

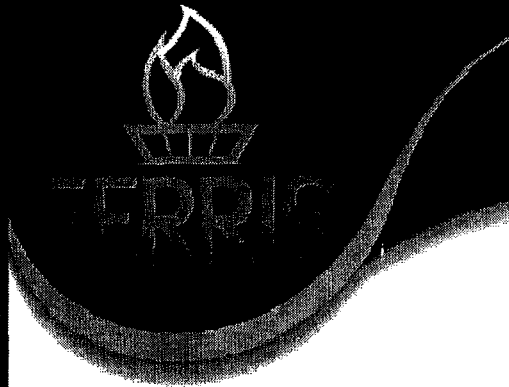
HVACR Programs

APRC 2006-2007

section 1 of 2

FERRIS STATE UNIVERSITY
COLLEGE of TECHNOLOGY

HVACR PROGRAMS



ACADEMIC PROGRAM REVIEW REPORT

AAS, HVACR TECHNOLOGY
BS, HVACR ENGINEERING TECHNOLOGY

2006

FERRIS STATE UNIVERSITY
COLLEGE of TECHNOLOGY

ACADEMIC PROGRAM REVIEW REPORT

AAS in HVACR TECHNOLOGY & BS in HVACR ENGINEERING TECHNOLOGY

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Manager HVACR Institutes
HVACR Programs

ACADEMIC PROGRAM REVIEW REPORT

HVACR AAS, HVACR BS

Table of Contents

Section	Tab
Introduction	1
Section 1: Program Overview	2
Section 2: Perceptions	3
(a) Graduate Surveys	4
(b) Employer Surveys	5
(c) Graduate Exit Surveys	6
(d) Current Student Surveys	7
(e) Faculty Surveys	8
(f) Advisory Committee Surveys	9
Section 3: Program Profile	10
Section 4: Facilities and Equipment	11
Section 5: Conclusions	12
Appendices	13
(a) Program Check sheets	A
(b) Administrative Program Review	B
(c) Labor Market Analysis	C

INTRODUCTION**Department Chair Perceptions:**

As I write these comments in August of 2006, the HVACR programs are at their strongest point since I arrived at Ferris in 1998. Enrollment is up, our financial position is strong, our new building is phenomenal, student accomplishments continue to gain nation-wide acclaim, and most important we have stability in our faculty with a superb team in place.

Since fall semester in 2001, HVACR has hired four adjuncts, one full time temporary faculty and seven new tenure track faculty. During the same period, eight full time tenured or tenure track faculty have left the employ of the university. For the first time since 2001, the HVACR department is starting the fall semester with the same team of faculty that finished up the academic year in May, bringing a welcome stability to a department. I use the word team when describing the current faculty because we truly function as a team in what I can only describe as a dream department. The current faculty and staff of the HVACR department are motivated and enthusiastic, each contributing unique skill and personality. The sum total results in a high level of energy and provides a chemistry that is a true joy to be a part of. With this group on board, I believe that the HVACR program is only beginning to excel.

For the first time ever, we have added a third section for HVAC 331, our entry class for junior year and the bachelor's program. At the same time, our associate degree program is at 94% capacity, and our online program has one section filled and another with eight students enrolled. Meanwhile, eight more application for the online program await my attention and associate degree applicants are still pending a decision from admissions.

The HVACR Institutes, under the management of Steve Eichenberg and with the customer service expertise of Craig Derby continue to increase revenue each year, providing the HVACR department with funding to supplement limited university allocations. Additionally, two federal earmarks totaling \$800,000 have allowed the department to develop an online program that is pioneering the delivery of technical curricula via the Internet. Finally, an endowment with assets near \$5 million provide reserve funding for further program development, enhancement and recruiting efforts.

Bachelor's degree students continue to earn top place finishes in the annual ASHRAE student competitions. With this year's 2nd place in the HVAC System Design and 3rd place in the HVAC System Selection, FSU students stretch their domination of the competition to nine years with nine 1st place, four 2nd place and two 3rd place finishes. While the other HVACR programs are watering down their curriculum, we are enhancing our technician program by incorporating larger and more complex commercial systems and equipment. Meanwhile, demand for both bachelor's degree and associate degree graduates has been strong throughout the slow economy and employers consistently tell us how pleased they are with Ferris grads.

