Guelph Campus Classroom HVAC Strategy

The University of Guelph is committed to the health and safety of our community.

To ensure a thorough approach to creating and maintaining a safe indoor environment, the role of heating, ventilation and air conditioning (HVAC) and the maintenance practices associated with them are regularly assessed using current public health guidance along with industry best practices related to COVID-19. An assessment of practices and procedures related to HVAC was completed by U of G Physical Resources (PR), Environmental Health and Safety (EHS) and with the assistance of external consulting engineers. Public health authorities continue to advise that COVID-19 spread is by droplets and aerosols, which presents a risk to people that are in enclosed spaces and indoor situations where physical distancing is not possible.

The most important factors in reducing the risk of COVID-19 remain as:

- Minimizing the number of people in a space at one time
- Maintaining physical distance as recommend by current Public Health guidelines
- Using well-constructed and well fitted mask
- Practicing effective hand and respiratory hygiene
- Practicing self-evaluation for symptoms each day prior to attending campus using the U of G’s COVID-19 Screening Form

According to Public Health Ontario the risk of virus transmission may be increased in crowded, inadequately ventilated settings, and with increased time spent in under these circumstances. It is important to note that indoor ventilation alone will not prevent transmission between individuals in close proximity, especially if those individuals are not taking other protective measures. Most infections are linked to person to person transmission through close contact with a person who is infected, even when not showing symptoms. For this reason, it is very important to follow infection prevention and control measures such as self-screening, staying home when not feeling well, effective mask wearing, frequent and effective hand washing and maintaining physical distancing.

The University appreciates that there are many sources of information regarding HVAC and COVID-19. These include numerous independent researchers, international advisory bodies, expert panels, and the news media. The University will continue to use all public health guidance, best practices and information and will update accordingly.
Supporting the health and safety of our community

We expect improved public health conditions in 2021-2022 due to vaccine rollout in the coming months. In-person activities and events will continue to occur in accordance with public health guidance.

Following public health guidance, the University has implemented a series of measures to reduce the risk of transmission:

- Practicing physical distancing (as recommend by current Public Health guidelines) and considering reduced occupancies throughout campus by re-arranging schedules, physical space layouts, and task execution where possible.
- Requiring the proper use of masks while indoors and outdoors as recommend by current Public Health guidelines.
- Widely communicating the effective COVID-19 precautions such as hand washing and physical distancing.
- Via the U of G’s COVID Self Screening Form, managing a self-screening program for all staff, faculty, students, contractors and visitors that visit campus, to be completed prior to attending campus. Advising the community to not come to campus if the form indicates you should stay home.
- Enhanced cleaning and disinfection of high touch surfaces on campus.

These remain the most effective measures against COVID-19.

Implementing ventilation measures on campus

To support the measures to prevent COVID-19 transmission, Physical Resources will continue to monitor and maintain the indoor environment through:

- Regularly reviewing ventilation guidance provided by public health, and industry recommendations.
- Continuing to maintain HVAC systems on campus.
- Maximizing outdoor airflow in ventilations systems, to avoid reductions in outside air flow.
- Continuing to use MERV-14 filters or the highest rated filter possible for the design of each HVAC system.
- Performing air purging before and after occupancy for a time required to achieve the equivalent air changes as required by ASHRAE guidelines.
- Increasing relative humidity in buildings to a minimum of 40% where possible.

Note that many science academic and research buildings are continuously supplied with 100% outside air.
Classroom specific additional control measures during the pandemic

The varied nature of the people using and passing through classrooms could result in greater numbers and densities of people in these spaces compared to other campus spaces. Because of this uncertainty, the following measures are being implemented in classroom environments based on the recommendations formulated through the University’s review and with information from external experts:

1. **Performing an HVAC assessment.** Air flow measurements will be conducted in classrooms to establish an equivalent air exchange rate per hour (ACH). Equivalent air changes per hour is the sum of the volume of actual air flow and purified air.

