



Enhancing of Heritage Awareness and
Sustainability of Built Environment in
Architectural and Urban Design Higher Education

STATEMENTS



for Teaching through Design
for Sustainability of the Built
Environment and Heritage
Awareness



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Statements for Teaching through Design for Sustainability of the Built Environment and Heritage Awareness

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HOW TO READ HERSUS VADEMECUM STATEMENTS

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ON TERM AND
AUTHORS

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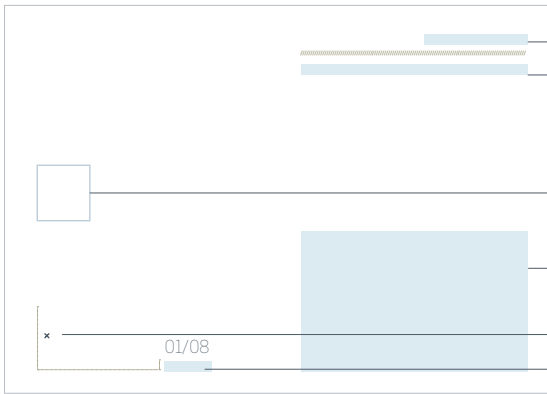
WHAT, HOW, WHY,
BY WHOM TO BE
TOUGHT

3

AT WHAT COURSE
TYPE , WHICH
SCALE AND WHAT
OUTCOMES TO
EXPECT

4

RELEVANT
REFERENCES FOR
THEORY AND
PRACTICE

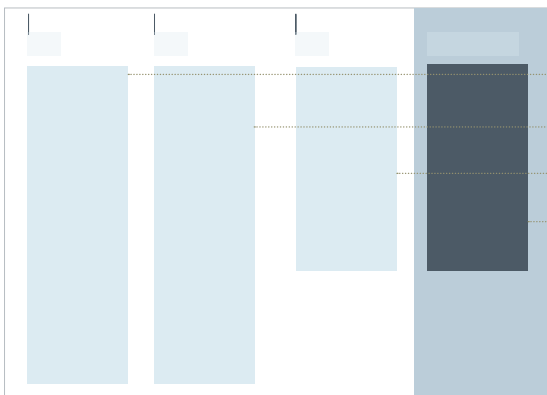


TITLE
TRANSLATION IN HERSUS PARTNERS LANGUAGES

HERSUS PARTNERS LOGO

GENERAL DEFINITION

AUTHOR/S
TYPE OF TERM

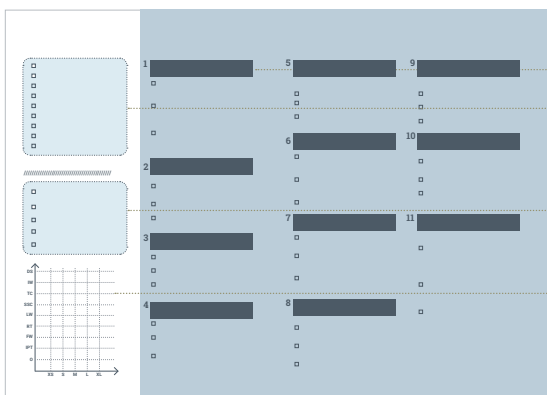


WHAT? CONTENTS

HOW? METHODS

WHY? GOALS

TEACHING COMPETENCES



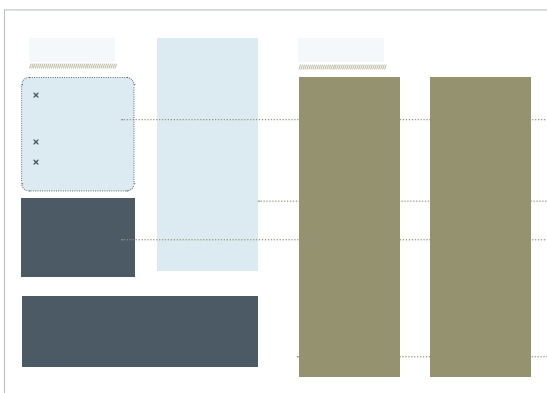
COURSE OUTCOMES

COURSE TYPE

COURSE SCALES

MATRIX - COURSE TYPE IN RELATION TO SCALE

■ □ Checklists



RELEVANT EXAMPLE ID

RELEVANT EXAMPLE EXPLANATION

RELEVANT EXAMPLE PHOTOS

KEY REFERENCES

terms

ACTIONS

Preventive Conservation



Integral Heritage Protection



Conservation



Restoration



Redevelopment



Adaptive Reuse



Consolidation



Temporary planning and Meanwhile spaces



Refurbishment/Rehabilitation



Heritage Management



Nature Based Solutions



Public Advocacy for Social Participation



Circular Economy



Developing Cultural Routes and Itineraries



Microclimate Improvement



UBFA

×

Jelena Ristić Trajković

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actions

statements

NATURE BASED SOLUTIONS

природом инспирисана решења • *Soluzioni ecoscompatibili* • NBS / Σχεδιασμός που εμπνέεται από φυσικές διεργασίες • *Soluciones de Origen Natural*