In summary, as chair I couldn't be more pleased with the state of the HVACR department. Enrollment is up, funding is strong, faculty and staff have positive energy and graduates are in demand. With the work on the Granger Center behind us, the online program established and a strong faculty team in place, I feel as if we have arrived at an important juncture. We now have a rock solid foundation and can now focus our attention on enhancing our programs. I attribute our success to the hard work, dedication and enthusiasm of the faculty and staff. They are truly remarkable people. I look forward to seeing what they will accomplish in the coming years.

Mike Feutz
Chair, HVACR Department
Ferris State University



FERRIS STATE UNIVERSITY

DATE: August 18, 2006

TO: Doug Haneline, Chair, Academic Program Review Council

FROM: Tom Oldfield, Dean, College of Technology

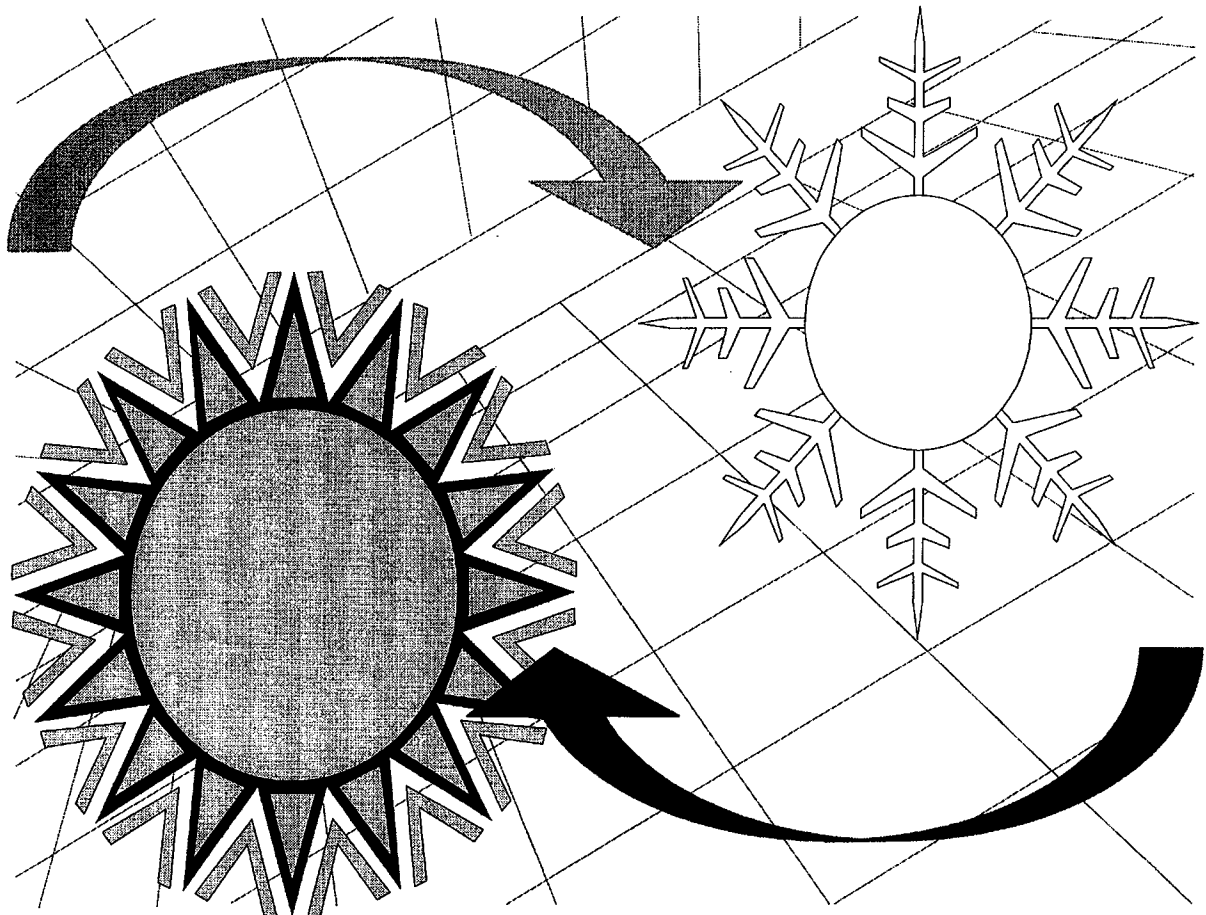
SUBJ: Analysis of Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) Program

