AFEC
asociación de fabricantes
de equipos de climatización

Masterclass

Air Filtration

Science, technology and practical measuring of INDOOR AIR QUALITY

29th April 2026, Madrid (Spain)

Partners and sponsors

TROX

UNE Normalización Española

Air Filtration
masterclass and workshop

This course examines the **fundamental aspects of Indoor Air Quality (IAQ)**, addressing the identification of **common pollutants**, the **health implications** associated with inadequate air quality, and the implementation of **effective strategies** to mitigate these risks.

Through a combination of scientific principles, practical demonstrations, and analysis of real-world case studies, **participants will acquire the skills** necessary to evaluate their indoor environments, understand the application sensitivities of appropriate filtration technologies tailored to their specific requirements, and adopt essential behavioral changes relevant to the interaction between occupants and their workspaces.

This masterclass transcends the mere discussion of filtration systems; it aims to **establish a foundation for a healthier and more sustainable lifestyle** through defining, defending, and delivering fit-for-purpose filtered air indoors.

📍 **Place**: UNE offices - C/ Génova 6, 28028 Madrid (SPAIN)

📅 **Date:** April 29th, 2026

⏰ **Time**: 11:00 to 17:00

🪑 **Seats**: Limited

🇬🇧 **Language**: English

Led by **Dr. Iyad Al Attar**

Join AFEC & Dr. Iyad Al-Attar and embark on an inspiring journey into the unseen, exploring how the air inside our buildings profoundly shapes our well-being, productivity, and our planet.

This masterclass is offered on a complimentary basis to representatives of AFEC member companies and to stakeholders from the sector and public administration. Participation is limited and places will be confirmed subject to availability.

Program

11:00	11:40	**Registration and welcome coffee**
		Welcome by UNE and introduction by AFEC
Session 1	11:40 - 12:30	**Introduction to air filtration** Filtration fundamentals and applications Air filter design, selections and stages
Session 2	12:30 - 13:20	**Understanding air filter selection, installation, performance and standards** Air filter selection, installation and performance Navigating global filtration standards: EN1822, EN 16798-3
	13:20 - 13:30	*Break*
Session 3	13:30 - 14:10	**Impact of operational & climate conditions on HVAC & filtration systems** Evaluating the operational conditions and adaptive engineering strategies required to maintain HVAC resilience Air filter performance and IAQ implications during extreme events such as sandstorms, wildfires, and pandemics
14:10	15:00	**Lunch**
Session 4	15:00 - 15:50	**IAQ measurement, monitoring, and filter performance in buildings** Scenario analysis & optimization Systems Integration through correlating laboratory filter performance metrics and energy efficient IAQ outcomes. Interactive workshop: air quality monitoring through a collaborative group exercise utilizing portable IAQ sensors.
	15:50 - 16:00	*Break*
Session 5	16:00 - 16:50	**Future innovations and trends in air filtration** Innovations in air filter design, media and manufacturing Circularity in filtration Workshop: filter design (work individually) Q&A / Summary
16:50	17:00	**Closing remarks**

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Program overview

Morning session

Understanding filtration systems and impact of operational and climate conditions

Session 1

Introduction to air filtration

Fundamentals of air filtration. Defining core principles, historical background, and multi-stage mechanical processes involved in separating contaminants from airstream.

- **Profiling airborne pollutants.** Identifying common particulate (PM), gaseous (VOCs), and biological contaminants, analyzing their primary sources, and understanding their behavior in suspended states.
- **Performance characteristics.** Defining critical metrics that dictate filtration efficacy, including initial efficiency, sustained capture rates, dust-holding capacity, and pressure drop.
- **Design parameters & considerations.** Exploring the engineering elements of filter construction, from media selection and pleat geometry to structural framing and aerodynamic resistance.
- **Variables influencing filter selection.** Examining key operational factors—such as target particle size distribution, face velocity, system air volume, and environmental loading conditions—that dictate the optimal filter choice for specific facility applications.

Session 2

Understanding air filter selection, installation, performance, and standards

- **The physics of capture.** Detailing the core collection mechanisms of filtration—including straining, inertial impaction, interception, diffusion, and electrostatic attraction—and how they target specific particle sizes.
- **Filter loading dynamics.** Examining the operational lifecycle of filter media, analyzing the environmental causes of premature clogging, and understanding how dust cake formation impacts system pressure and energy consumption.
- **In-situ performance monitoring.** Utilizing differential pressure sensors, airflow meters, and real-time data tracking to continuously monitor filter health and mechanical stress within active HVAC environments.
- **Evaluating filtration efficacy.** Exploring the scientific metrics and laboratory testing methods used to determine fractional efficiency, particle penetration, and total dust-holding capacity.
- **Navigating global standards.** An overview of key international testing frameworks, comparing the methodologies and classifications of ISO 16890, EN 1822, EN 16798-3 and others to ensure compliant and effective filter selection.