GENERAL DEFINITION/ EXPLANATION

Nature-based solutions (NBS) are "concepts that bring nature into cities and those that are derived from nature. NBS address societal challenges and enable resource recovery, climate mitigation and adaptation challenges, human wellbeing, ecosystem restoration and/or improved biodiversity status, within the ur-ban ecosystems" (definition of the CA17133 Implementing **nature-based solutions** for creating a re-sourceful circular city). The **Nature-based Solutions** Initiative defines NBS as "actions that involve the protection, restoration or management of natural and semi-natural ecosystems; the sustainable management of aquatic systems and working lands such as croplands or timberlands; or the creation of novel ecosystems in and around cities. They are actions that are underpinned biodiversity and are de-signed and implemented with the full engagement and consent of local communities" (**Nature-based Solutions** Initiative, University of Oxford).

The implementation of NBS in the built environment is not a new concept. Throughout the whole histo-ry of the building, people have been inspired by and used materials and techniques enabled by the natu-ral surroundings.

NBS is strongly related to sustainability and heritage, especially regarding conservation and environmental management of semi-natural protected areas, climate mitigation and adaptation challenges, and human wellbeing in built environments.

WHAT?

CONTENT

The full capacity of NBS educational potentials remain unexplored, whilst innovative programmes related to NBS are still missing systematic development of formal and informal education programmes in this area. Expert workshop hosted by the German Federal Agency for Nature Conservation (Kabisch at all., 2016) identified four main knowledge gaps relating to:

- (1) the effectiveness of NbS;
- (2) relationship between NbS and society;
- (3) design of NbS; and
- (4) implementation aspects.

At the same time, these are the main problems and topics that need emphasis from an educational perspective. Concerning sustainability and heritage, the last three are of particular importance considering the specificity of design interventions within the heritage areas and the necessity of a sensitive approach to the preservation and promotion of specific heritage values.

NBS methodologies are relevant in both the design and selection stage. Also, it is essential to emphasize that NBS actions are valid and have significance for interventions on multiple urban and architectural levels and scales: from architectural scales of building details, single objects and lots to urban scales, such as cities and regions, and as such have a role and potential in various curricula and modules (architecture, urbanism, technologies), both in theoretical and practical issues.

HOW?

METHODS

Considering that the NBS covers a vast field of applied techniques and technologies, concepts, typology of objects, building densities, and different implementation scales, educational methods mainly depend on the scale and the educational focus. In the following paragraph, some of the most relevant aspects regarding educational methods are listed to generally cover different scales and topics regarding NBS:

- The general teaching philosophy: Problem-based, Place-based, Integrated/inter-professional, Community-based, Design-based, Multi-site, Systematic, Symbiotic, etc.
- The leading methods and tools: Critical Evaluation of Cultural Heritage, Sustainability Analysis from an interdisciplinary perspective, Research by Design, Site analysis, etc.
- Learning styles and activities: Active learning through different activities: 1) visual—drawing diagrams, outlining processes, watching videos, design; 2) auditory—lectures, participating in group discussions; 3) tactile—taking field trips, doing hands-on activities, etc.
- Possible/appropriate learning environment: project-based, knowledge-centred; assessment-centred, etc.

WHY?

GOALS

Implementation of NBS mainly remains fragmented and marginal and needs urgent attention in education to more profound research and improvement of the implementational aspects.

Teaching intentions should cover NBS implementation within heritage environments (both natural and built) through seeking new strategies to tackle urban challenges in a sustainable way. The focus should be on the improvement of the following specific goals and areas:

- climate action for adaptation, resilience and mitigation,
- impacts on health and wellbeing,
- ecosystem services,
- biodiversity conservation,
- environmental sensitivity
- place-based interventions.

It is necessary to cover what tools and methodologies should be used and developed to target the mentioned specific goals, monitor impacts, and evaluate the strengths and weaknesses of response options.

Design tactics should depend on recognizing and identifying the correct balance between recognized heritage values, performance/program needs and environmental characteristics of the site. The main goal is to implement resilient and sustainable solutions to a wide range of societal, ecological and economic challenges and problems.

TEACHERS' COMPETENCIES



Having in mind the breadth of the topic and spatial implementation scales, various approaches to education are possible, and depending on that, various pedagogical models. Expertise and knowledge of NBS techniques and technologies, as well as various aspects of their implementation, are required. However, there is no specific teacher profile that is most adequate. Teacher can be a reflective agent, a knowledgeable expert, a skilful expert, a social, etc. depending of a course concept and focus within NBS implementation.