Upon review of the Heating, Ventilation, Air Conditioning, Refrigeration Self-Study document, I make the following observations:

1. The program provides a comprehensive education in HVACR that prepares our graduates for the demands of today's HVACR industry. This is in keeping with the mission of Ferris State University.
2. The program faculty are enthusiastic and committed to providing a quality education to their students. They have demonstrated a team approach to all aspects of the program from updating and revision of the curriculum to developing recruiting strategies that have resulted in increased enrollments in the AAS and BS degrees. The faculty have also worked hard and overcome many obstacles to develop a quality online program that is meeting the needs of industry. The design of the program and the efforts of the faculty make the program transfer friendly which has been a priority of the Vice President and the President.
3. The quality of the program is demonstrated by the top place finishes of the bachelor degree students in the national American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) student competitions and the industry demand for our graduates.

In summary, I believe that the self-study is an accurate reflection of the Heating, Ventilation, Air Conditioning and Refrigeration program and will work with the program faculty as they move to take the program to the next level.

PROGRAM OVERVIEW
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY



A. PROGRAM MISSION & GOALS:**A.A.S. Program:**

The Ferris State University, HVACR Technology program has a sixty one year history of high quality technical career-oriented educational offerings that provide the State of Michigan and the nation with prepared HVACR technicians. The mission and goal of the program is to educate students for positions in field service, design, engineering laboratories and service technology at the upper level of the technological spectrum in the HVACR industry. Some of the goals of this program have changed slightly over time to keep up with a changing industry. The program works closely with an advisory board of active industry personnel to ensure goals meet the current needs of the industry.

The goals of the program have changed only slightly since the last program review to meet changing industry demands. The program is in complete compliance with the mission of the university with the students receiving a practical education that leads directly to employment any where in the world. The skills learned at Ferris prepare them to be immediately productive to their employers.

B.S. Program:

The Ferris State University, HVACR Engineering Technology program was conceived by the needs of industry in 1984. The mission of the program is to develop the professional skills and attitudes in students, necessary to measure, monitor, control and maintain HVACR systems at optimum performance.

This program has gone through some major changes since the last program review. In 2002, the B.S. Program was offered for the first time on-line. In an effort to reach a wider audience, this unique program is now available to persons unable to move to the Big Rapids area. Ferris will see the first graduates of this on-line program this spring! The program now has students from New York to California.

This program is also in complete compliance with the mission of the university with the students receiving a practical education that leads directly to excellent paying positions anywhere in the world. Again, the skills learned at Ferris prepare them to be immediately productive to their employers, often put in charge of new engineering graduates from other colleges and universities.

B. PROGRAM VISIBILITY & DISTINCTIVENESS:**A.A.S. Program:**

The associates degree program has modified it's curriculum through the years to stay in tune with the university's mission, including research with replacement (non CFC, ozone depleting) refrigerants and development and administration of nationally mandated refrigerant recovery certifications. This program has a 100% placement of it's graduates filling positions at the community, state and national level. Ferris is one of the primary sources of degreed HVACR technicians provided to the State of Michigan. The program also provides technical information and services to the industry on a continual basis, conducting technical seminars that attract participants from across the nation. Thirty percent of the graduates of this program go on into the Ferris HVACR Engineering Technology Program.

