COURSE OUTLINE

(1) GENERAL

SCHOOL	POLYTECHNIC		
ACADEMIC UNIT	ARCHITECTURE		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ARC_303	SEMESTER	1st
COURSE TITLE	SUSTAINABILITY AND THE ENVIRONMENT 1		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	WEEKLY TEACHING HOURS	CREDITS
	2	2
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	specialised general knowledge
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Learning outcomes aim to introduce sustainability and environmental concerns as an integral part of architectural thinking. Upon successful completion of the course, students will be able to demonstrate:

- A critical understanding of the concept of sustainability and the different ways in which it is defined in relation to architecture and the environment.
- A basic understanding of systems thinking and how it can be applied to approach sustainability issues through Dynamic Systems Theory.
- Basic understanding of the causal loop analysis method for analyzing complex socio-technical systems.
- Analytical and critical thinking skills
-Broad understanding of current trends in intelligent mobility systems and critical understanding of their potential.
- Ability to retrieve, select and critically evaluate information from a variety of sources related to questions and topics discussed in the course.
- Ability to think independently while working in teams.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*

- Search for, analysis and synthesis of data and information with the use of the necessary technology
- Working independently
- Team work
- Working in an interdisciplinary environment
- Respect for the natural environment
- Criticism and self-criticism
- Production of free, creative and inductive thinking
- Communication skills
- Capacity for critical thinking

(3) SYLLABUS

From smart buildings to mobility systems and from automated construction methods to a circular approach to resource reuse, information technologies and systems thinking are broadening our perspective on sustainable design. A more holistic approach that considers the entire life cycle of building, urban and mobility systems, as well as their interactions with people, complements and extends traditional bioclimatic design strategies. The course approaches the issue of sustainability as both an evaluation criterion and a necessary environmental goal in relation to building, urban and mobility systems through systems theory and systems science. It introduces key concepts of bioclimatic design and ecosystem theory and how these concepts can be used to understand and critique important sustainability issues in architectural or urban design. Emphasis is placed on participatory or collaborative systems, resource sharing and circular economies with applications to shared mobility systems and their interactions with shared living and working spaces.

The course combines lectures, classroom discussions, demonstrations and a final group project presented by the students. The course is organized into two thematic areas, which are taught alternately. The first area focuses on the bioclimatic design of the building envelope through a practical approach. The second area focuses on urban and mobility systems and cyclical design approaches. The group project focuses on the selection, analysis and critical presentation of a concept or case study related to sustainability and the environment selected by the students and synthesizes these two thematic areas. Collectively, the topics in the two subject areas cover the concepts of passive, active and behavioral sustainable design strategies. Due to the breadth of topics covered, there is no single textbook for the course. A list of suggested readings is provided along with lecture notes.

Sample Topics (subject to modification)

- Introduction to sustainability, environmental footprint
- Automation in manufacturing and circular design
- Bioclimatic design
- The building envelope

- System dynamics
- Systems analysis through causal loops
- Smart cities - ideas and constraints
- Smart mobility - ideas and constraints

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT in teaching and communication with students. Support of learning through the e-learning platform e-class. Demonstration of use of software for system dynamics modeling and simulation.
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	*Activity* / *Semester workload* Lectures: 30 Seminars - Educational visits: 10 Presentations - Discussions: 20 Independent study - Bibliographical research - Project: 40 *Course total* (25 hours = 1ECTS): ***100***
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Language of evaluation: Greek, English. Project at the end of the semester. Participation in the course is taken into account - lectures, seminars, exercises, presentations. The evaluation procedure and criteria are presented to students in the first lecture and in the assignment descriptions that are being distributed. Any changes are announced in advance and are included in the course website and in the assignment descriptions.

(4) ATTACHED BIBLIOGRAPHY

Suggested Bibliography:

- Mitchell, Frederico Casalegno Willliam J. Connected Sustainable Cities. MIT Mobile Experience Lab, 2008.
- Mitchell, William J., Chris E. Borroni-Bird, and Lawrence D. Burns. Reinventing the Automobile: Personal Urban Mobility for the 21st Century. New edition. Cambridge, MA: The MIT Press, 2010.
- Mostafavi, Mohsen, Gareth Doherty, and Harvard University Graduate School of Design, eds. Ecological Urbanism. Revised edition. Zürich: Lars Muller, 2016.
- Pollalis, Spiro, Andreas Georgoulias, Stephen Ramos, and Daniel Schodek, eds. Infrastructure Sustainability and Design. 1st edition. New York, NY: Routledge, 2012.
- Papanikolaou, Dimitris. "To Share or Not? A Critical View on Personal Mobility." Architecture and Culture 7, no. 3 (September 2, 2019): 399–417. https://doi.org/10.1080/20507828.2019.1653030.
- Meadows, Donella H., Jorgen Randers, and Dennis L. Meadows. Limits to Growth: The 30-Year Update. 3rd ed. Chelsea Green, 2004.
- "Lifecycle Construction Resource Guide." EPA Region 4. 61 Forsyth Street SW Atlanta, GA 30303: United States Environmental Protection Agency. Pollution Prevention Program Office Office of Policy and Managemen, February 2008. www.epa.gov/region4/p2.

- Rios, Fernanda Cruz, Wai K. Chong, and David Grau. “Design for Disassembly and Deconstruction - Challenges and Opportunities.” Procedia Engineering, Defining the future of sustainability and resilience in design, engineering and construction, 118 (January 1, 2015): 1296–1304. https://doi.org/10.1016/j.proeng.2015.08.485.
- Sterman, John, and John D. Sterman. Business Dynamics: Systems Thinking and Modeling for a Complex World with CD-ROM. McGraw-Hill/Irwin, 2000.
- Ανδρεαδάκη-Χρονάκη, Ε. Βιοκλιματικός Σχεδιασμός – Περιβάλλον και Βιωσιμότητα», 2006, University Studio Press, Θεσσαλονίκη.