COURSE DESCRIPTION
Environmental Systems Sustainability

SSD: TECNOLOGIA DELL'ARCHITETTURA (ICAR/12)

DEGREE PROGRAMME: SVILUPPO SOSTENIBILE E RETI TERRITORIALI (P40)
ACADEMIC YEAR 2022/2023

COURSE DESCRIPTION

TEACHER: DELL'ACQUA FEDERICA
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GENERAL INFORMATION ABOUT THE COURSE

INTEGRATED COURSE: U2943 - LA STRUTTURA ECOLOGICA DEGLI INSEDIAMENTI
MODULE: U2942 - SOSTENIBILITA' DEI SISTEMI AMBIENTALI
CHANNEL: A-Z
YEAR OF THE DEGREE PROGRAMME: I
PERIOD IN WHICH THE COURSE IS DELIVERED: SEMESTER II
CFU: 5

REQUIRED PRELIMINARY COURSES

None

PREREQUISITES

None

LEARNING GOALS

The goal of the integrated course "The Ecological Structure of Settlements" - consisting of the "Ecology" (6 CFU) and "Sustainability of Environmental Systems" (5 CFU) Modules - is to provide students with a cultural framework and the definition of appropriate methodologies for reading and interpreting environmental systems. The letter is understood as the outcome of the interaction between the anthropized and natural environment, and eco-systemic conditions. The course will give students the skills they need to address ecological-environmental issues.
The "Sustainability of Environmental Systems" Module aims to provide knowledge and methodologies that are part of the new urban renewal scenarios imposed by climate change and

the answers that the European Union intends to provide with the "Ecological Transition" of districts envisaged by the Green Deal. The training goal is also to transfer the ability to make choices within the project aimed at the sustainable development foreseen by the 2030 Agenda and the adaptation of urban systems to environmental, climatic, and pathogenic impacts.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

The student must be able to understand the conditions of sustainability of environmental systems in relation to climate change, using the basic concepts related to the ecosystem- based approach to environmental design, sustainable use of resources and the reduction of the impacts of human activities on environmental systems. The student must be able to acquire the appropriate methodologies of knowledge and interpretation of the ecosystem values of urban districts.

Applying knowledge and understanding

The student will be able to carry out specific investigations of the environmental aspects of man-made habitats, on the basis of which he will be able to make conscious choices aimed at the climate adaptation of urban systems to environmental impacts and to strategically prefigure new climate-proof settlements of urban districts.

COURSE CONTENT/SYLLABUS

1_ **Introduction to "Sustainability of Environmental System" Module (1 hour)**

Presentation of the Module, interaction with the Ecology Module, course learning goals, examination methods, teaching materials, final assessment methods

2_ **Environmental Project and Sustainable Development (2 hours)**

Basic concepts of Environmental design through the evolution and reference figures of the discipline; Environmental design within the framework of the Agenda 2030 Sustainable Development Goals

3_ **Environmental systems, urban ecosystems, urban habitats (2 hours)**

The concept of environment, environmental system, ecosystem, and urban habitat in Environmental Design

Exercise: The "Main words" of Environmental Design

4_ **Cities, human activities and climate impacts (4 hours)**

Climate change scenarios, the concept of hazard, risk and climate vulnerability, the relationship between anthropogenic activities and climate impacts in the urban context, definition of climate adaptation and mitigation as measures to tackle climate change effects .

Exercise: Report about the relationship between human activities and climate impacts in the urban context

5_ **Circular Economy and Ecological Transition. New scenarios for sustainable environmental design (2 hours)**

Linear and circular processes: circularity in resource use and impacts reduction as the basis of sustainable environmental design.