Session 3

Impact of of operational & climate conditions on HVAC & filtration systems

- **IAQ, health, & productivity:** Defining the critical role of air filtration in mitigating poor indoor air quality and demonstrating the direct correlation between optimal IAQ, cognitive function, and occupant well-being.
- **Application-specific analysis:** Tailoring filtration strategies to distinct built environments, contrasting the stringent infection control requirements of hospitals with the high-occupancy demands of schools and commercial offices.
- **Environmental & operational stressors:** Evaluating how external climate extremes (such as high ambient humidity or regional dust events) and fluctuating operational loads directly impact filter efficiency, pressure drop, and media degradation.
- **Installation & commissioning protocols:** Implementing rigorous, standardized test practices to ensure filtration systems are properly sealed and deliver their promised performance metrics post-installation.
- **Predictive maintenance strategies:** Moving beyond traditional calendar-based filter replacements by leveraging continuous monitoring, filter loading curves, and data analytics to guarantee optimal IAQ outcomes while minimizing energy waste.

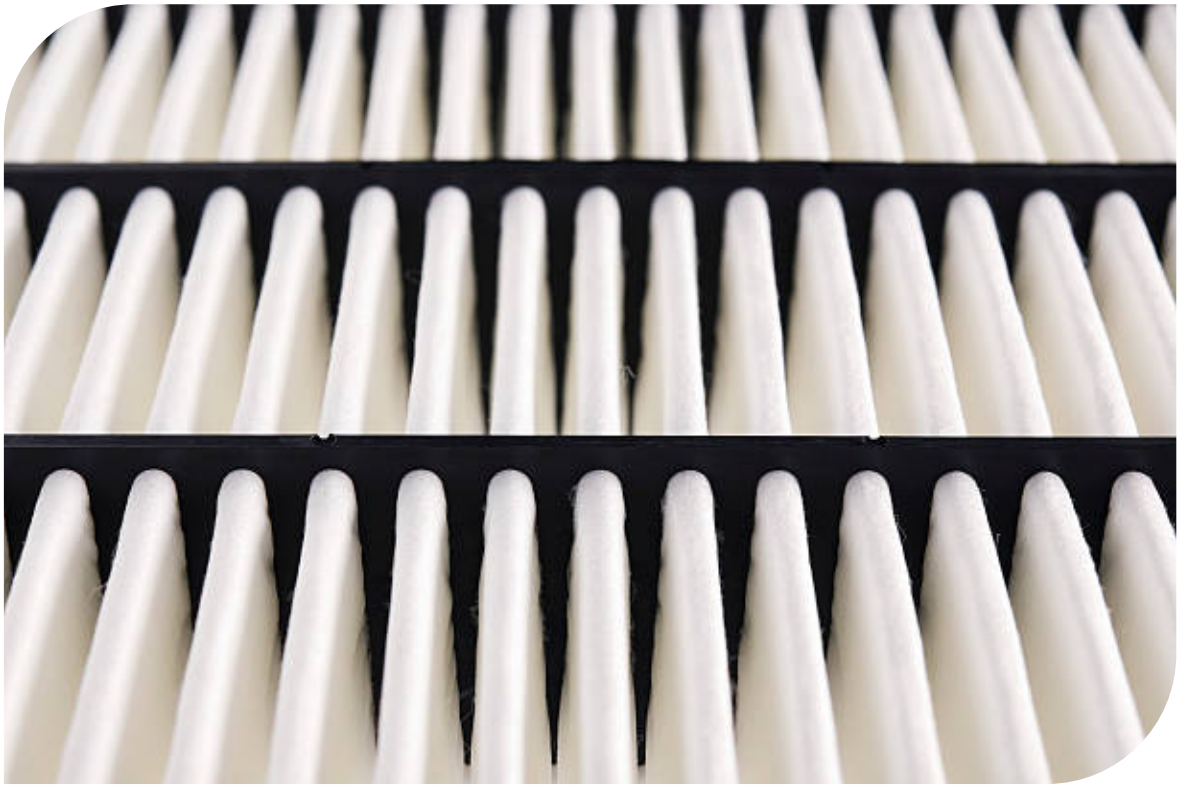
Afternoon session

Practical Workshops: individual and group activities

Session 4

IAQ measurement and monitoring and filter performance for buildings

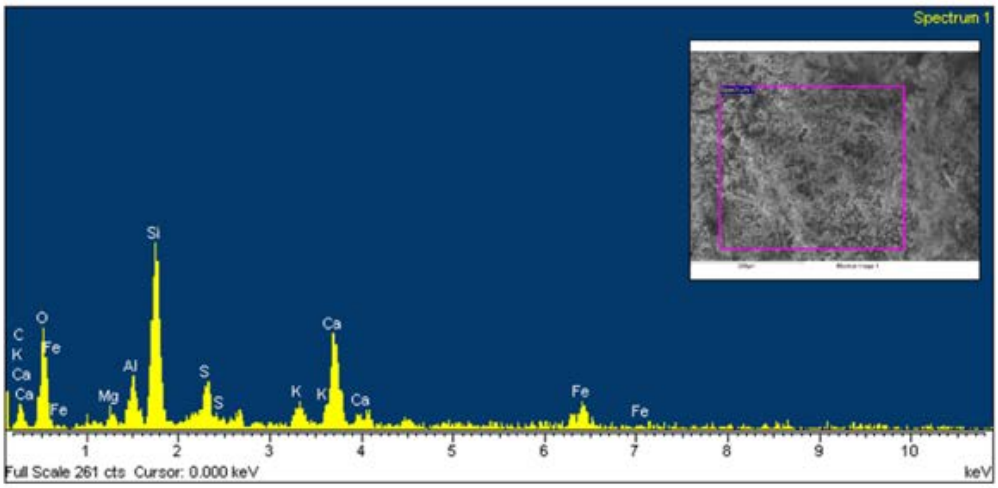
- **Scenario Analysis & Optimization:** Evaluating diverse environmental challenges (e.g., urban pollution, high occupancy) to determine the most effective and energy-efficient filtration solutions for specific building profiles.
- **Systems Integration:** Correlating laboratory filter performance metrics with real-world IAQ outcomes and total HVAC energy demands.
- **Interactive Workshop: Hands-On IAQ Monitoring:** A collaborative group exercise utilizing portable IAQ sensors to measure, analyze, and interpret live environmental data—such as particulate matter, VOCs, and CO_2—in real-time.



Session 5

Hands-on IAQ Measurement and Monitoring

- **Next-Generation Materials & Manufacturing:** Exploring cutting-edge advancements in filter media—such as electrospun nanofibers and smart textiles—along with novel aerodynamic designs that maximize particle capture while minimizing pressure drop.
- **Sustainable Filtration & Circular Economy:** Addressing the environmental footprint of HVAC consumables by transitioning toward recyclable media, reusable framing systems, biodegradable materials, and comprehensive lifecycle analysis (LCA).
