# COURSE OUTLINE

## 1. GENERAL

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|---|---|---|---|
| **SCHOOL** | Engineering | | |
| **DEPARTMENT** | Environmental Engineering | | |
| **LEVEL OF STUDIES** | 7 | | |
| **COURSE CODE** | **15ΘΕ3Ν** | **SEMESTER** | **Spring** |
| **COURSE TITLE** | Bioclimatic Design and Simulation | | |

| **TEACHING ACTIVITIES** *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.* | **TEACHING HOURS PER WEEK** | **ECTS CREDITS** |
|---|---|---|
| | 3 | 5 |
| | | |
| | | |
| *Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.* | | |

| | |
|---|---|
| **COURSE TYPE** *Background, General Knowledge, Scientific Area, Skill Development* | Optional |
| **PREREQUISITES:** | |
| **TEACHING & EXAMINATION LANGUAGE:** | Greek |
| **COURSE OFFERED TO ERASMUS STUDENTS:** | https://eclass.duth.gr/ |
| **COURSE URL:** | |

## 2. LEARNING OUTCOMES

**Learning Outcomes**

*Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.*

- Knowledge of bioclimatic design techniques and practices
- Knowledge of simulation tools context
- Knowledge of the combined open space and building design and simulation
- Use of bioclimatic design modelling
- Apply simulation to validate and predict differing bioclimatic scenarios

**General Skills**

*Name the desirable general skills upon successful completion of the module*

*Search, analysis and synthesis of data and information, ICT Use*
*Adaptation to new situations*
*Decision making*
*Autonomous work*
*Teamwork*
*Working in an international environment*
*Working in an interdisciplinary environment*
*Production of new research ideas*
*Project design and management*
*Equity and Inclusion*
*Respect for the natural environment*
*Sustainability*
*Demonstration of social, professional and moral responsibility and sensitivity to gender issues*
*Critical thinking*
*Promoting free, creative and inductive reasoning*

- Develop skills in implementing bioclimatic design modelling tools
- Develop skills in explaining the generated simulation data
- Environmental risk assessment and protection

## 3. COURSE CONTENT

1. Basic concepts of physical phenomena influencing bioclimatic design
2. Urban flows and heat transfer in urban environment

3. Heat and mass transfer in buildings. Conduction-convection-radiation
4. Thermal response factors, heat waves, building and settlement thermal interaction
5. Simulation theory, urban heat island, aesthetics, societal, urban morphology
6. Microclimate and typology of open spaces
7. Rehabilitation strategies and techniques
8. Computational simulation models ( Energy3D, ENVI-Met, Ray-Man)
9. Training in the use of open spaces simulation tool
10. Training in the use of open spaces simulation tool
11. Training in the use of building energy simulation tool
12. Training in the use of building energy simulation tool
13. Design and simulation of project proposal

## 4. LEARNING & TEACHING METHODS - EVALUATION

| | |
|---|---|
| **TEACHING METHOD**<br>*Face to face, Distance learning, etc.* | Face to Face |
| **USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT)**<br>*Use of ICT in Teaching, in Laboratory Education, in Communication with students* | **Implementation of software for simulation and data analysis** |
| **TEACHING ORGANIZATION**<br>*The ways and methods of teaching are described in detail.*<br>*Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.*<br><br>*The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.* | |
| **STUDENT EVALUATION**<br>*Description of the evaluation process*<br><br>*Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others*<br><br>*Please indicate all relevant information about the course assessment and how students are informed* | Formative assessment 0%<br>Summative assessment 100% |

| *Activity* | *Workload/semester* |
|---|---|
| Lectures | 30 |
| Software training | 50 |
| Project development | 40 |
| Assignment | 30 |
| Total | **150** |
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## 5. SUGGESTED BIBLIOGRAPHY

- Bioclimatic design: Environment & Sustainability, Hronaki E., 2006, University Studio P
- Tutor class material

# ANNEX OF THE COURSE OUTLINE

## Alternative ways of examining a course in emergency situations

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|---|---|
| **Teacher (full name):** | Stamatis Zoras |
| **Contact details:** | szoras@env.duth.gr |
| **Supervisors: (1)** | Yes |
| **Evaluation methods: (2)** | Written assignment submitted on the Teams designated space |
| **Implementation Instructions: (3)** | A Teams link will be sent to students to apply distant learning |

**(1)** Please write YES or NO

**(2)** Note down the evaluation methods used by the teacher, e.g.

- *written assignment* or/and exercises
- written or oral examination with distance learning methods, provided that the integrity and reliability of the examination are ensured.

**(3)** In the **Implementation Instructions** section, the teacher notes down clear instructions to the students:

a) in case of **written assignment and / or exercises:** the deadline (e.g. the last week of the semester), the means of submission, the grading system, the grade percentage of the assignment in the final grade and any other necessary information.

b) in case of **oral examination with distance learning methods:** the instructions for conducting the examination (e.g. in groups of X people), the way of administration of the questions to be answered, the distance learning platforms to be used, the technical means for the implementation of the examination (microphone, camera, word processor, internet connection, communication platform), the hyperlinks for the examination, the duration of the exam, the grading system, the percentage of the oral exam in the final grade, the ways in which the inviolability and reliability of the exam are ensured and any other necessary information.

c) in case of **written examination with distance learning methods**: the way of administration of the questions to be answered, the way of submitting the answers, the duration of the exam, the grading system, the percentage of the written exam of the exam in the final grade, the ways in which the integrity and reliability of the exam are ensured and any other necessary information.

There should be an attached list with the Student Registration Numbers only of students eligible to participate in the examination.