

**SUSTAIN Module Syllabus:  
Urban Infrastructure**

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## INTRODUCTION

This Module Outline provides details to assist your study regarding Urban Infrastructure Module within Sustainable Urban Development (SUD) Curricula developed under Strengthening Higher Education in Urban Sustainability and Transitions towards Internationalisation of Academic Institutions and Networks (SUSTAIN) project.

Technical infrastructures such as energy, water, waste water, telecommunication and transport systems guide and facilitate urban functioning and urban life in multitude of ways. They are backbones for urban livelihoods and economies, integrate (or splinter) cities socially and spatially, and mediate resource flows.

Under such perspective, the urban infrastructure module, as a part of the broader context of SUSTAIN curricula, introduces the history, the key characteristics (ecological, socio-technical, political and economic) and the problems of these urban support systems, their co-evolution with cities and the imperatives for changing these systems. The module also provides an overview and introduction to the issues of sustainable urban infrastructure development patterns and planning, infrastructural crises, and debates on social and technical solutions to the infrastructure question at the course of splintering urbanism, public health problems, and environmental degradation.

## TARGET LEARNERS

Target groups of this introductory course are not only limited to students who would like to get acquainted with technical infrastructure related issues and sustainability professionals but also all interested audience.

## MODULE OBJECTIVES

The course aims to enable participants to:

1. Understand the history, the socio-technical nature, the key characteristics and functions of technical infrastructure in the (re-)production of cities.
2. Foster an understanding of the co-evolution of and linkages between cities/regions and technical infrastructure.
3. Raise awareness for and understand current trends, problems and policies in relevant



infrastructure domains (water, wastewater, energy, telecommunication, waste, transport).

4. Conduct empirical case studies and critically reflect and discuss the place-specific characteristics and distinct problems of urban infrastructure through the use of theoretical concepts such as “large technical systems“, “inverse infrastructures“, “people as infrastructures“, “splintering/splintered urbanism“

## LEARNING OUTCOMES

On completion of this module students should:

1. Understand the history, the socio-technical nature, the key characteristics and functions of urban infrastructure.
2. Gain an understanding of the the co-evolution of and linkages between cities/regions and technical infrastructure.
3. Gain an understanding of current trends, problems and policies in relevant infrastructure sectors.
4. Apply their theoretical knowledge on a case study of their home city or a city they know well and discuss the place-specific characteristics and problems of urban infrastructure.

## KEY CONTENT

This section of the module aims to introduce the history, the socio-technical nature, the key characteristics and functions of technical infrastructure in the (re-)production of cities.	<b>Lecture 1</b> Introduction by the lecturer, Topics, objectives and schedule of the module First understandings of the concept of infrastructure
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<p>By the end of this section, the students will be given general topics related urban infrastructures and will be asked to (individually, or in groups) select one of these general topics and start working on the design of a respective case study on the selected topic.</p>	<p><b>Lecture 2</b></p> <p>Urban Infrastructure:</p> <p>Conceptual understanding(s) and planning approaches</p> <p>Required Reading (as part of an in-class, collective study):</p> <p>Star, Susan Leigh 1999: The Ethnography of Infrastructure. In:</p> <p>American Behavioral Scientist 43(3): 377–391.</p>
	<p><b>Lecture 3</b></p> <p>History of electrification in Europe and the US</p> <p>The academic debate on Large Technical Systems</p> <p>Required Reading:</p> <p>Hughes, Thomas P. 1987: The Evolution of Large Technological Systems. In: Bijker, Wiebke E.; Hughes, Thomas P.; Pinch, Trevor J. (eds.): The Social Construction of Technological Systems. New Directions in the Sociology and History of Technology. Massachusetts: MIT: 51-82.</p>
<p>This section of the module aims to foster an understanding of the co-evolution of and linkages between cities/regions and technical infrastructure.</p>	<p><b>Lecture 4</b></p> <p>The co-evolution of cities and infrastructure</p> <p>The commercialization of infrastructure and the debate on splintering urbanism</p> <p>Required Reading:</p>

<p>Within this section, the students will be asked to perform in-depth interviews with two experts in the area of their selected topic (i.e. ministry officials, project experts, consultants, etc.). The students will be asked to relate the interview findings with the theoretical debates introduced in class as well as the spatial development dynamics of their cities.</p>	<p>Graham, Stephen and Marvin, Simon 2001: Introduction. In: Graham, S. and Marvin, S.: Splintering Urbanism. Networked Infrastructures, Technological Mobilities, and the Urban Condition, Routledge, London.</p> <p>Gandy, Matthew 2006: Planning, Anti-planning and the</p> <p>Infrastructure Crisis Facing Metropolitan Lagos. In: Urban Studies 43(2): 371–396</p>
<p>The last two lectures are designed in the way that students present their findings (in form of paper and presentation) in relation to theoretical debates in the presence of the interviewed experts.</p>	<p><b>Lecture 5</b></p> <p>Case Studies Workshop 1</p>
	<p><b>Lecture 6</b></p> <p>Case Studies Workshop 2</p>

## REQUIRED ACADEMIC SKILLS AND COMPETANCIES

Students completing this module should be able to have the following academic skills and competencies:

- Oral and written communication skills

Participants should be able to present their ideas in written form and present them orally.

