COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Planning and Regional Development – Department of Civil Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	MCC201	SEMESTER	Winter
COURSE TITLE	Assessment and Evaluation of the Environmental Impacts of Transport Systems		

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
	3	7,5
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*	Special background, specialization
PREREQUISITE COURSES:	building physics
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (when there are ERASMUS students)
COURSE WEBSITE (URL)	https://eclass.uth.gr/courses/PRD_P_222/

(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 Objectives

Upon completion of the course, students will be able to:

1. Understand the propagation of transport and industrial noise in open fields, as well as the main acoustic assessment criteria: SPL, Leq, Lden, L10, L90 – statistical sound pressure levels and the use of the measurement unit dB(A).
2. Recognize the relationship between urban forms and the propagation of environmental noise.
3. Understand Directive 2002/49/EC (CNOSSOS-EU) on environmental noise and apply its requirements in the context of a transport project (e.g., a ring road).
4. Apply Directive 2002/49/EC at different spatial scales: region, medium-sized city, and municipality.
5. Analyze a strategic noise map and produce an assessment of population exposure to environmental noise.
6. Identify “hot spots” or areas highly exposed to environmental noise on strategic noise maps.
7. Acquire basic knowledge of air pollution linked to transport, and its effects on health and

ecosystems.
8. Calculate and evaluate the carbon footprint of transport infrastructures at the stages of construction, operation, and maintenance.
9. Recognize the environmental impacts of transport on biodiversity and propose mitigation strategies such as ecological corridors and buffer zones.
10. Develop a comprehensive and interdisciplinary approach to assessing and managing the environmental impacts of transport infrastructures.

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…*
	…….

Through this course, students will develop general competencies that enhance their creative, analytical, and synthetic thinking, focusing on understanding the environmental impacts of transport systems and applying European directives.
Specifically, students will be able to:

- Apply methodological tools such as Directive 2002/49/EC and CNOSSOS-EU in real-world planning and project evaluation contexts
- Process and interpret data from strategic noise maps to understand environmental issues
- Evaluate complex transport systems by considering multiple stakeholders and their interactions
- Link physical understanding of phenomena with technical and political decision-making tools
- Approach infrastructure sustainability from a holistic and interdisciplinary perspective
- Draft well-documented environmental assessments for municipalities, cities, or regions
- Develop critical thinking, dialogue, and collaboration skills within complex urban and social frameworks

(3) SYLLABUS

Main Course Content

Chapter 01: Environmental Noise

01_ Physical foundations of environmental acoustics
02_ European Directive 2002/49 on Environmental Noise
03_ Methodologies: NMPB95 and CNOSSOS-EU
04_ Strategic Noise Maps (SNM) and Noise Action Plans (NAP)
05_ Technical measures and solutions for environmental noise reduction
06_ Noise and urban forms
07_ Noise and health impacts
08_ Soundscapes and environmental noise

Chapter 02: Air Pollution, Carbon Footprint, and Biodiversity

09_ Air pollution related to transport infrastructures
10_ Carbon footprints of transport infrastructure projects
11_ Impacts of transport infrastructures on biodiversity

Chapter 03: Case Studies

12_ Software tools (CadnaA, CO_2 calculation, biodiversity assessment)
13_ Strategic noise maps and action plans in Greece and Europe
14_ Ongoing environmental issues in transport infrastructure projects

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face teaching in the classroom</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Computers are used during the lectures of the course, but also in communication with the students. They are used in delivering Power Point lectures, presenting related slides, videos and instructional CDs and providing statistical material and bibliography for the needs of the course and the work being done.</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Teaching</td><td>39</td></tr>
<tr><td>Study & analysis of literature</td><td>60</td></tr>
<tr><td>Homework writing</td><td>70</td></tr>
<tr><td>Field Works exercice</td><td>18,5</td></tr>
<tr><td>Total</td><td>187,5</td></tr>
</table>
</td></tr>
<tr><td>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.</td><td>
<table>
<tr><th>Evaluation process</th><th>Yes/No</th></tr>
<tr><td>Language</td><td>Greek</td></tr>
<tr><td>Oral examination</td><td>Yes</td></tr>
<tr><td>Written work</td><td>Yes</td></tr>
</table>
The assessment criteria used are linked to their understanding of the course problem and their ability to defend an oral and written argumentation.
</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. *Κ. Βογιατζής «Περιβαλλοντική Τεχνική & Θεσμικό Πλαίσιο Εφαρμογής», Γ' ΕΚΔΟΣΗ, Εκδόσεις ΣΥΜΜΕΤΡΙΑ, 2015, 584 σελ.*
2. *Κ. Βογιατζής, Σ. Χαϊκάλη και Α. Χατζοπούλου «Προστασία του Ελληνικού Ακουστικού Τοπίου - Θεσμικό Πλαίσιο του Περιβαλλοντικού Θορύβου» Εκδόσεις ΠΑΠΑΣΩΤΗΡΙΟΥ, 2009, 256 σελ.*
3. *G. Gerolymatou, N. Remy, K. Vogiatzis, V. Zafiropoulou, "Assessing Health Effects and Soundscape Analysis as New Mitigation Actions Concerning the Aircraft Noise Impact in Small- and Middle-Size Urban Areas in Greece", MDPI: Environments 2019, 6, 4, http://dx.doi.org/10.3390/environments6010004.*
4. *K. Vogiatzis, N. Remy, "Changing the Urban Sound Environment in Greece: A Guide Based on Selected Case Studies of Strategic Noise Maps (SNM) and Noise Action Plans (NAP) in Medium and Large Urban Areas", MDPI: Environments 2018, 5(6), 64, https://doi.org/10.3390/environments5060064.*
5. *K. Vogiatzis, N. Remy, Soundscape design guidelines through noise mapping methodologies: An application to medium urban agglomerations, NOISE-D-16-00005, De Gruyter Editions / Noise Mapping Journal: Special issue on Recent Advances on Soundscape Research, 2017;4:1-19, Dec 2016, https://doi.org/10.1515/noise-2017-0001*
6. *K. Vogiatzis, "Environmental noise and air pollution monitoring in the Athens ring road (Attiki Odoso): An important parameter for a sustainable urban development", Int. Journal of Sustainable Development & Planning, Vol. 10, No 4 (2015) WIT PRESS, pages 528-543, (SCOPUS), https://doi.org/10.2495/SDP- V10-N4-528-543*
7. *K. Vogiatzis, N. Remy, Research Article: "Strategic Noise Mapping of Herakleion: The Aircraft Noise Impact as a factor of the Int. Airport relocation, Noise Mapping, Vol. 1, Issue 1 (Sept 2014), p. 15-31, De Gruyter Open, https://doi.org/10.2478/noise-2014-0003*

8. K. E. Vogiatzis, N. Remy "From Environmental noise abatement to soundscape creation through strategic noise mapping in medium urban agglomeration in South Europe", Science of Total Environment (STOTEN), Accepted 25 Jul 2013, Article in Press, Sci Total Environ (2013), (SCOPUS)), http://dx.doi.org/10.1016/j.scitotenv.2013.07.098

- Related academic journals:

1. Noise mapping
2. Int. Journal of Sustainable Development & Planning
3. Science of Total Environment
4. MDPI Environments
5. Building acoustics
6. Applied Physics