

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, excursion report, LCA report
- Lectures Thursdays and Fridays 12.09. – 24.10.
- 4 assignments as homework
- Excursion 23.10.
- Excursion reports 15.11
- Life cycle assessment of a smartphone using professional software
- LCA reports 9.12.
- LCA presentations 13.12.
- Information at mycourses ELEC-E8714

Course extent

- 5 credits course (135 h)
 - Lectures: 1 cr
 - Homework: 1 cr
 - Excursion and report: 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)
- 40% for the homework (individual)
- 60% for the LCA report and presentation (individual and group)

Schedule lectures/exercises

- 12.9. Course introduction, sustainability in electronics & main legislation
- 13.9. Life cycle assessment & kick-off LCA exercise
- 19.9. Manufacturing of electronic components, circuit boards and equipment
- 20.9. – 3.10 GaBi work and database generation in groups
- 4.10. Review LCA data
- 10.10. Metals in electronics - metals production
- 11.10. Unit processes in metal production and recycling
- 17.10. Recycling of metals
- 18.10. Home work clinic
- *23.10. Visit to Boliden copper smelter and Outotec (Pori, start 06.30am Otakaari 3)*
- 24.10. Visiting lecture: Nokia case study
- 31.10 LCA exercise: Use and End of life
- 1.11. Home work clinic
- 7.11. – 28.11 LCA exercise continued in groups
- 29.11. – 6.12. Preparation reports/presentations in groups
- 9.12. LCA reports
- 13.12. LCA presentations

Home work schedule

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

Topics:

HW 1 (DL 27.9.): Hazardous substances in electronics

HW 2 (DL 4.10.): Life cycle inventory analysis

HW 3 (DL 15.11.): Mass balance calculation of copper electrorefining, home work clinic 18.10.

HW 4 (DL 15.11.): Comparison of metal production from primary and secondary sources, home work clinic 1.11.

Life Cycle Assessment (LCA) of a smartwatch

- Conducted as a group work using LCA software (GaBi)
 - *Covers manufacturing, use & end of life*
 - *Instruction sessions for each group*
 - *Independent work required in groups after the instruction sessions*
- Data collection from GaBi databases, literature and disassembly of a Samsung Galaxy Watch
 - *Supported data collection 19.09. – 3.10.*
- Group report about used procedure and findings, DL 9.12.
- Group presentations 13.12.