B. PROGRAM VISIBILITY & DISTINCTIVENESS - cont.:**A.A.S. Program:**

There are now over 250,000 HVACR technicians that have received their refrigerant recovery certification from Ferris. There are very few, if any locations in the Nation in the HVACR field that have not heard of Ferris. Just this year, the HVACR programs won the prestigious Jeff Forker Award for Excellence in Training given out by the National Air Conditioning Contractors of America (ACCA). ACCA is one of the key professional organizations in the HVACR field and the award is given for four key areas: Professionalism, professors work collaboratively to ensure that the curriculum is built on a solid foundation and supplemented in a cohesive manner. This results in students and alumni who are extremely knowledgeable in all aspects of HVACR. Trade involvement, faculty and students regularly attend ACCA sponsored events in order to increase their knowledge of cutting-edge technology in HVACR and host seminars for new products as well as existing products. Community Service, faculty and students are involved in Heat's On, a volunteer program that ensures low-income housing has adequate HVACR inspections and that systems operate reliably. Load calculation course students also conduct energy audits for local businesses and schools to educate the public about possible energy savings they can achieve, crucial with the current state of energy costs. Creativity, the Granger Center for Construction and HVACR building which is state-of-the-art, contains classrooms, labs and lecture areas that are consistently updated with the most current technologies to enhance the students learning experience.

There are a number of other two year programs in Michigan but none have the reputation, facilities and faculty that Ferris has. Competition for students in the two year program has become stiffer in recent years and many of the other two year programs are considerably less expensive to attend. Now that the Ferris HVACR Technology Program has a new building, a stable, knowledgeable staff and an aggressive marketing campaign, the enrollment for the program next fall is over the limit. Continued marketing of the quality and national status of the Ferris HVACR Technology Program is key to continued future success.

B.S. Program:

This program is only one of two programs in the nation providing a ladder baccalaureate program for associate degree graduates in the HVACR field, emphasizing the HVACR applied engineering. Graduates from this program will serve business and industry in the community, State of Michigan and the nation in the following areas: perform audits and complete energy / economic building and system analysis, to identify, recognize and recommend solutions to problems encountered in HVACR systems found in commercial and industrial buildings, to test adjust and balance mechanical systems and controls for optimum comfort and economy, to optimize building and system operation through the utilization of digital controls and state of the art facility management systems. This degree fills the gap between the technician and the engineer and has gained international recognition. Since 1997, the students from this program have competed in the ASHRAE (American Society of Heating Refrigerating and Air Conditioning Engineers) international HVACR design and system selection competition. The competition is from Engineering schools from around the world. The results of the Ferris HVACR students are as follows:

B. PROGRAM VISIBILITY & DISTINCTIVENESS - cont.:**B.S. Program:**

- 1997: ASHRAE Design competition - third place
- 1998: ASHRAE Design competition - first place
- 1999: ASHRAE Design competition - second place
- 2000: ASHRAE Design competition - first place
- 2000: ASHRAE System selection competition - first place
- 2001: ASHRAE Design competition - first place
- 2001: ASHRAE System selection competition - first place
- 2002: ASHRAE Design competition - first place
- 2002: ASHRAE System selection competition - first place
- 2003: ASHRAE Design competition - first place
- 2003: ASHRAE System selection competition - second place
- 2004: ASHRAE Design competition - first place
- 2004: ASHRAE System selection competition - second place
- 2005: ASHRAE System selection competition - third place
- 2006: ASHRAE Design competition - second place
- 2006: ASHRAE System selection competition - third place

The Ferris HVACR students have dominated this international competition since they started competing. In 9 years of competition, the Ferris HVACR students have taken 9 first places, 3 second places and 2 third place finishes in international competition. Over 90 Ferris graduates have tasted victory at the international level and all graduates are required to participate. Their success has brought international recognition to Ferris State University and has given the program a well respected name in the field of HVACR.

