



ADVANCED LIFE CYCLE IMPACT ASSESSMENT

This course begins by giving an overview of the life cycle impact assessment (LCIA) phase of LCA studies. The general framework, definitions and concepts will be presented from those of the ISO standards to the present state-of-the-art. Practical exercises will focus on how to make appropriate choices when performing the LCIA phase in a study (choice of impact categories, characterisation models, when to apply normalization and/or weighting, relating to stakeholders) and on the differences between current LCIA methods.

The second half of the course presents a deep dive into the modelling aspects involved in the life cycle impact assessment (LCIA) phase of LCA studies. Practical exercises on designing impact pathways and models from inventory indicators (stressors) to midpoint and endpoint characterisation, using examples from both well-established and emerging impact categories, and with a special view on the uncertainty associated with LCIA. New trends in LCIA modelling, with a focus on spatial and temporal differentiation.

The course

COURSE OUTLINE

- Description of the different mandatory and optional LCIA elements according to ISO 14040/14044 and other impact assessment frameworks.
- Definitions and concepts of LCIA, such as stressors, actual versus potential impacts, impact categories and pathways, environmental mechanisms, classification, fate, exposure, incidence, duration, linearity, steady-state vs. dynamic, marginal cause-effect modelling, thresholds, tipping points, severity, category indicators, midpoint and endpoint characterisation, areas of protection, normalisation, ranking, weighting.
- Selection of impact categories. Stakeholder views on environmental impact categories.
- Example of the impact pathway modelling of a common impact category: Describing the problem and the target, the borderline to inventory, how to handle incomplete inventory data. Correct application of characterisation factors.
- Simplifying LCIA: What characterises an adequate level of modelling?
- The role of normalisation in LCA studies. Methods for weighting: Distance-to-target versus preference-based methods. Advantages and limitations.
- Combinations of impact categories and ready-made LCIA methods: An overview of the most commonly used and most recent LCIA method packages: CML, EcoIndicator, Impact2002+/ImpactWorld+, Stepwise,



ReCiPe, LIME, TRACI. Consistency in and between methods, illustrated with case examples.

- Interpretation and presentation of LCIA results, transparency, dealing with stakeholder interests.
- Exercise: Choosing and justifying the choice of an impact assessment method (impact categories, characterisation models, need for normalization and weighting) for a specific application context, applying it to an LCI result, calculating the LCIA result, interpretation and presentation of the result to a group of stakeholders.
- Top-down assessment of the importance of impact pathways.
- Interaction between impact pathways, synergies, parallel and serial impacts, risk of double-counting. Importance of background levels and abatement of impacts.
- Criteria to distinguish good modelling practice from bad. Empirically based versus theoretically based models. Correlation versus cause-effect. Ways to construct impact pathways bottom-up and top-down. Models that are open for improvement.
- Digging deeper into the differences between the impact pathway models of existing ready-made LCIA methods: What are the causes for the differences and how can these be overcome? We look in particular on toxicity, land use/water use and resource use.
- Exercises on understanding and designing impact pathway models for specific impact categories, chosen among both well-established and emerging impact categories, according to the interests of the participants: Fate and exposure modelling, effect modelling and category indicators at midpoint and endpoint, correct design and calculation of characterisation factors.
- Modelling spatial differentiation in fate, exposure, and ecosystem sensitivity. From risk assessment to global modelling. Exercise: Practical examples of including spatial variation in current LCIA models.
- Modelling temporal variation and delay in impacts. Exercise: Practical examples of including temporal variation and timing of impacts in current LCIA models.
- Identifying and quantifying uncertainty in impact pathway modelling. Sanity checks of model results.

FORM AND ACADEMIC RECOGNITION

Form: 5 days = 22 hours interactive lectures and 18 hours exercises.

Academic recognition: 3 ECTS-point including mandatory pre-course reading from a literature list provided.

LEARNING OUTCOMES

Knowledge of frameworks, definitions and contexts for LCIA. Advanced understanding of impact assessment modelling, including normalisation and weighting and their limitations. Ability to choose and justifying the choice of an impact assessment method in a specific application context, simplifying it as appropriately, calculating an LCIA result and presenting it to a group of

stakeholders. Ability to distinguish good and bad modelling practice and to describe an impact pathway in a systematic way, including correct design and calculation of characterisation factors. Understanding of the importance of and practical approaches to include spatial and temporal aspects in an LCIA. Ability to calculate LCIA results taking uncertainty into account.

The practicalities

WHEN AND WHERE?

Monday, November 4th to Friday, November 8th, 2019
Spain, Barcelona, International Life Cycle Academy (ESCI-UPF),
Passeig Pujades 1 (entry from Passeig Picasso 8)

PARTICIPANT PREREQUISITES

Master degree or equivalent. Proficiency with LCA and knowledge of Brightway2 Open Source software (equivalent to our Brightway2 course the week before). Must bring own laptop computer, with Brightway2 installed.

TEACHING STAFF

Dr. Ralph Rosenbaum, Industrial Chair ELSA-PACT Montpellier, France
Prof. Bo Weidema, Aalborg University, Denmark
PhD, Scientific coordinator Laure Patouillard, CIRAIG, Canada

PRICE AND COURSE CONDITIONS

6000 Euro for professionals
3000 Euro for university personnel and
1500 Euro for students

Second registrations from the same institution are offered a 50% discount on this course.

Prices do not include travel, accommodation and meals.

Accommodation recommendations will be sent once course is confirmed.

CONTACT AND REGISTRATION:

Registration deadline 30. September - please get in touch as soon as possible to ensure the course is confirmed and to secure your place.

Contact person: Inger Weidema, E-mail: inger@ilca.es