- Methodical and critical learning skills

Participants should be able to have and use basic methodical and critical learning skills enabling them to undertake further studies.

- Use of data or tools for decision support

Participants completing this module should be able to identify and use qualitative and quantitative data to formulate responses to concrete and abstract problems.

## **REQUIRED VOCATIONAL SKILLS AND COMPETANCIES**

Students completing this module should be able to have the following vocational skills and competencies:

- Critical thinking and argumentation skills

Participants completing this module should be able to engage effectively and appropriately with peers and supervisors as well as communicate their knowledge, skills and responsibilities. They will also be able to understand, discuss and critically reflect on advanced textbooks and scientific articles.

- Theory to practice application skills

Participants completing this module should be able to apply the acquired knowledge to their work duties in a professional manner.

- Collaborative and teamwork skills

Participants should be able to demonstrate group work skills through problem solving within interdisciplinary teams.

- Adaptive capacity

Participants completing this module should be able to work and co-exist in multi-cultural environments through cooperation, collaboration and understanding, as well as gaining the ability to apply their knowledge and understanding on urban infrastructures in such practical contexts.

## **ECTS AND ASSESSMENT METHODS**

Participation is considered a fundamental aspect to all courses of the Urban Infrastructure Development Module. Failure to actively participate and engage in class and/or group discussions does negatively affect grading procedures.

- Constant and active participation in the class and group discussion: 35%
- Oral presentation of research on urban infrastructure: 15%
- Research paper (2,500 words): 50%

Awarded CPs: 3 ETC

Attendance: No less than 80% of the total module time

Lowest pass grade: 65/100

## MODULE DEVELOPER:



TECHNISCHE  
UNIVERSITÄT  
DARMSTADT

## Chair for Spatial and Infrastructure Planning

### ABOUT THE INSTITUTE

Cities and regions are in transition. They keep changing their built environment and social structures, they are growing, shrinking, are being exposed to a growing locational competition, are increasingly integrated into new national and international networks. And, they are faced with novel ecological risks and global environmental changes. These fundamental transformations of cities and regions, but also their momentum and path dependency are mediated by technical infrastructure systems like energy, water, sanitation, waste or telecommunication systems. These systems do not only have a large impact on architecture and the built environment, but on the sustainability of urban and regional development in manifold ways. Vice versa, these technical systems themselves significantly depend on urban and regional conditions, such as the settlement structure, local system builders in the utilities, in public policy and administration, in research and technology development, in the private sectors and in civil society.

Targeting the thorough study and teaching of these urban and regional processes of change, the restructuring of urban infrastructures, and new forms of urban and regional governance, the Chair for Spatial and Infrastructure Planning was established in March of 2009 as part of Darmstadt University of Technology, one of the leading institutes of technology in Germany. The Chair is integrated into both the Faculty of Architecture and the Faculty of Civil Engineering and Geodesy. It is our ambition to introduce perspectives of public policy and planning into both faculties, to deal with problems arising from sustainable spatial and infrastructure development and to provide scientific knowledge towards the development of planning strategies.

Learn more about the Chair:

[http://www.raumplanung.tu-darmstadt.de/fg\\_ruip/startseite\\_ruip/index.en.jsp](http://www.raumplanung.tu-darmstadt.de/fg_ruip/startseite_ruip/index.en.jsp).



MODULE CONTRIBUTORS AND REVIEWERS:

**IHS**

**Making cities work**



**EURAC**  
research

**I.C.L.E.I**  
Local Governments for Sustainability

## **ABOUT SUSTAIN PROJECT**

The SUSTAIN project aims to improve the quality of tertiary education in Sustainable Urban Development in Europe and partner universities in Asia; develop standardized education modules related to SUD and furthermore enriching them with international perspectives and academic and vocational skills and competencies; promote collaboration and international cooperation between European and Asian Higher Education Institutions in SUD but also collaboration and sharing between Erasmus Mundus programmes; establish links and bridge European Higher Education and practice in SUD; increase the visibility and access to European Higher Education in Asia in the field of SUD, attracting prospective Asian and international students.

The SUSTAIN project is co-ordinated by the Institute for Housing and Urban Development Studies (IHS) with the Dutch Research Institute for Transitions, the Netherlands, the Rotterdam School of Management, the Netherlands, Darmstadt University of Technology, Germany; National Technical University of Athens, Greece; European Academy of Bolzano, Italy; Ca' Foscari University of Venice, Italy; Gadjah Mada University, Indonesia; Centre for Environmental Planning and Technology, India; Beijing University of Civil Engineering and Architecture, China; and International Council for Local Environmental Initiatives, Germany.

**[www.sustainedu.com](http://www.sustainedu.com)**

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