The program has several other unique relationships with community, state and nation. The students are required to do a summer internship between the junior and senior year. During the internship, the students must apply the knowledge acquired during the junior year. This gives the students a chance to apply skills learned at Ferris in a real work setting. The internship is also a winning relationship for the companies that hire the interns for the summer. Companies not only get a productive employee for the summer but a potential future employee after graduation. A large number of graduates return to work at the location that they interned. There are currently internship sites across the nation. Another unique relationship that the BS program has with the community and state is the Energy Audit course. During the fall semester of the senior year, students take HVAC 451, which requires them to do a comprehensive energy audit on a real building for a customer. The students collect and analyze data from the building and put together a written report outlining the findings. The students must also give a presentation to the owner regarding the findings of the audit. This is a win-win situation for student and building owner. The owner gets valuable information on how to better use resources and the students get valuable written and verbal communication practice.

The visibility and distinctiveness has now increased with the ability for students across the nation to get this degree over the internet. As stated earlier, the on-line program has students from New York to California.

C. PROGRAM RELEVANCE:**A.A.S. Program - B.S. Program:**

There is no aspect of public life that does not use the graduates from the HVACR Programs. All facilities demand human comfort and indoor air quality. Inadequate human comfort and indoor air quality translate into greater cost of operation through loss of productivity. HVACR systems must also function at maximum energy efficiency. Poor efficiency also translates into increased cost of operation through wasted resources. Refrigeration systems are used in manufacturing processes, perishable good processing, storage and transport. HVACR programs are critical to maintaining the high quality of life for those citizens in Michigan and the nation. Increased productivity and energy efficiency means that there is more capital available to use on other projects.

The future expectations for both the HVACR Technology graduates and HVACR Engineering Technology graduates look excellent. According to the graduate, employer, advisory board and labor market surveys, there is an increasing demand for the graduates in both programs. Note: Attached in the appendix is a labor market analysis from the U.S. Department of Labor. HVACR systems are becoming increasingly complicated and require highly trained individuals to work with them. The B.S. program has shown a consistent enrollment and is usually at maximum capacity. Enrollment as of this next year is showing a turn around for the A.A.S. degree, due to active recruiting and the attraction of a state-of-the-art building. The continued demand from industry and the high salary and excellent placement will continue to attract students to the program. It should be also noted that HVACR jobs are more insulated from outsourcing to other countries. As long as there are people working in building and living in homes, there will be HVACR jobs.

The HVACR program has done very well keeping up with the changing needs of industry. This has been achieved by our students and faculty actively taking part in the HVACR field's professional organizations, taking part in international competitions with other HVACR educational institutions and having a very active advisory board. The awards for excellence from our industry and positive feedback from employers and graduates are indicators that the program is keeping pace with a rapidly changing industry.

D. PROGRAM VALUE:

The benefits to the University by having these programs are many. Very few programs have given the University the high name recognition at the state, national and international level as the HVACR programs. From all the international competition wins, working with the EPA and certifying hundreds of thousands of HVACR technicians, receiving national acclaim for excellence of education in the industry and having a nationally recognized faculty (Note: one faculty member is a co-author of the main textbook used in our field), Ferris State University is a nationally and internationally recognized name in our field and a name that symbolizes quality and excellence. The A.A.S. program also prepares students to continue on to other 4 year programs offered at Ferris. Typically 30 - 40% of the 2 year graduates move on into the 4 year program creating further revenue and recognition to the University.