COURSE TYPE

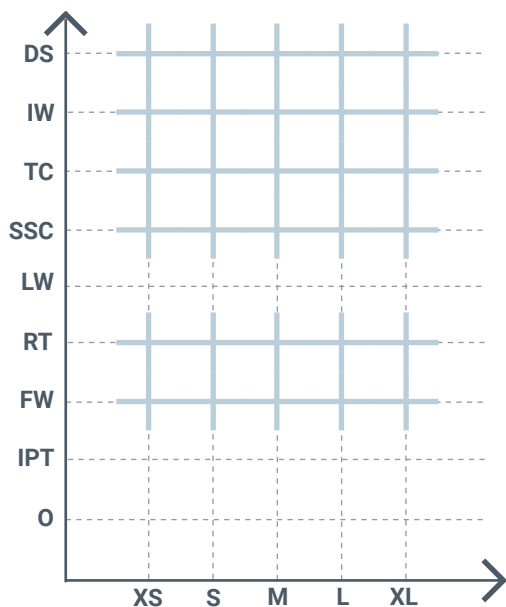


- Design Studio (DS)
- Intensive Workshop (IW)
- Theory Course (TC)
- Seminar (short comprehensive) (SSC)
- Laboratory work (LW)
- Research Thesis (RT)
- Field work (FW)
- Internship Practical training (IPT)
- Other (O)

SCALE



- Construction Detailing and Interior Design Scale (XS)
- Architecture: Buildings Scale (S)
- Urban Design Scale (M)
- Urban and Regional Planning Scale (L)
- Landscape Scale (XL)



LEARNING OUTCOMES



1 Ability to create architectural designs that satisfy both aesthetic and technical requirements. The student could have the ability to:

- prepare and present building design projects of diverse scale, complexity, and type in a variety of contexts, using a range of media, and in response to a brief;
- understand the constructional and structural systems, the environmental strategies and the regulatory requirements that apply to the design and construction of a comprehensive design project;
- develop a conceptual and critical approach to architectural design that integrates and satisfies the aesthetic aspects of a building and the technical requirements of its construction and the needs of the user.

2 Adequate knowledge of the histories and theories of architecture and the related arts, technologies and human sciences. The student will have knowledge of:

- the cultural, social and intellectual histories, theories and technologies that influence the design of buildings;
- the influence of history and theory on the spatial, social, and technological aspects of architecture
- the application of appropriate theoretical concepts to studio design projects, demonstrating a reflective and critical approach.

3 Knowledge of the fine arts as an influence on the quality of architectural design. The student will have knowledge of:

- how the theories, practices and technologies of the arts influence architectural design;
- the creative application of the fine arts and their relevance and impact on architecture;
- the creative application of such work to studio design projects, in terms of their conceptualisation and representation.

4 Adequate knowledge of urban design, planning and the skills involved in the planning process. The student will have knowledge of:

- theories of urban design and the planning of communities;
- the influence of the design and development of cities, past and present on the contemporary built environment;
- current planning policy and development control legislation, including social, environmental and economic aspects, and the relevance of these to design development.

5 Understanding of the relationship between people and buildings, and between buildings and their environment, and the need to relate buildings and the spaces between them to human needs and scale. The student will have an understanding of:

- the needs and aspirations of building users;
- the impact of buildings on the environment, and the precepts of sustainable design;
- the way in which buildings fit into their local context.

6 Understanding of the profession of architecture and the role of the architect in society, in particular in preparing briefs that take account of social factors. The student will have an understanding of:

- the nature of professionalism and the duties and responsibilities of architects to clients, building users, constructors, co-professionals and the wider society;
- the role of the architect within the design team and construction industry, recognising the importance of current methods and trends in the construction of the built environment;
- the potential impact of building projects on existing and proposed communities.

7 Understanding of the methods of investigation and preparation of the brief for a design project. The student will have an understanding of:

- the need to critically review precedents relevant to the function, organisation and technological strategy of design proposals;
- the need to appraise and prepare building briefs of diverse scales and types, to define client and user requirements and their appropriateness to site and context;
- the contributions of architects and co-professionals to the formulation of the brief, and the methods of investigation used in its preparation.

8 Understanding of the structural design, constructional and engineering problems associated with building design. The student will have an understanding of:

- the investigation, critical appraisal and selection of alternative structural, constructional and material systems relevant to architectural design;
- strategies for building construction, and ability to integrate knowledge of structural principles and construction techniques;
- the physical properties and characteristics of building materials, components and systems, and the environmental impact of specification choices.

9 Adequate knowledge of physical problems and technologies and the function of buildings so as to provide them with internal conditions of comfort and protection against the climate. The student will have knowledge of:

- principles associated with designing optimum visual, thermal and acoustic environments;
- systems for environmental comfort realised within relevant precepts of sustainable design;
- strategies for building services, and ability to integrate these in a design project.

