

ELEC-E8714 Sustainable electronics

- Instructors: Prof. Mervi Paulasto-Kröckel, Prof. Mari Lundström, Dr. Vesa Vuorinen, Dr. Leena Tähkämö, Dr. Jari Aromaa
- Graduate course for 4./5. yr students
- Structure: lectures, home work, lab work, LCA report
- Lectures Thursdays and Fridays 14.09. – 1.11.
- 4 assignments as homework
- Lab work 11.10. – 12.10.
- Lab work result presentations 18.10
- Life cycle assessment of a smartphone using professional software
- LCA report presentations 7.12.
- Information at mycourses ELEC-E8714

Course extent

- 5 credits course (135 h)
 - Lectures: 1 cr 20
 - Homework: 1 cr 20
 - Lab work and presentation: 1 cr
 - LCA report and presentation: 2 cr

Requirements & grading

- No exam
- It is expected that you participate in all lectures, exercises and presentations
 - If you cannot participate a lecture/lab work, you can replace the missed content by a comprehensive report about the topic within a week
- Grading from 0 (failed) to 5 (excellent)
- 30% for the homework (individual)
- 30% for the experimental work and presentation (group)
- 40% for the LCA report and presentation (individual and group)

Schedule lectures/exercises

- 14.9. Course introduction, sustainability in electronics & main legislation
 - 20.9. Life cycle assessment
 - 21.9. Life cycle assessment cont.
 - 27.9. Metals in electronics - metals production
 - 28.9. Unit processes in metal production and recycling
 - 4.10. Recycling of metals
 - 5.10. Home work clinic
 - 11.10. Lab work
 - 12.10. Lab work
 - 18.10. Presentations lab work
 - 19.10. Home work clinic
 - 25.10. Manufacturing of electronic components and circuit boards & kick-off LCA exercise Part I: manufacturing
 - 26.10. Visiting lecture: Nokia case study
 - 1.11. Manufacturing of electronic equipment
 - 2.11. – 15.11. GaBi work and database generation in groups
 - 16.11. Review LCA data
 - 22.11. LCA exercise Part II: Use and End of life
 - 23.11. – 6.12. GaBi work and preparation reports/presentations in groups
 - 7.12. Reports and presentations
-

Home work schedule

Home work is either calculations or content analyses based on given material

Topics:

HW 1 (DL 29.9.): Hazardous substances in electronics

HW 2 (DL 6.10.): Life cycle inventory analysis

HW 3 (DL 7.12.): Comparison of metal production from primary and secondary sources, home work clinic 5.10.

HW 4 (DL 7.12.): Mass balance calculation of copper electrorefining, home work clinic 19.10.

Life Cycle Assessment (LCA) of a smartphone

- Conducted as a group work using LCA software (GaBi) on a lab computer at the campus
 - *Part I: Manufacturing*
 - *Part II: Use & End of life*
 - *Instructions for each phase given during lectures*
 - *Independent work required in groups after the instruction session*
- Data collection from GaBi databases, literature and disassembly of a smartphone
 - *Data collection supported during manufacturing lectures 25.10. – 1.11.*
- Group report about used procedure and findings, DL 7.12.
- Group presentations 7.12.