D. PROGRAM VALUE - cont.:

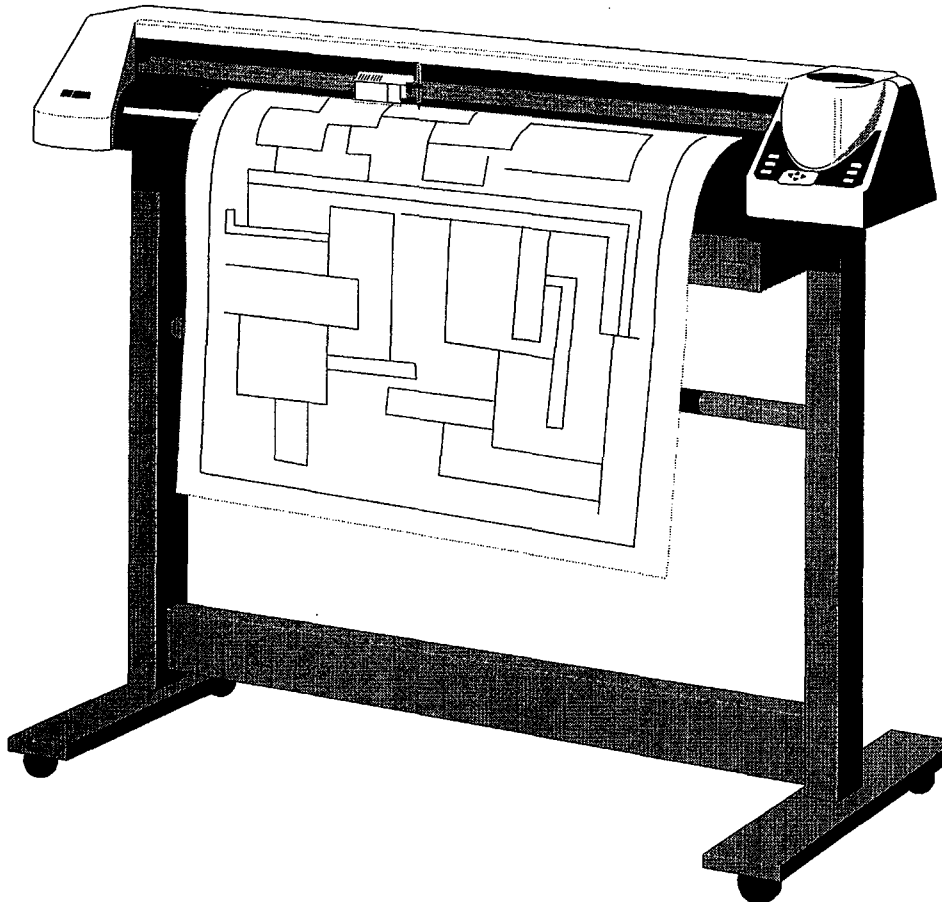
Ferris now has a state-of-the-art building for the students in HVACR to learn in. As a result of the last program review, the Granger Center has been built with the latest technology in not only the laboratory areas but also in the classrooms. The building was built with the intent that the building itself would be used as a training tool. All ductwork, piping and equipment are exposed, labeled and color coded so they are readily available for use in instruction. There is no other facility in the nation that compares to the Granger Center for teaching HVACR.

With in the last year, the HVACR programs have a stable staff of professionals. Each faculty member in the HVACR program has years of experience in the field and experience in multiple areas of discipline. The students work with faculty members that are published authors, industry liaisons, industry review specialists, industry technical trainers, business owner and operators and active members of all the professional organizations in our field. The students not only receive quality education within the technical areas of the field but practical working and applied knowledge of the field. This enhances the students ability to get quality jobs and also gives the potential employer an employee that is fully productive day one on the job. The graduate surveys have described over and over the value of being productive from the very first day to themselves and their employer.

The most valuable asset to the employer has already been stated, a quality employee that is productive from the first day on the job. Time is money and it is critical for employers that the graduates can carry a full work load with minimum supervision from the start. The amount of time it takes a typical Mechanical Engineering graduate to be productive is about 2 years of additional on the job training. Again, our graduates can produce from the start and is the key reason that the program has a 100% placement of all graduates at well paying salaries. Value to the employer is derived from feedback on surveys of employers, graduates and advisory board members. It also is displayed at the number of offers that each graduate gets and the number of return employers such as Trane, Carrier, Johnson Controls, Siemens, etc. that hire numerous graduates year after year.

The programs, faculty and facilities have benefited entities external to the university in many different ways. The faculty are all active in professional organization both in our field and related fields. The organizations include: Air Conditioning Contractors of America (ACCA), American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE), Mechanical Service Contractors of America (MSCA). Positions within these organization range from student advisors, regional vice presidents and document review panels members. The Ferris faculty are impacting the vary information that not only our students are using, but students from all other HVACR programs and current professionals are using. The facility is also being used by professional organizations and industry for meetings, seminars and training. The Granger Center has one of the only major HVACR control training labs in the state of Michigan.

