Executive Summary

The safety and health of our students, faculty, staff, and visitors to campus is paramount to Administrative Affairs, Facilities & Services (AAF&S) efforts as we continue to return to on-site work and prepare the campus for the start of the fall semester. With what we know now and what we will continue to learn about COVID-19, we will continue to work together to create an environment that mitigates the spread of COVID-19 and allow our community to return to campus feeling safe and confident in their living, learning and work environment.

Several members of the AAF&S staff are experts in operations and maintenance, environmental health and occupational safety, engineering, and building code compliance. The AAF&S team will continue to monitor the leading experts’ guidance on the virus and assist the campus’ leadership as we develop safety protocols and prepare for the fall semester. If you have specific questions please do not hesitate to reach out via email to facilities@uis.edu.

Below are several topics that have been brought forward recently on the operation of the university's heating, ventilation and air conditioning (HVAC) systems that require a little more of an explanation than a brief answer during a town hall Zoom meeting or other forums and these topics may be of interest to the wider UIS community.

As you read through the topics, please keep in mind two things:

1) HVAC systems are unique to each building. There is not a one-size-fits-all strategy for every HVAC system across campus. The University continues to provide proper maintenance and operation of the HVAC systems through proactive and preventive maintenance strategies. Modifying HVAC systems that have been designed and commissioned to operate under carefully constructed parameters can cause unintended, harmful consequences.

2) People can catch COVID-19 from others who have the virus. The disease spreads primarily from person to person through small droplets from the nose or mouth, which are expelled when a person with COVID-19 coughs, sneezes, or speaks. These droplets are relatively heavy, do not travel far and quickly sink to the ground. People can catch COVID-19 if they breathe in these droplets from a person infected with the virus. This is why it is so critical every individual wear a mask, maintain proper physical distance, practice proper proactive personal hygiene, and not gather in groups larger than what the CDC and IDPH recommend. That is our #1 offense and defense in our fight against COVID-19.

Heating Ventilation and Air Conditioning (HVAC)

First, the university will continue to follow the latest guidance and best practices from the Centers for Disease Control and Prevention (CDC) and the Illinois Department of Public Health (IDPH), in consultation with university experts at UIUC, UIC and other professional organizations and government agencies.

As we continue to return to on-site work and prepare for the fall semester, it is important to note that the disabling of HVAC systems in buildings is not recommended. It is important to maintain proper temperature and humidity levels and continue to bring in fresh air and keep air flowing through the
buildings to prevent occupant and equipment thermal stress and to lower the risk of mold, bacteria and other microbial growth in our facilities.

The American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) has approved and issued the following two statements regarding transmission of COVID-19 and the operation of HVAC systems during the COVID-19 pandemic.

“Transmission of SARS-CoV-2 through the air is sufficiently likely that airborne exposure to the virus should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems, can reduce airborne exposures.”

“Ventilation and filtration provided by heating, ventilating, and air-conditioning systems can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air. Unconditioned spaces can cause thermal stress to people that may be directly life threatening and that may also lower resistance to infection. In general, disabling of heating, ventilating, and air-conditioning systems is not a recommended measure to reduce the transmission of the virus.”

As of May 2020, conclusive research not been presented that says contaminated air taken from one space and recirculated through an HVAC system into another space has been found to play a significant role in the spread of infections. There is ongoing research and discussion regarding the operation of HVAC systems related to COVID-19, but it is not complete and will likely take years to reach a definitive conclusion. What we do know is HVAC systems and the ventilation and filtration they provide can reduce the airborne contaminants and thus may reduce the risk of COVID-19 transmission through the air.

As such, on May 6, 2020 the CDC provided strategies to consider for improving the building ventilation system as part of their Interim Guidance for Businesses and Employers Responding to Coronavirus Disease 2019 (COVID-19). ([https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html](https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html)). Below is a list of the CDC considerations with statements on what the university has done and will continue to do to comply with the CDC’s recommendations.

1) **Increase ventilation rates. [CDC]**
   - UIS’s HVAC systems have ventilation rates that are typically higher than required by codes and recommended by standards. AAF&S advises caution when considering opening windows to bypass the buildings HVAC system. Opening windows brings in unfiltered air and potentially unwanted pollutants, allergens, weather, and insects into the building. Opening windows may be appropriate in certain spaces, depending on the outdoor air conditions, when fresh air is not supplied to a space via mechanical ventilation means.

2) **Ensure ventilation systems operate properly and provide acceptable indoor air quality for the current occupancy level for each space. [CDC]**
   - UIS’s HVAC systems have digital controls that have been set to meet and, in most cases, exceed ASHRAE Standard 62.1 for indoor air quality. HVAC systems are continuously monitored by the AAF&S staff and are routinely checked by our steam and power plant engineers and HVAC technician to ensure proper operation. Preventive maintenance is conducted on the university’s HVAC systems and they are routinely checked to ensure they provide exceptional indoor air quality.

3) **Disable demand-controlled ventilation (DCV). [CDC]**
   - UIS has disabled the campus standard HVAC systems that utilize DCV.

