A holistic framework for integrated sustainability assessment of pharmaceuticals

Level: Bachelor (Biology/Chemistry) / Master (SMI)
Duration: 10 or 21 weeks
Start: March 2022 - ongoing
Project form: Literature review, value chain mapping, stakeholder analysis & interviews
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Pharmaceuticals are beneficial to human health, but can also have negative impacts on the environment. Examples include the emission of CO2 during manufacturing and the toxic impacts of excretion products. Several methods have been developed to assess the environmental and sustainability impacts of pharmaceutical production and of pharmaceutical use, but holistic methods that cover all impacts over their entire life cycle are currently lacking. This requires the integration of existing LCA methodologies with Risk Assessment methodologies. Important questions to be answered include "What does the value chain of a pharmaceutical look like?", "What type of impacts should be included in a sustainability assessment?" and "What is an appropriate functional unit to assess the sustainability of a pharmaceutical?".

The main aim of the current project is to develop a holistic framework for sustainability assessment of pharmaceuticals. This research will comprise the following elements:

- Mapping the pharmaceutical value chain from development to production, use and waste;
- Identification of the most important stakeholders involved in the pharmaceutical value chain;
- Identification of relevant environmental and sustainability impacts of pharmaceuticals based on analysis of the value chain, reviewing scientific literature and stakeholder interviews;
- Coupling relevant impacts to methodologies to assess these impacts described in literature;
- Propose a holistic framework to assess the sustainability of pharmaceuticals, including an appropriate functional unit.

If time allows, the proposed framework can be applied in one or two case studies to be defined by the student.