Course syllabus

AI and Environment
AI och miljö

VFTA10, 3.0 credits, G1 (First Cycle)

Valid for: 2025/26
Faculty: Faculty of Engineering LTH
Decided by: PLED L
Date of Decision: 2025-02-27

General Information

Depth of study relative to the degree requirements: First cycle, has only upper-secondary level entry requirements
Elective for: TILLF1
Language of instruction: The course will be given in English

Aim

AI is widely heralded as a driver of economic growth, and a solution to environmental problems like climate change and biodiversity loss. At the same time, the rapid development and adoption of large, general-purpose AI models, such as for generative AI, has brought increased public attention to the industry's escalating emissions and resource use. This course is intended for students curious about the complex interplay between AI and the environment. It offers conceptual and analytical tools to assess the embodied and operational costs of AI, compare beneficial and harmful impacts of AI applications, and evaluate governance efforts at the individual, organisation and social level.

Through a combination of lectures and seminars on key readings, course participants will engage with cutting-edge academic research and debates on this important and topical issue.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- explain the concepts of artificial intelligence and the environment
- describe challenges and opportunities entailed in AI's climate impact

- be able to explain and give examples of rebound effects and externalisation

Competences and skills
For a passing grade the student must

- analyse and evaluate the climate consequences of AI applications
- recognise and compare numeric and interpretive perspectives on AI and the environment
- demonstrate competent use of basic English terminology used in social scientific research on AI and the environment

Judgement and approach
For a passing grade the student must

- critically interpret how AI shapes informational and epistemic practices
- identify, assess and credibly balance conflicting interests in AI governance, with particular attention to environmental issues

Contents

The course is structured as a four-week lecture and seminar series. All teaching will be conducted in person in order to facilitate discussions of the course material.

The lectures have been designed to explore tensions between different perspectives on AI and the environment. They cover the following material:

1. Course introduction: framing AI and the environment — The opening lecture introduces the course's motivating problem (i.e., how to think about and improve the environmental consequences of AI), and defines its central dynamics and concepts (e.g., datafication, extraction, externalisation and rebound effects).
2. Accounting for AI's climate impact — This lecture describes how AI contributes to the drivers of climate change, both in terms of its embodied and operational carbon costs and as a facilitator of environmentally damaging industries, while also promising to improve energy and land use efficiencies (and possibly decrease total energy use), contribute to nature conservation and climate change adaptation, and support advances in climate and biodiversity science.
3. Interpreting ecologies of intelligence — Here, the the broader material and informational context of AI is brought into focus. The lecture first explores AI's hardware and data supply chains, before analysing how the use of AI in organising, selecting and presenting information shapes environmental beliefs (e.g., about the validity of climate science) and practices (e.g., in terms of unsustainable mass consumption).
4. AI governance for transformative change — To conclude, this lecture presents an overview of significant logics, methods and examples of AI governance (at individual, organisation and social levels), and explores how they intend to negotiate conflicting societal interests and goals.

Two academic articles have been selected in compliment to each lecture, with the purpose of strengthening student conceptual and analytical capacities. Students are expected to read both articles prior to the week's seminar, and to discuss and evaluate their arguments with their peers.

Examination details

Grading scale: UG - (U, G) - (Fail, Pass)
Assessment:

In order to complete the course, students must contribute to in-class discussions of the course material, and receive a passing grade for an independent essay of

approximately 2000 words. The essay questions will be set in the first week of class and the essay will be due no later than one week after the final class.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Modules
Code: 0125. **Name:** AI and Environment.
Credits: 3.0. **Grading scale:** UG - (U, G).

Admission

The number of participants is limited to: 8
Selection: Completed university credits
Kursen överlappar följande kurser: TFRH20

Reading list

- Bossert, L.N., & Loh, W. 2025. Why the carbon footprint of generative large language models alone will not help us assess their sustainability. Nature Machine Intelligence. https://doi.org/10.1038/s42256-025-00979-y.
- Cowls, J., Tsamados, A., Taddeo, M., & Floridi, L. 2023. The AI gambit: leveraging artificial intelligence to combat climate change—opportunities, challenges, and recommendations. AI & SOCIETY, 38(1), 283–307.
- Crawford, K., & Joler, V. 2018. Anatomy of an AI System: The Amazon Echo as an anatomical map of human labor, data and planetary resources. Anatomy of AI. http://www.anatomyof.ai.
- De Vries, A. 2023. The growing energy footprint of artificial intelligence. Joule, 7(10), 2191–2194.
- Galaz, V., Centeno, M.A., Callahan, P.W., et al. 2021. Artificial intelligence, systemic risks, and sustainability. Technology in Society, 67, 101741.
- Haider, J., & Rödl, M. 2023. Google Search and the creation of ignorance: The case of the climate crisis. Big Data & Society, 10(1), 205395172311589.
- Kaack, L.H., Donti, P.L., Strubell, E., et al. 2022. Aligning artificial intelligence with climate change mitigation. Nature Climate Change, 12(6), 518–527.
- Vinuesa, R., Azizpour, H., Leite, I., et al. 2020. The role of artificial intelligence in achieving the Sustainable Development Goals. Nature Communications, 11(1), 233.

Contact

Course coordinator: James White, james.white@lth.lu.se
Examinator: James White, james.white@lth.lu.se