Information about HVACR@Ferris State University for Parents

Students who are accepted into the HVACR program at Ferris State University are taught by nine full time faculty, all with extensive industry experience, and each with specific expertise. These faculty teach in two separate and distinct programs – the associate degree program (freshman and sophomore year) and the bachelor degree program (junior and senior year). All students earn the associate degree and are then free to choose to stay for further learning and opportunities in the bachelor degree program, or depart for a great career in the industry.

The associate degree program involves both lecture and hands on laboratory exercises that teach students to systematically trouble shoot, service and repair HVACR equipment. At Ferris, theory and hands on work are equally important. A typical student schedule will involve 6 to 9 hours of HVACR lecture per week, with 12 hours of lab.

During lab, students are assigned to a piece of equipment that has a problem. These assignments are designed to simulate a "service call", so students are provided with the same information that a technician would get from a homeowner or business owner, such as, "it whirs for a while, and it sounds like it lights, but then it clicks and shuts off, and we never get heat. After a while, it does the same thing all over again." The student must then figure out what is wrong and fix it. At Ferris, we teach students how to systematically troubleshoot the equipment, so that they identify the real problem and fix the right thing. This teaches them not to be "parts changers" – that is, someone that simply replaces parts until they fix the problem. Parts changers usually change the wrong part and the customer ends up paying more than they should, or the manufacturer replaces a part under warranty that isn't even bad.

The customer, the manufacturer, and the contractor appreciate the education that a technician receives from Ferris. Graduates are more productive because they know how to fix it right the first time. And because this saves time and money for everybody, they have a better chance of being promoted!

The bachelor degree program also involves lecture and lab, with a focus is on larger HVACR systems and engineering, and students study engineering. Labs consist of work with computer software, direct digital controls, and commissioning.

This program provides the theories necessary for the proper selection and energy efficient design of HVACR systems, but doesn’t stop there. Students take that knowledge and apply it to actual design situations, and accomplish in school exactly what an engineer on the job does.

At Ferris, there is a heavy emphasis on controls, but not until after students are have gained competent knowledge of systems and equipment. If the students do not understand what the systems are all about, they cannot control them.

Students start their education with a secondary equipment selection course, in which they learn about ducting and piping systems. The focus of the class is on selection of fans, pumps and valves based on proper sizing of pipes and ducts along with calculation of friction and dynamic pressure losses through the systems, fittings, valves, dampers, filters etc. Both hand calculation (slide rules/wheels) and computer software are utilized.

As part of this class, students commission both hydronic and air systems, utilizing the program’s energy lab equipment.

Students then move to load calculation and energy code, where hourly analysis of building load and corresponding energy consumption is completed, with heavy emphasis on applicable ASHRAE standards. Actual buildings are given as lab exercises, allowing students to input data based on working drawings, along with climate data specific to the region in which the building is located.

Primary equipment selection is a course all by itself where students learn to select equipment to match the building loads utilizing the same manufacturers' data used by engineers. An annual technical symposium organized by the students brings representatives to campus to speak about specific equipment or systems, such as centrifugal chillers or in-floor radiant heat.

Students learn control theory and application through two courses dedicated to just that. Terminology and theory is the focus of the first class, along with hands on application on a basic level. In the second class, students are given actual job specifications, and are required to program one of the 10 DDC workstations to simulate actual conditions.

As a culmination of their learning, students complete two “real world” courses. The first is a full-blown energy audit of a functional building within a one hour radius of campus. Students gather data on site and use software to analyze energy consumption and determine improvement. Findings are reported in a submittal that is presented to the building owner via a printed document and a live Powerpoint presentation.

The final class consists of a complete HVAC system design. Students are given complete working drawings and specifications, minus the mechanicals, for an actual building. Students must perform load calculations on the building, select the best system for the application and design the system from the ground up, including sizing of ducting and piping, pump, fan and valve selection, and selection of major components such as boilers, chillers and air handlers.

Please note: **The entire academic program is designed to prepare the student for the job.** Labs are set up to simulate real world conditions so that students learn how to service equipment as if they were working for a customer. Technical skills are paramount, but faculty also place emphasis on traits such as honesty and integrity, so that graduates are prepared not only technically but also professionally.

The experience of the faculty allow them to share on-the-job savvy through "war stories" – lessons learned on the job the hard way. In sharing their experiences, faculty help students learn to avoid mistakes made by others. The collective faculty wisdom is fertile ground for such lessons!

Students also learn other job skills at Ferris in a number of ways. We have a very active advisory committee that visits twice a year – once in October and once in April. During the fall meeting, committee members hold mock interviews, allowing students to practice interviewing skills in a non-threatening environment while picking up tips on appropriated attire and resume/cover letter do's and don’ts. At the spring meeting, committee members partake in a panel discussion and field questions from student about a variety of topics such as soft skills, the importance of being on time and attendance, etiquette and customer service. These two events give students access to the collective wisdom of 25 industry leaders from all sectors in the industry. Students also attend break out sessions at industry conventions and on-campus seminars to learn about business from a contractor's perspective. Lessons on topics such as the importance of salesmanship are learned from these seminars.

Housed on the north side of campus is the HVACR facility, The Granger Center for Construction and HVACR. The Granger Center is a 76,000 square foot building that houses several separate and distinct labs. We have a lab for oil heating and hydronics and a lab for gas heating and warm air, another lab for air conditioning. One for commercial refrigeration equipment. and one that we call the "fab lab", short for fabrication lab. The fab lab doubles as an electrical lab, and has sixteen stations, each equipped with electrical power and disconnects for various voltages, including:

single phase		three phase		
120	240	208	480	230 (delta)

Additionally, the building contains perhaps the most complete and up-to-date direct digital control (DDC) lab in the nation, with systems from four major manufacturers.

Another lab, the energy lab, consists of a working mechanical room and includes a 35 hp. boiler, 10 ton chiller, dual duct and VAV air handlers, and numerous terminal devices located throughout the building. The entire system is controlled by a new direct digital control system.

Finally, the Granger Center features four environmental chambers, each equipped with two HVAC systems. One is controlled by faculty to simulate heating and cooling conditions while the other is controlled by students to counter the loads imposed by the faculty system. These chambers provide the students with feedback and allow for control loop tuning.