2. **Setting ventilation targets.** A minimum of six ACH for classrooms is accepted as an effective best practice and is equivalent to the standard used in healthcare settings, such as patient examination rooms.

3. **Enhancing ventilation in classrooms that do not meet the target of 6 ACH target.** Classrooms that cannot attain this target will be further assessed for the following:
   a. Exploring and making changes to equipment and operation towards achieving the ACH target, if appropriate and possible; and/ or
   b. Installing one or more air purification units in the space to augment the HVAC system in reaching the effective ACH target.

**Frequently Asked Questions**

1. **How does transmission of COVID-19 occur?**

   Public Health Ontario actively monitors, reviews and assesses relevant information related to COVID-19 transmission and continues to emphasize that most cases are linked to person-to-person transmission through direct close contact with someone who is positive for COVID-19, primarily via large aerosol droplets. Transmission via aerosols over longer distances is less common but may be possible under favorable conditions such as prolonged exposures in crowded, poorly ventilated spaces.

2. **Is exposure to aerosol droplets the same as airborne transmission?**

   Aerosols are liquid droplets which can travel through the air. COVID-19 forms predominately large aerosol droplets (droplet transmission), which are less likely to travel beyond two metres. Aerosols can be generated by coughs and sneezes, and in healthcare settings by certain aerosol generating medical procedures, however, the
presence of aerosols does not constitute airborne transmission. Reports of outbreaks in settings with poor ventilation have occurred. However, when looking closely at these situations, these outbreaks are also associated with crowding in an enclosed space, close-proximity conversations and higher risk activities (e.g., singing, shouting, dancing or exercise, especially without precautions such as wearing a mask or keeping a physical distance). The risk of transmission increases when these factors overlap. The HVAC system plays only a part in preventing infectious disease transmissions. Other measures, such as self-screening/staying home when you are sick, physical distancing/de-densification and finding alternatives to these higher risk activities (e.g., virtual participation in events), use of masks, enhanced disinfection of high-touch points and increased hand hygiene, continue to be emphasized by public health authorities.

3. What role do buildings’ HVAC systems play?

The standard COVID-19 preventative measures, including self-screening, physical distancing, use of non-medical mask, surface cleaning, and disinfection and hand washing are key to prevention and mitigation. There is not one public health measure that can guarantee protection from COVID-19; multiple strategies are needed.

HVAC systems in most non-medical buildings play only a minor role in infectious disease transmission, including the transmission of COVID-19. Health Canada states that there is no evidence currently that the virus can transmit over long distances through the air, e.g., beyond 2m proximities within a room, from room to room through air ducts.

COVID-19 has not changed code or regulatory requirements for ventilation in workplaces. Consistent with the hierarchy of health and safety controls and the precautionary principle, public health agencies and industry organizations have developed guidelines for building ventilation during the pandemic.

4. How is U of G implementing guidelines for building ventilation?

This HVAC strategy through these guidelines includes several measures that are being implemented by Physical Resources engineering and technical staff to interpret guidelines in relation to the variety and complexity of buildings and systems on the Guelph campus. The HVAC strategy focuses on verifying that systems are being properly maintained and operating accordingly, adjusting controls for parameters such as the amounts of total air and outdoor air where feasible, and upgrading filtration where feasible with the existing infrastructure. Most ventilation systems at U of G have been running MERV-14 filters since the ventilation upgrades were completed between 2014 and 2016.

Like many other large educational institutions, we have a variety of buildings and systems. Modifications and upgrades depend on the building and system under
consideration. Where central HVAC systems cannot be upgraded and in workspaces where there is no mechanical ventilation, other practicable solutions may be considered such as using portable air purifiers and reducing occupancy. Actions to increase natural ventilation, such as using windows and doors, may also be recommended.