10 The necessary design skills to meet building users' requirements within the constraints posed by cost factors and building regulations. The student will have the skills to:

- critically examine the financial factors implied in varying building types, constructional systems, and specification
- understand the cost control mechanisms which operate during the development of a project;
- prepare designs that will meet building users' requirements and comply with legislation, appropriate performance standards and health and safety requirements.

11 Adequate knowledge of the industries, organisations, regulations and procedures involved in translating design concepts into buildings and integrating plans into overall planning. The student will have knowledge of:

- the fundamental legal, professional and statutory responsibilities of the architect, and the organisations, regulations and procedures involved in the negotiation and approval of architectural designs, including land law, development control, building regulations and health and safety legislation;
- the professional inter-relationships of individuals and organisations involved in procuring and delivering architectural projects, and how these are defined through contractual and organisational structures;
- the basic management theories and business principles related to running both an architects' practice and architectural projects, recognising current and emerging trends in the construction industry.

BUILT ARCHITECTURAL / URBAN DESIGN PROJECT EXAMPLE



Project title and location:

✕ Hundertwasser Haus in Vienna,
Austria

Authors:

✕ Friedensreich Hundertwasser with
architect Joseph Krawina as a
co-creator

Year (period) of the project

✕ 1983-1985

“Hundertwasser Haus” in Vienna is one of the spectacular historical cases of the building that brings nature into cities and housing architecture and those that is inspired by nature. This concept represents the best practice of building greening systems integrated not only with building environmental function and aesthetics but also with user lifestyles. In line with that, it contributes to overall sustainability, not only environmental but also social.



Figure 1. Wien - Hundertwasserhaus

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Figure 2. Wien - Hundertwasserhaus

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RELEVANT LITERATURE
/ SOURCES FOR FURTHER
RESEARCH



[1] COST Action CA17133 Implementing nature-based solutions for creating a resourceful circular city, <https://circular-city.eu/>

[2] Nature-based Solutions Initiative, University of Oxford, <https://www.naturebasedsolutionsinitiative.org/what-are-nature-based-solutions/>

[3] European Commission. (n.d.). Nature-Based Solutions, <https://ec.europa.eu/research/environment/index.cfm?pg=nbs>.

[4] Langergraber, G., Atanasova, N. (Eds.). (2020). Blue-Green Systems special issue: Towards Circular Cities – Nature-based solutions for creating a resourceful circular city. *Blue-Green Systems* 1 January 2020; 2 (1)

[5] European Commission. (2015). *Final Report of the Horizon 2020 Expert Group on 'Nature-Based Solutions and Re-Naturing Cities'*. Luxembourg: Publications Offi.

[6] Mussinellia, E., Tartagliaa, A., Bisogni, L., & Malcevschic, S. (2018). The role of Nature-Based Solutions in architectural and urban design. *Techne*, Issue 15, 116-123.

[7] Frantzeskaki, N. (2019). Seven lessons for planning nature-based solutions in cities. *Environmental Science & Policy*, 93, 101-111.

[8] Laforteza, R., & Sanesi, G. (2018). Nature-based solutions: Settling the issue of sustainable urbanization. *Environ Res*, 172, 394-398.

[9] Cohen-Shacham, E., Walters, G., Janzen, C. and Maginnis, S. (eds.) (2016). *Nature-based Solutions to address global societal challenges*. Gland, Switzerland: IUCN. xiii + 97pp. DOI: <http://dx.doi.org/10.2305/IUCN.CH.2016.13.en>

[10] Kabisch, N., N. Frantzeskaki, S. Pauleit, S. Naumann, M. Davis, M. Artmann, D. Haase, S. Knapp, H. Korn, J. Stadler, K. Zaunberger, and A. Bonn. 2016. Nature-based solutions to climate change mitigation and adaptation in urban areas:

perspectives on indicators, knowledge gaps, barriers, and opportunities for action. *Ecology and Society* 21(2):39. DOI: <http://dx.doi.org/10.5751/ES-08373-210239>

[11] Eggermont, Hilde; Balian, Estelle; Azevedo, José Manuel N.; Beumer, Victor; Brodin, Tomas; Claudet, Joachim; Fady, Bruno; Grube, Martin; Keune, Hans (2015). "Nature-based Solutions: New Influence for Environmental Management and Research in Europe". *Gaia - Ecological Perspectives for Science and Society*. 24 (4): 243–248. doi:10.14512/gaia.24.4.9.

[12] Djokić, V., RistićTrajković, J., Nikezić, A., & Kordić, M. (2019). Biophilic architecture: nature-based design solutions for health and well-being in living spaces. ARCHDESIGN '19 / VI. *International Architectural Design Conference*.