Exercise: Report on the relationship between circular economy and environmental design

6_ **The EbA - Ecosystem-based Adaptation approach to climate-proof urban design (2 hours)**
The ecosystem approach to climate-proof urban design, the concept of environmental performance and ecosystem service for reducing climate vulnerabilities in urban settings
7_ **Technical policies to tackle climate change effects (2 hours)**
The European guidelines for Renovation Building. National technical policies on climate adaptation: SNAC (2015) and the PNACC (2018).
Climate adaptation and mitigation plans in Europe and Italy, The climate adaptation plans of Copenhagen, Rotterdam, Berlin, Hamburg, Ancona and Bologna.
8_ **Climate-proof eco-districts. Climate adaptation strategies and actions (4 hours)**
The urban design of contemporary North European eco-neighborhoods, sustainable development strategies at the district scale, the cases of Vauban in Freiburg (Germany), Hammarby Sjöstad in Stockholm (Sweden), Bo01- Västra Hamnen in Malmö (Sweden), Ørestad in Copenhagen (Denmark), Wilhelmsburg in Hamburg
Exercise: Interpretative reading of the environmental factors of a European eco-district
9_ **Analysis and knowledge of environmental systems: the blue, green, grey, red sectorial areas (13 hours)**
Knowledge, through the analysis by sectoral domains of an urban environmental system identified at the district scale, in the components relating to the fabric of the built environment, the infrastructure system, the green system and the water system and interpretative analysis carried out on the basis of the SNAC (2015) and PNACC (2018) guidelines
Exercise: Analysis by sectorial areas of an urban district in Naples

10_ **Strategic Actions and Programmes for Environmental Systems (14 hours)**
Elaboration of strategies, expressed by sectorial areas, aimed at the transition of the district, examined in the analysis and knowledge phase, into a climate-proof eco-district
Exercise: Climate-proof strategies and actions for an urban eco-district in Naples

11_ **The role of green infrastructure for urban climate proof design (4 hours)**
The contribution of green infrastructure to climate adaptation and mitigation at the urban project scale; the cases of Copenhagen and Barcelona.
Exercise: Deepening the green sectorial aspect of an urban eco-district in Naples

READINGS/BIBLIOGRAPHY

- Bologna R., Losasso M., Mussinelli E., Tucci F. (2021) (a cura di), Dai distretti urbani agli ecodistretti. Metodologia di conoscenza, programmi strategici, progetti pilota per l'adattamento climatico, Maggioli, Santarcangelo di Romagna (RM)
- Gangemi V. (Ed.) (2001), Emergenza ambiente. Teorie e sperimentazioni della Progettazione Ambientale, CLEAN, Napoli
- Dell'Acqua F. (2020), "La scelta green di Amburgo: das Hamburger Klimaschutzkonzept 2011/ The Hamburg Green Option: das Hamburger Klimaschutzkonzept 2011" in Losasso, M., Lucarelli,

M.T., Rigillo, M., Valente, R. (Eds.), Adattarsi al clima che cambia. Innovare la conoscenza per il progetto ambientale, Maggioli, Sant'Arcangelo di Romagna, pp. 273-280
- Leone M., Tersigni E. (2018), Progetto resiliente e adattamento climatico. Metodologie, soluzioni progettuali e tecnologie digitali, CLEAN, Napoli
- Losasso M., Verde, S., (2020), "Strategie progettuali di adattamento urbano ed edilizio in scenari di multirischio ambientale / Design strategies for urban and building adaptation in environmental multi-risk scenario", AGATHÓN International Journal of Architecture, Art and Design, No.8, pp. 64-73
- Losasso M. (2017), "Progettazione ambientale e progetto urbano", Eco Web Town, n. 16 - Vol. II, pp. 7-16
- Ministero dell'Ambiente e della Tutela del Territorio e del Mare (MATTM), Piano Nazionale di Adattamento ai Cambiamenti Climatici PNACC, 2017
- Ronchi E., Pandemia e alcune sfide green del nostro tempo: economia circolare, decarbonizzazione, mobilità sostenibile (available at: https://www.greencitynetwork.it/wpcontent/uploads/Pandemia-e-sfide-green_Edo-Ronchi.pdf)-
More teaching and exercise materials will be available for the students during the course.

TEACHING METHODS OF THE COURSE (OR MODULE)

Lectures for aout 60% of the total hours, b) tutorials for 40 % of the total hours to deepen applied knowledge

EXAMINATION/EVALUATION CRITERIA

a) Exam type

- ☐ Written
- ☑ Oral
- ☑ Project discussion
- ☐ Other

In case of a written exam, questions refer to

- ☐ Multiple choice answers
- ☐ Open answers
- ☐ Numerical exercises

b) Evaluation pattern