. It is thus important to characterize these variations and their effect on LCA results. Therefore, it is necessary to assess and understand the possible sources of uncertainty and variability and to rank them in order to highlight the priorities to minimize the environmental impacts of the evaluated technologies.

This PhD course is oriented towards a major key issue for LCA, namely understanding and handling uncertainties in LCA. Some of the key issues addressed during the course will be:

- Distinguishing between UNCERTAINTY and VARIABILITY
- Sensitivity analyses: a review of statistical tools
- Spatial variations
- Modeling of uncertainty of impact characterization
- Meta-analysis: meta-models applied to LCA
- Parameterized models and reduced parameterized models applying Global Sensitivity Analysis (GSA) for energy pathways
- Prospective uncertainties



This PhD training alternates theory (11 x 1h30 courses) and practice (7 x 1h30 case study + 8 h personal work). The theoretical fundamentals learned during the lectures will be applied to a case study on energy pathways. A statistical tool will be used. 4 sessions of 2 h are scheduled for the personal project that will be developed in teams (2–3 people).

TEACHING STAFF

- Isabelle BLANC (Professor at MINES ParisTech)
- Paula PEREZ-LOPEZ (Assistant Professor at MINES ParisTech)
- Anne VENTURA (Researcher at University Gustave Eiffel)
- Lynda AISSANI (Researcher at INRAE)
- Romain BESSEAU (Researcher at MINES ParisTech)
- Mélanie DOUZIECH (Tenure Track at MINES ParisTech)

MORE INFORMATION

Please, visit the website of the Centre Observation Impacts, Energie (O.I.E.) to get more information on this training:

<http://www.oie.mines-paristech.fr/Formation/Doctorat/Cours-doctoral-ACV/>

USEFUL LINKS

MINES ParisTech: <http://www.mines-paristech.fr/>

Centre O.I.E.: <http://www.oie.mines-paristech.fr/>

Institut national de recherche pour l'agriculture, l'alimentation et l'environnement (INRAE): <https://www.inrae.fr/>

University Gustave Eiffel : <https://www.univ-gustave-eiffel.fr/>

EcoSD: <http://ecosd.fr/>

2019 PARTICIPANTS

Manchester University (GB), Electricité de Strasbourg (France), OS (Iceland), RTE (France), Fraunhofer (Germany), Siena University (Italy), BRGM (France), Centrale-Supélec (France), CSTB (France), Institut of Energy and Climate Research (Germany), VITO (Belgique), ISOR (Iceland)



PROGRAM

CDE 1	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
9h00 - 10h15	Introduction to uncertainties / Variability related to LCA Isabelle BLANC – MINES ParisTech	Meta-Analysis / Meta-Models Isabelle BLANC –MINES ParisTech	Case study	Assessing spatial variability in LCA: why Lynda AISSANI – INRAE 9h30-11h	Case study finalization
10h30 - 12h00	Sensitivity analysis : Definition and statistical tools Paula PEREZ LOPEZ – MINES ParisTech	Parameterized models & Reduced parameterized models based on GSA Isabelle BLANC –MINES ParisTech	Case study	Prospective LCA uncertainties for energy pathways Isabelle BLANC– MINES ParisTech 11h30-12h30	Case study finalization
13h30 - 15h00	Uncertainty Analysis in LCA Isabelle BLANC – MINES ParisTech	Case study	Understanding sources of uncertainties in impact characterization methods (1) Anne VENTURA – Univ. Eiffel	Assessing spatial variability in LCA: How Lynda AISSANI – INRAE	Presentation of the case study by groups & Discussion
15h30 - 17h00	Global Sensitivity Analysis (GSA) in LCA Paula PEREZ LOPEZ – MINES ParisTech	Case study	Understanding sources of uncertainties in impact characterization methods (2) Anne VENTURA – Univ. Eiffel	Case study	--
17h00-18h30	Presentation of the Case study on Energy Pathway Paula PEREZ LOPEZ MINES ParisTech	Case study	Case study	Case study	--