It is important to note that a space not having mechanical ventilation does not necessarily mean that there is an elevated risk for COVID-19. Many activities performed on the U of G campus are classified as low risk in that prolonged, close interaction between people is not required. For example, office workers who do not have frequent close contact with coworkers, customers, or the public are classified as low risk. Using a mask, reductions in onsite staffing levels and applying maximum occupancies based on public health guidelines significantly reduces transmission risk in addition to any other applicable recommendations by public health. Other measures such as self-screening, staying home when you are sick, physical distancing, reducing occupant density and finding alternatives to higher risk activities (e.g., virtual participation in events), use of masks, enhanced disinfection of high-touch points and increased hand hygiene continue to be emphasized by public health authorities.

5. What role do supplemental air filtration/purifier units play, e.g., High-Efficiency Particulate Air (HEPA), standard air purifiers?

There is no reliable evidence that supplemental air filtration/purifier units on their own are effective in reducing transmission risk of COVID-19, but public health authorities suggest they may be useful as a supplement to HVAC ventilation or if there is no outdoor air exchange.

The transient nature of the population using and passing through classrooms results in greater numbers and density of people indoors compared to other spaces. As a result, an HVAC assessment of classrooms is being conducted with a target ventilation rate of six equivalent air changes per hour (6 ACH). Supplemental air filtration with HEPA filters will be considered for classrooms that cannot meet the 6 ACH target. The units will be managed and maintained by Physical Resources and appropriate operational staff.

6. How has U of G prepared HVAC systems for the resumption of increased on-campus activities?

Despite significantly reduced building occupancy since the start of the pandemic, most of the HVAC systems on the Guelph campus have remained operational since last March. Filters have been regularly replaced based on best practices and are monitored in real-time by the building automation system (BAS).

In preparation for a gradual and safe re-entry to each building, Physical Resources has been performing the following inspections and maintenance:
• Ensuring filters have been replaced based on the BAS monitoring system.
• Ensuring all setbacks and startup modes are operational.
• Utilizing BAS to provide proof-positive that fans are working, and that air is moving in and out of the building.
• Dampers (outside and return) are monitored and tested daily by the BAS to ensure they are working properly to help ensure the flow of fresh air to the building.
• Operation of filters are monitored in real time to ensure proper operation and set-off alarms if they are not.
• Conducting an HVAC assessment on classrooms.
• Investigating the installation of air purifiers with HEPA filters in classrooms where the 6 ACH target cannot be attained. Altering the BAS’ ventilation control logic to maximize the amount of outdoor air.
• Performing air purging before and after occupancy for a time required to achieve the equivalent air changes as required by ASHRAE guidelines.
• Measuring and comparing carbon dioxide levels within a building to outside air assessing ventilation levels in real time.

7. How is U of G addressing the suggestions of some research papers that we should increase ventilation and air change rates, increase fresh (outdoor) air flow and/or run air change 24/7?

The University’s HVAC Strategy was based on a review of and alignment with relevant legislative requirements and credible industry guidelines, including Public Health Ontario, the Ontario Building Code, Centre for Disease Control and Prevention (CDC) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

ASHRAE is the CDC’s and Ontario’s primary authority on HVAC and it has published core recommendations for the industry. U of G’s facilities group has also worked with University units to align HVAC operating hours within buildings according to their occupancy. In the event of an emergency, ASHRAE recommends flushing of a space with as much outside air as possible for extended amounts of time. The University defines an emergency in the context of COVID-19 as an outbreak on campus. In the event of an outbreak on campus, the University will follow the recommendations of local public health authorities.

8. Some resources suggest we should have MERV 13 filters installed on all centralized HVAC? What is U of G doing?

Most buildings and HVAC systems on-campus already utilize MERV-14 filters as the minimal standard for central air handling units.
9. I use the stairs and there is no ventilation. Should I be concerned?

Stairwells are common use spaces, and all users are expected to wear a mask as outlined in the U of G COVID-19: Guidance for Using Non-Medical Face Masks. Brief interactions such as passing someone on the stairwell does not confer a material risk in the transmission of COVID-19. In addition, high touch surfaces such as railings and door handles will be disinfected regularly. Physical distancing signage has also been posted and depending on the building, yield signage or designated stairwell directions are used to reduce traffic.

If you have concerns regarding your workspace, please contact your supervisor.