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Kandidatarbete

Examenskod ACEX10



Healthy office indoor environments in times of Covid-19: A field measurement study

Humans can spend, on average, 85-90% of total lifetime indoors for studying, working and living. Nowadays, green buildings (with features such as efficient use of energy, good indoor environmental air quality, consideration of the quality of life of occupants in design and operation) acknowledge more and more the importance of the indoor environment (i.e., temperature, relative humidity, carbon dioxide, sound, illuminance) on people's health and well-being. In particular, during the current Covid-19 pandemic, studies have shown the close relations between indoor climate parameters and the spread of SARS-CoV-2. For example, the linkages between indoor air temperature and relative humidity and the risk of infection by the virus. Therefore, an interesting question is how the building indoor environmental performance in green buildings

Target group of students

Samhällsbyggnadsteknik,
Civilingenjör, Arkitektur och
teknik, Maskinteknik,
Arkitektur

Group size

3-6 students (also could be
e.g. 2 groups of 3-4
students)

Special requirements

Students who are inter-
ested in learning measure-
ment skills or surveys

Suggestion from

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is, and what the potential linkages are between the indoor environment and occupant health and well-being in times of the pandemic.

Indoor environmental quality (IEQ) mainly includes four aspects: thermal environment, air, acoustic and lighting. IEQ can influence occupant's comfort. For example, we can feel too cold and too warm, dry air, odours, noisy space, and dim lighting or glare. As a consequence, we can suffer from a headache, cough, and eye irritation. The question remains if we measure IEQ correctly. Physical measurement is a practical skill to examine and evaluate the building performance of IEQ. In the Swedish building code and the EN 16798, required levels and ranges of physical parameters to guarantee the indoor conditions are provided.

Objectives: The candidates

- will learn in this work how to conduct IEQ measurements in practice. They will be done on a case study building and with the focus on thermal comfort, air quality, lighting and acoustic. The key parameters will be monitored during winter/spring (approx. one month in total) with the help of an advanced sensor toolkit.
- In parallel, the candidates will collect relevant information of indoor environmental requirements from the national building code and guidelines, and
- conduct a review of national and international organisations on the recent research results on indoor climate and the spread of Covid-19 indoors.
- Possibly design a questionnaire on office comfort and health for the occupants of the case study building.

Implementation: The case study building is an office building located on Chalmers campus which is certified according to Miljöbyggnad Silver. The thesis work will be very important to timely examine the condition of building performance in a Pandemic and contribute to larger national and international research projects. The work is done in collaboration with businesses from the building sector, e.g. Chalmers Fastigheter, Bengt Dahlgren and Akademiska Hus. Depending on the interest of the candidates, we will divide the responsibilities in the groups to make the measurement plan, conduct the literature review and design the questionnaire.

Impact: This thesis topic is a very good opportunity for the students to comprehensively understand the different aspects of a comfortable and healthy indoor built environment. On the one hand, it will help students who

Kan projektet dubbleras?

Yes



have interests in research to go further in any of the above themes. On the other hand, the practical skills to measure a series of physical parameters related to occupant comfort and health are very demanded skills by the building industry. At the end of the building construction and development phase, indoor environmental measurements are always required to allow the building to be used, even in non-Pandemic times.

Förslag på litteratur/Literature:

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- [3] Sweden Green Building Council. (2020) Indikatorer i Miljöbyggnad. Retrieved from <https://www.sgbc.se/certifiering/miljobyggnad/certifiera-med-miljobyggnad/indikatorer-i-miljobyggnad/>.
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- [6] Wu Y., Jing W.Z., Liu J., Ma Q.Y., Yuan J., Wang Y.P., Du M., & Liu M. (2020) Effects of temperature and humidity on the daily new cases and new deaths of COVID-19 in 166 countries. Science of The Total Environment, 729, 139051.
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