

Module title	2.4 Digitalization and sustainability
Workload (ECTS)	3 ECTS
Module coordinator	Prof. Dr. Matthias Stürmer
Contributing lecturers	<ul style="list-style-type: none"> • Prof. Dr. Jürgen Holm • Prof. Dr. Michael Röthlin • Prof. Dr. Marie Peskova • Flurina Wäspi
Entry requirements	Builds on: <ul style="list-style-type: none"> • 3.1 Society and technology • 3.2 Society and the environment
Description	How does digital transformation impact on sustainability and how does the notion of sustainable development influence digitalization? First, this module provides an overview of current research and practical cases on how digitalization acts as an enabler of the transformation to sustainability. It explains how novel technology can be a driver of sustainability and circularity and thus contributing to the Sustainable Development Goals. Second, the ecological and social challenges of information and communication technologies (ICT) as well as alternative solutions (e.g. Green IT) are presented and discussed. And third, the concept of digital sustainability on how to open and preserve digital knowledge is introduced and illustrated with examples.
Learning outcomes and competences	<p>Competences:</p> <p>Students</p> <ul style="list-style-type: none"> • can explain the positive and negative impact of digitalization and ICT on sustainable development and the SDGs and know current research and initiatives. • comprehend the theoretical background and know practical examples how innovative ICT solutions support transformation to sustainability and circular economy. • can explain the environmental and social effects of manufacturing, using, and disposing of electronic products and know solutions to these challenges. • are aware of the problems of privatization of the digital space and know how to provide access to digital knowledge in form of open source software, open data, and open content. <p>Outcome:</p> <p>Students</p> <ul style="list-style-type: none"> • are able to develop concepts of ICT technology contributing to more sustainability on a specific case. • are able to apply the concept of digital sustainability on current ICT services and products.
Assessment of learning outcomes	Project on digitalization for sustainability: Students elaborate a concept of a specific ICT solution contributing to more sustainability on a given case in a specific industry. The project also includes the implementation of digital sustainability within the chosen ICT solution.
Didactic approach	<ul style="list-style-type: none"> • Contact teaching 2h per week during 7 weeks • Exercises that prepare for the creation of project work

Project-based learning	Student's project covering: <ul style="list-style-type: none"> • implementation of ICT solution as an enabler of sustainability • implementation of digital sustainability on the chosen ICT solution
Links to other modules	<ul style="list-style-type: none"> • Circular Business models • Circular supply chain • Cities and Infrastructure • Society and Technology
Bibliography	<p>Hilty, L.M., Aebischer, B., 2015. ICT for Sustainability: An Emerging Research Field, Advances in Intelligent Systems and Computing. Springer International Publishing.</p> <p>Lange, S., Pohl, J., Santarius, T., 2020. Digitalization and energy consumption. Does ICT reduce energy demand? Ecological Economics 176, 106760. https://doi.org/10.1016/j.ecolecon.2020.106760</p> <p>Morley, J., Widdicks, K., Hazas, M., 2018. Digitalisation, energy and data demand: The impact of Internet traffic on overall and peak electricity consumption. Energy Research & Social Science 38, 128-137. https://doi.org/10.1016/j.erss.2018.01.018</p> <p>Lucivero, F., 2020. Big Data, Big Waste? A Reflection on the Environmental Sustainability of Big Data Initiatives. Sci Eng Ethics 26, 1009-1030. https://doi.org/10.1007/s11948-019-00171-7</p> <p>Strubell, E., Ganesh, A., McCallum, A., 2020. Energy and Policy Considerations for Modern Deep Learning Research. Proceedings of the AAAI Conference on Artificial Intelligence 34, 13693-13696. https://doi.org/10.1609/aaai.v34i09.7123</p> <p>O'Brien, W., Yazdani Aliabadi, F., 2020. Does telecommuting save energy? A critical review of quantitative studies and their research methods. Energy and Buildings 225, 110298. https://doi.org/10.1016/j.enbuild.2020.110298</p> <p>Boos, S., 2021. Digital und nachhaltig: Vom Schwarm geboren. WOZ Die Wochenzeitung. https://www.woz.ch/-bec0</p> <p>Digitale Nachhaltigkeit - Nachhaltige Digitalisierung https://www.digitale-gesellschaft.ch/nachhaltigkeit/</p> <p>Stürmer, M., 2020. Perspectives on Digital Sustainability (Habilitation). University of Bern, Bern. http://doi.org/10.48350/157325</p> <p>Stuermer, M., Abu-Tayeh, G., Myrach, T., 2017. Digital sustainability: basic conditions for sustainable digital artifacts and their ecosystems. Sustainability Science 12, 247-262. https://doi.org/10.1007/s11625-016-0412-2</p>
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