- **Interactive Challenge: Individual Filter Design:** A culminating design sprint where attendees independently apply course concepts to conceptualize and spec a theoretical filtration solution for a complex, real-world environmental scenario.
- **Knowledge Assessment (Optional):** A short, individual multiple-choice quiz designed to test the core air quality concepts, terminology, and engineering principles learned throughout the master class.
- **Q&A, Summary, & Closing Remarks:** An open forum to troubleshoot specific facility challenges, consolidate key takeaways from the master class, and deliver concluding thoughts on the trajectory of indoor air quality management.



Meet the instructor

Dr. Iyad Al-Attar

Dr. **Iyad Al-Attar** is a Visiting Academic Fellow in the School of Aerospace, Transport, and Manufacturing at Cranfield University, specializing in air quality and filter performance for land-based gas turbines. His current research at the University of Oxford investigates the inclusion of air quality as a foundational element of sustainable urban development, focusing on HVAC ecosystems, sensing infrastructure, and human-centred design.

Dr. Al-Attar is actively engaged in academic service and scientific communication, holding influential roles as an editorial board member and referee for the **Filtration Society (UK)** and the ***Journal of Cleaner Production***. His extensive publication record encompasses the physical and chemical characterization of airborne pollutants, the advanced design of filter media, and the optimization of sustainable performance within HVAC and gas turbine applications.

A recognized authority in the field, Dr. Al-Attar serves as the **Global Correspondent for Innovations and Technologies** for *International Filtration News (IFN)*. He is also a long-term columnist for *Climate Control Magazine*, where he provides expert analysis on the critical impact of Indoor Environmental Quality (IEQ) on human fertility and the specialized atmospheric requirements of **In Vitro Fertilization (IVF) facilities**.

Bridging the gap between academic research and industrial application, Dr. Al-Attar was recently appointed as a Commissioner for the WELL Building Institute. He also serves as the Indoor Air Quality (IAQ) Patron for EUROVENT and was the first associated air filtration consultant for Eurovent Middle East. Through these roles, he advocates for global governance to embed air quality monitoring and enhancement into the built environment.

Dr. Al-Attar received his Ph.D. in Engineering from Loughborough University (UK), following an M.Sc. from Kuwait University and a B.Sc. from the University of Toronto (Canada).