CIVIL-460

Indoor air quality and ventilation

Licina Dusan

Cursus	Sem.	Type
Civil Engineering	MA2, MA4	Opt.
Minor in Integrated Design, Architecture and Sustainability	E	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Written
Workload	120h
Weeks	14
Hours	**4 weekly**
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

This course provides a fundamental knowledge of an emerging area - indoor air quality. This course also gives an overview of ventilation strategies and airflow distribution strategies tuned to ensure the highest level of air quality in buildings.

Content

Indoor air pollution properties, sources and concentrations, sick-building syndrome, health effects and risk analysis; polluant dynamic behaviour and fate, source control, conventional and advanced ventilation strategies; ariflow/pollution distribution; air filtration energy conservation; human exposure assessment; models for predicting source emissions and human exposure; air pollution monitoring; air quality, ventilation standards, healthy building guidelines.

Keywords

Air quality in buildings, ventilation strategies, airflow distribution, human exposure

Learning Prerequisites

Required courses

None, but familiarity with building physics is recommended

Recommended courses

- Comfort and architecture: sustainable strategies (AR-442)
- Building energetics (ENG-445)
- Building physics I IV (AR PHYS)
- Air pollution and climate change (ENV-400)

Important concepts to start the course

- Building physics
- Fluid dynamics
- HVAC systems
- Indoor environmental quality

Learning Outcomes

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

- Integrate indoor air quality & ventilation requirements into the building design & operation lifecycle
- Discuss about sources of particle- and gas-phase air pollutants in buildings and their impact on human health and well-being
- Perform calculations related to aerosol and gas-phase disctribution and human exposure
- Assess / Evaluate building air pollution control mechanisms and determine their effectiveness
- Integrate air quality data and prepare and review written and oral technical documents
- Perform indoor air quality assessment through handling instrumentation and conducting measurements

Teaching methods

This course consists of theory lectures, hands-on sessions and individual and group assignments

Expected student activities

To actively participate in lectures, individual and group projects

Assessment methods

- Written mid-term exam based on theory: 20%
- Written end-semester exam based on theory: 20%
- Written individual blog post: 15%
- Written project report: 30%
- Oral presentation: 15%

Resources

Virtual desktop infrastructure (VDI)

No

Bibliography

Purchasing a textbook is not compustory as students will be able to rely on combination of peer reviewed papers and accompanying materials for majority of the topics. The reference tectbooks include the following:

- Spengler, J., McCarthy, J., and Samet, J. Indoor air quality handbook, McGrow-Hill Professional (2001).
- Morawska, L. and Salthammer, T., Indoor environment: airbone particles and settled dust Wiley-VCH (2003)
- Hinds, W.C., Aerosol technology: Properties, behavior, and measurement of airborne particles, Wiley (1999)
- Steinfeld, J.H. and Pandis, S.N., Atmospheric chemistry and physics: from air pollution to climate change, Wiley (2006)
- Awbi, H.B, Ventilation of buildings, E&FN SPON (2003)
- Etheridge, D., Sandberg, M.Building ventilation-Theory and Measurement, John Wiley & Sons (1996).
- Peer-reviewed papers and websites - it will be provided thoughout the semester

Ressources en bibliothèque

- Awbi, H.B, Ventilation of buildings, E&FN SPON (2003)
- Hinds, W.C., Aerosol technology: Properties, behavior, and measurement of airborne particles, Wiley (1999)
- Morawska, L. and Salthammer, T., Indoor environment: airbone particles and settled dust Wiley-VCH (2003)
- Etheridge, D., Sandberg, M.Building ventilation-Theory and Measurement, John Wiley & Sons (1996).

- Steinfeld, J.H. and Pandis, S.N., Atmospheric chemistry and physics: from air pollution to climate change, Wiley (2006)
- Spengler, J., McCarthy, J., and Samet, J. Indoor air quality handbook, McGraw-Hill Professional (2001).

Prerequisite for

Master Project