

## **SCIENCE LEARNING CENTER (1035)**

The Science Learning Center, constructed in 2016, is a three story, 122,500 square foot facility for undergraduate teaching spaces including laboratories for organic chemistry, general chemistry, biology and physics. Other spaces include two 280 seat lecture halls, SCALE UP classrooms, offices, student study spaces and a café. A mechanical penthouse is located on top of the third level that houses most of the central HVAC equipment. Organic chemistry laboratories have general fume hood and snorkel exhaust.

Most areas of the building except for the two large lecture halls are served by four variable volume Air Handling Units (AHUs) with chilled water coils and heating hot water coils for cooling and heating. These AHUs have both a common return air system and shared supply air system for redundancy. The central air handling units provide conditioned supply air to the building through above ceiling ductwork with more than 220 variable air volume terminal units that vary the air volume supplied to each space based on space temperatures. The central AHUs were designed to supply air to the building that is approximately 90% ventilation air and 10% recirculated air returned from the office and classroom spaces. There is also an energy recovery system in the building that transfers energy from the discharge exhaust air stream to the incoming outdoor air stream via a pumped glycol water loop system. Three Energy Recovery Units (ERUs) in the penthouse recover energy from the exhaust air streams via an air-to-glycol water heat exchange coil. The glycol water is pumped to similar coils located in each AHU as a means to pre-cool the incoming outdoor air with the embedded energy in the outgoing exhaust air stream.

The two lecture halls have dedicated variable volume, single zone air handlers that vary the conditioned air flow to maintain space temperature. The return air from these halls will be returned to the air handling unit serving each space. The lecture hall AHUs were designed to supply air that is approximately 60% ventilation air and 40% recirculated air returned from each lecture hall space.

There are a total of 10 Fan Coil Units that provide heating and cooling within electrical, mechanical and data rooms within the building. These units have no ventilation requirements and operate with 100% recirculated room air.

In laboratory areas, constant and variable volume terminal units maintain air flow through the fume hoods and for general exhaust from these areas. Organic chemistry laboratories have general exhaust, fume hood exhaust and snorkel exhaust air flows. General chemistry and biology laboratories have both general and fume hood exhaust. Supply air for these spaces is modulated to maintain a fixed offset between exhaust air and supply air, to maintain space temperature, to makeup fume hood and snorkel exhaust and to maintain minimum air change rates. All of the air supplied to laboratories is exhausted and is not recirculated within the building. The offset between the exhaust air and supply air to each space will keep each laboratory under negative pressure with respect to the corridor.

Offices, classrooms, the café, circulation, physics lab, scale up classrooms and corridor spaces are supplied by variable volume air handlers. Variable volume terminal units located within the above ceiling supply ductwork downstream of the central AHUs modulate the flow of conditioned air to maintain space temperatures. The return air from these spaces that is not used for exhaust air makeup will be returned to the central air handling units where it is mixed with the ventilation air from outside the building and passed through a filter bank before being conditioned and supplied to the building.

