

PENS-213

Green highways in residential area

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| Cursus | Sem. | Type |
|------------------------|------|------|
| Projeter ensemble ENAC | BA4 | Opt. |

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| Language of teaching | English |
| Credits | 4 |
| Withdrawal | Unauthorized |
| Session | Summer |
| Semester | Spring |
| Exam | During the semester |
| Workload | 120h |
| Weeks | |
| Hours | 48 weekly |
| Courses | 4 weekly |
| Exercises | 22 weekly |
| Project | 22 weekly |

Number of positions

It is not allowed to withdraw from this subject after the registration deadline.

Summary

The two main topics of this multidisciplinary project are: evaluation of the air and noise pollution induced by a high way on an urban residential area and; proposal of innovative, low-cost architectural and civil engineering solutions based on the use of vegetation and advanced materials

Content**Air pollution monitoring:***Outdoor*

- gas pollutants NO_x, CO, O₃, SO₂
- aerosol-point measurements (PM₁₀) and aerosol spatial distribution with a Doppler lidar
- meteorological metadata, wind, temperature, humidity and solar radiation

Indoor:

- gas pollutants NO_x, CO, O₃, SO₂

Outdoor and indoor acoustic noise monitoring

The measurements will be taken 24/7 at several locations at different distance from the highway.

Data analysis and interpretation

The acquired in the previous phase data will be used to evaluate the air and noise pollution levels and compare them with Federal norms. The data will be further analysed to reveal diurnal variations and dependences on: working/non-working days, traffic intensity, and meteorological conditions.

Abatement strategy architectural and engineering solutions

Two options for reducing the air pollution and noise will be considered: use of vegetation or/and advanced materials. Plants absorb and actively react with air pollutants, have the ability to regenerate and specific types have self-cleaning properties. Architectural and engineering solutions such as green barriers, green walls or green zones will be investigated. The use of advanced materials in the architectural and engineering design will be investigated as additional or alternative solution. Materials such as nanomaterials, catalytic-destruction coatings and advanced acoustic isolation materials will be considered as well.

Keywords

air pollution, pollutant gasses, aerosol, acoustic noise, highway, transport, residential area, vegetation, green barrier,

Learning Outcomes

By the end of the course, the student must be able to:

- Use air quality measurement equipment
- Work out / Determine with experimental and other data
- Plan a complex project
- Analyze critically results
- Use a multidisciplinary method or approach
- Present the project to multidisciplinary audience

Transversal skills

- Use both general and domain specific IT resources and tools
- Evaluate one's own performance in the team, receive and respond appropriately to feedback.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Use a work methodology appropriate to the task.
- Make an oral presentation.

Assessment methods

Written Report

Oral presentation

Supervision

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| Office hours | Yes |
| Assistants | Yes |
| Forum | Yes |