

USE - Design for a Sustainable Future

Design for a Sustainable Future	
Offered by	Department of The Built Environment
Language	English
Primarily interesting for	All students
Prerequisites	Required courses: Recommended courses:
Contact person	Drs. Johan van Zoest (J.G.A.v.Zoest@tue.nl)

Content and composition

Technology has hurled humanity into today's high tech civilization. Yet all is not well aboard Spaceship Earth. How can we design technology that gives stagnant economies new impulses, bolster democracy, heal the planet, makes our civilization sustainable? In this USE line, you build the skills to translate 'sustainability' into measurable goals, to identify the right challenges and design strategies for developing technological solutions that work.

Course code	Course name	Level classification	2023-2024	2024-2025
7XEUA0	Design for a Sustainable Future	1. Introductory	Regular education	Regular education
7XSUA0	Design for a Sustainable Future: User	2. Deepening	Regular education	replaced by 7X2X0
7XSUB0	Design for a Sustainable Future: Society	2. Deepening	Regular education	replaced by 7X2X0
7XSUC0	Design for a Sustainable Future: Enterprise	2. Deepening	Regular education	Replaced by 1ZK20: Sustainability perspectives on Product Innovation
7XAUA0	Design for a Sustainable Future: Project	3. Advanced	Regular education	Alternative project

Course description

7XEUA0, Design for a Sustainable Future

Sustainable development,

- intellectual and moral underpinnings
- history of sustainability thought and global policy frameworks
- sustainable human development from a big history perspective
- sustainable human development from a political economical perspective
- evolutionary perspective: societal resilience and collapse, collective learning processes, evolutionary search
- visioning; utopian and dystopian futures
- defining and measuring human progress; sustainable development goals
- sustainable design, responsible innovation and sustainable development

USE - Design for a Sustainable Future

Managing complex challenges

- complexity and wicked problems
- fallacies and biases
- critical and systems thinking, practical wisdom
- elementary complex problem solving
- incorporation of complexity in analysis tools

Assessment and decision support methods

- material flow analysis
- life cycle assessment
- financial feasibility analysis
- actor analysis
- quick scan tools for technology assessment
- scenario analysis and visioning
- multi criteria analysis

Alongside a lecture series, the course includes a 6 weeks design sprint tackling a specific sustainability challenge.

7XSUA0, Design for a Sustainable Future: User

Students attend a lecture series that combines Social Theory and Design Methodologies for user-centered design. The lectures will be in English. The following lecture topics will be covered.

Social theory:

- Social science paradigms, normative definitions of the user, practice based approaches, sustainable consumption
- Urban paradigms, smartness and smart citizenship, urban commons and commoner identities
- The sharing economy, digitalization and user practices

Design Methodologies

- User centered design
- Value sensitive design
- Participatory design

In addition to the lecture series, the students will work on a group project implementing user centered design methodologies to a particular urban user problem. Since this course follows 7XEUA0 the user problems will be defined based on the challenges and design brief the students have formulated during that course.

7XSUB0, Design for a Sustainable Future: Society

Science of cities (basic)

- Evolution and Fundamentals of cities

Diagnosis

- Basics of diagnosis
- Checklist of city diagnostics
- Problem definition and root cause analysis

Strategy making (basic)

- Visioning and foresight
- Scoping the challenge
- Designing transition experiments

Presenting convincingly

- Pyramid Principle
- Golden Circle: why, how, what

USE - Design for a Sustainable Future

7XSUC0, Design for a Sustainable Future: Enterprise

The "real" green market is very limited. Although sustainable and green concepts are very beneficial for the longevity and health of society and individuals, these concepts typically have a substantially higher price tag. This makes the customers' choice for such products and services more difficult. Moreover, it is known that when venture capitalists and other funding institutions are making a choice whether to invest in a new sustainable venture, they are not primarily concerned with the technological novelty of the venture. Instead, investors prefer to focus on the general service offered and the business model of the venture. Finally, each healthy business has to have enough customers and cannot survive on government subsidies in the long run. Thus, technology innovation has to be supplemented with business model innovation, taking into account the current and expected governmental regulations and other contextual factors. This course will therefore immerse you into the world of business model innovation in order to make a green firm a commercial success. Moreover, you will learn how multiple actors and business models depend on each other and together form an ecosystem creating and delivering value to their customers.

The course offers a series of interactive lectures and tutorials discussing the concept business model from various perspectives and illustrating with numerous examples. Business model innovation is "hot" but it is certainly not a panacea. You will learn how and when you should apply business model innovation, and which factors have an influence on its success. The course further features testimonials and talks of several company speakers. During the course you will work on the following group assignment and reflect upon it: become a business consultant based on the design and advise of an innovative business model for a sustainable firm.

7XAUA0, Design for a Sustainable Future: Project

- Provide a summary/description of the content, learning goals, etc. The project course differs every quartile. Depending on the number of students that apply for the course, we offer 1 to 8 different projects each quartile, on topics ranging from landscape design, healthy cities design, smart mobility, structural design, passive building design, circular design. All projects tackle sustainability challenges in built environments different scales from materials to structural engineering and architectural design to regional/urban planning. While some of the projects welcome a broad range of students from different departments, some of the project require specific skills (drawing, mapping, modelling).
- We also offer a number of free-style projects, in which students craft their own research/design assignment based on specific interests, but fitting within a broad topic (e.g. circularity).
- Students are informed about the available projects at the beginning of each quartile, and they are given the choice of topic.
- The information available on Canvas at the beginning of each quartile is limited and general. Detailed information about the content and requirements of each project are posted by the specific project instructors at the start of term.