4) **Further open minimum outside air dampers (as high as 100%) to reduce or eliminate recirculation. In mild weather, this will not affect thermal comfort or humidity. However, this may be difficult to do in cold or hot weather. [CDC]**
• UIS’s HVAC systems have air dampers that have been programmed/set to allow as much outdoor air as possible into the building without negatively affecting temperatures or humidity, which aligns with the CDC recommendation. As we move forward, AAF&S will be operating our building’s HVAC systems at that fine line where bringing in too much outside air may be detrimental to the indoor building environment (too hot/cold or too much humidity for occupant comfort, building equipment and building environment safety) yet bringing in as much fresh air as possible and mixing it with recirculated air for dilution. As we operate on this fine line, there may be times in the summer months when temperatures inside may be a little warm (or cool in the winter months) and times when it may feel a little “sticky” (or dry in the winter) and we ask you understand that we are working to bring in as much fresh air as possible while still maintaining a safe environment.

5) **Improve central air filtration to the MERV-13 or the highest compatible with the filter rack, and seal edges of the filter to limit bypass. [CDC]**

• UIS campus construction standards for ventilation systems include filtration. Standard building environments are supplied with clean air that has passed through a filtration system. These systems include the highest compatible filter sized to fit within the filter rack and the minimum rated filter in UIS buildings has a Minimum Efficiency Reporting Value (MERV) of 8.

• Filters vary across campus due to the age and variety of HVAC systems in use. The campus’ HVAC systems contain the most appropriate filters for that particular building’s system operation. One cannot simply install a higher-efficiency (higher MERV rated) filter because it can be counterproductive to the operation of HVAC systems due to a high pressure drop that exceeds the system design and leads to diminished air supply. Higher-efficiency filters may also become quickly loaded, which can cause air to bypass the filter. If you have specific questions on the MERV rating of the filters serving a space, please contact AAF&S at: facilities@uis.edu

• On the Health and Sciences Building and all campus buildings built after 2004 (UHB, TRAC, LRH, FRH, Union, etc.), a minimum of a MERV-11 second stage filter is provided to provide higher-efficiency filtration.


6) **Check filters to ensure they are within service life and appropriately installed. [CDC]**

• AAF&S maintenance staff changes filters on a scheduled, routine basis to ensure they are within service life and appropriately installed. Checking filters across campus will be a priority for AAF&S as the university returns to on-campus operations.

7) **Keep systems running longer hours, 24/7 if possible, to enhance air exchanges in the building space. [CDC]**

• University HVAC systems are typically scheduled to run continuously during occupied times. Systems start before the building is scheduled to open and remain on past the scheduled building closing time.

• For the select systems not running around the clock, the systems are scheduled to flush the building two hours before and post occupancies to meet and exceed the needs of the building, its equipment and its occupants.

• If you have questions on the scheduled run time for the HVAC system serving your space please e-mail facilities@uis.edu.
Along with the considerations published by the CDC, ASHRAE has provided a resource page for COVID-19 (www.ashrae.org/covid19) and their Position Document on Infectious Aerosols (published 4/14/2020) recommended the following additional considerations for non-healthcare buildings that warrant discussion and review:

**Add duct- or air-handling-unit-mounted, upper room, and/or portable UVGI devices in connection to in-room fans in high-density spaces such as waiting rooms, prisons, and shelters. [ASHRAE]**

- Duct or air handling unit UVGI (ultraviolet germicidal irradiation) has been proven to inactivate viruses in an air stream. The more prevalent use of UVGI in air handling systems is to sanitize coils. Neither application of UVGI is installed in a standard campus HVAC system. The primary strategy for continuing to provide sufficient indoor air quality is to ensure HVAC systems continue to operate properly. There is no evidence to date that contaminated air taken from one space and recirculated through an HVAC system into another space has been found to cause infections; if there are future studies to prove that COVID-19 aerosol transmission is possible in this manner, then UVGI could be considered as a supplemental strategy. One of the downsides to UVGI is that it can be hazardous to human skin and eyes. For this reason, UVGI needs safety measures in place and is typically limited to unoccupied areas (air handling units, duct work and upper portions of rooms that have high ceilings). Additionally, the bulbs used to generate UVGI typically contain mercury, which will need to be disposed of properly when bulbs are changed. Each air handling system is unique and would require proper study and design before implementation could be considered.

- Any system where UVGI is considered will need funding for the first cost, additional utility consumption, periodic maintenance, and end-of-life replacement/disposal. This is in addition to the engineering, product submittal review/approval, inspection, and as-built documentation that will be required.

**Maintain temperature and humidity as applicable to the infectious aerosol of concern. [ASHRAE]**

- Standard campus HVAC systems are configured to maintain temperature set points. The HVAC industry recommends 40-60% relative humidity as the ideal range to minimize the likelihood of virus and bacteria transmission. Most campus HVAC systems can maintain the relative humidity in buildings below the recommended 60% level. However, during the cold and dry winter months, the indoor relative humidity falls well below the 40% level in most campus buildings. Central system humidifiers are only provided in special circumstances on campus for spaces with a specific need (such as for rare book collections, musical instruments, art displays, or other specific research requirements). Humidifiers can present many challenges and unwanted side effects. When not carefully monitored or controlled, there could be an increased likelihood of condensation forming on outside windows or walls, which could lead to mold or mildew growth. The existing building vapor barrier and duct work also need to be carefully reviewed to ensure other potential sources of moisture, mold, and mildew are not created. There are not currently plans to begin installation of additional humidifiers in AHU or duct systems.

- The use of portable humidifiers and electronic air cleaning devices utilizing ion generators are not recommended due to the unknown quality of water used in these devices, possibly causing excess humidity, and the potential for producing ozone.

These considerations are intended to guide and inform the decisions the university make as we continue to navigate the best practices that allow the university community to return to campus. If you have questions or require an in-person consultation to address your concerns, please send an email to facilities@uis.edu.