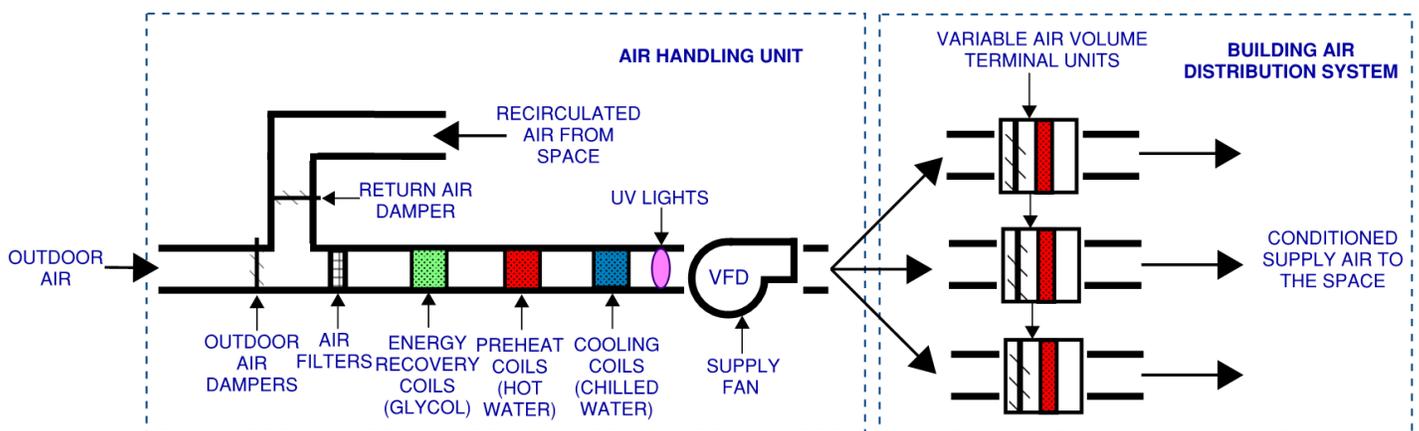
## **VARIABLE VOLUME AIR HANDLING UNITS (AHU-1, 2, 3 AND 4)**

The Air Handling Units deliver a variable volume of conditioned air consisting of a mixture of recirculated building air (except for laboratories) and fresh air from outside of the building. The building return air is filtered, mixed with outdoor air, pre-cooled with glycol energy recovery coils and cooled with chilled water coils in the building's air handling unit before being supplied to rooms throughout the building through above ceiling ductwork. Variable Air Volume terminal units (VAVs) located downstream of the AHUs in the supply air ductwork are equipped with an air damper to regulate the volume of air delivered from the central AHU to the space based on the current space temperatures. Many of the VAVs also include a fan, a hot water coil and a filter combination that will mix in air from the above ceiling plenum with the conditioned air from the central AHU when the space requires heating.

Air is recirculated from the spaces back to the air handling unit through ceiling mounted air return registers located in each space. Return air is pulled from a plenum space above the ceiling, in lieu of ductwork. Exhaust is provided in restrooms on each floor to remove odors and in all laboratory spaces to remove chemical fumes and for space and building pressurization purposes.

The four central building Air Handling Units are equipped with a bank of MERV 13 filters to remove particulates from the mixed air upstream of the unit coils. Each AHU is also provided with an ultraviolet (UV) light filtration system that serves to inhibit biological activity within each unit. The lecture hall AHUs are provided with Demand Controlled Ventilation (DCV) functions that reduce the ventilation rate during unoccupied periods as sensed by room CO<sub>2</sub> monitoring. DCV functionality is being disabled during the pandemic as part of UGA's COVID 19 response program. The lecture hall AHUs are also provided with an occupancy schedule to disable the AHUs at night and on weekends. The schedule is currently set to run the lecture hall AHUs continuously as part of UGA's COVID 19 response program.

Chilled water is supplied throughout the building from the campus chilled water system. Heating hot water, distributed throughout the building for heating, is provided by a steam-to-water heat exchanger using steam from the campus steam system.

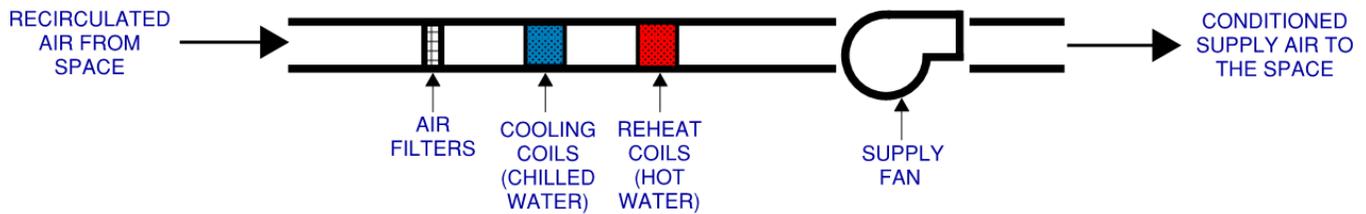


**VARIABLE VOLUME AIR HANDLING UNIT SCHEMATIC**

## FAN COIL UNITS

A fan coil unit is fairly simple: it's a fan with a coil or coils (like a car radiator) that can add heating and cooling to the air stream flowing through it. The FCUs have air filters to remove particulate matter from the air, a hot water coil and chilled water coil for heating and cooling the air, and a supply fan for forced air circulation through the unit and into the space. There is no ventilation air provided for these FCUs because they are located in spaces with transient occupancy.

The hot water is produced in the mechanical room by way of a heat exchanger that takes heat from the campus steam system and adds it to the building's hot water loop. The chilled water is provided from UGA's campus chilled water system.



**4-PIPE FAN COIL UNIT SCHEMATIC**