SURVEYS OVERVIEW
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY



SURVEYS OVERVIEW

As specified by the Academic Program Review Guidelines, six surveys are required in this section. They include:

1. Graduate follow-up survey
2. Employer follow-up survey
3. Graduate exit survey
4. Current student program evaluation
5. Faculty perceptions
6. Advisory committee

The tabulated results of each survey are attached. As there were an extremely large number of surveys (approximately 200), it was decided that it would not be appropriate to include all individual documents. Instead, the survey instrument and summary results are included in this report. The number of surveys returned and analyzed were as follows:

1. Graduate follow-up survey	52
2. Employer follow-up survey	20
3. Graduate exit survey	25
4. Current student program evaluation	92
5. Faculty perceptions	7
6. Advisory committee	12

All of the advisory committee members are also employers of our graduates which reinforces the perceptions in the employer survey.

SURVEYS ANALYSIS

AAS Graduate Survey: General curriculum questions showed that graduates felt that in the area of preparation, in all areas that they were prepared to well prepared. Averages in these areas were approx. 4.0. In terms of relevance, the graduates felt that all but one course area was relevant, and that area was oil. This could reflect where the graduates are getting jobs. The main area of the country that uses fuel oil is in the north east US. The rest of the US uses less fuel oil for heating and the course is less relevant to those graduates. Students also responded highly to wanting more technical content in the 2-year program. The students were comfortable with the level of non-technical courses in the curriculum. Daily activities show a wide range of job types from estimating/design to field and shop service. Starting salaries ranged from (\$21-\$25) to (\$46-\$50), this also depended on what year the students graduated. Current salaries ranged from (\$26-\$30) to (>\$60), this also depended on the year of graduation and the job responsibilities.

SURVEYS ANALYSIS

- AAS Graduate Survey:** General curriculum questions showed that graduates felt that in the area of preparation, in all areas that they were prepared to well prepared. Averages in these areas were approx. 4.0. In terms of relevance, the graduates felt that all but one course area was relevant, and that area was oil. This could reflect where the graduates are getting jobs. The main area of the country that uses fuel oil is in the north east US. The rest of the US uses less fuel oil for heating and the course is less relevant to those graduates. Students also responded highly to wanting more technical content in the 2-year program. The students were comfortable with the level of non-technical courses in the curriculum. Daily activities show a wide range of job types from estimating/design to field and shop service. Starting salaries ranged from (\$21-\$25) to (\$46-\$50), this also depended on what year the students graduated. Current salaries ranged from (\$26-\$30) to (>\$60), this also depended on the year of graduation and the job responsibilities.
- BS Graduate Survey:** General curriculum questions showed that graduates agree with all of the questions asked. The average on all questions was 4.06 on a 5 point scale. The lowest area at a 3.22 was the ability to deal with job specifications, although this was still slightly above average. The students felt good about the technical content of the curriculum but also voiced high marks on written and verbal preparation, an area that was not as strong in the past. 74% of the graduates responded that there was a need for more graduates in this program and 63% indicated that there should be more faculty. The range of job responsibilities was wider than the 2-year program from Education to Company ownership. The highest area of responsibility was marketing and sales, which the students requested more information in this area. The range of starting salaries was (\$31-\$35) to (>\$50), this was dependant on the year of graduation of the student. The current salary range was (\$36-40) to (>\$70) with 40% of the graduates reporting the >\$70 figure. This was also dependant on date of graduation and type of responsibility. This also shows the high quality of living the students can achieve with this degree.
- Employer Survey:** The average for all questions was 3.67 which corresponded to acceptable to good. The highest areas were in ability to work as a team and ability to work with a persons of diverse backgrounds. All HVACR skills were ranked about the same, in the high 3's. The lowest score was 3.13 or the ability to troubleshoot complex or multiply HVACR systems. This is an area that is currently being ramped up in the 234 course. This was noted in a previous advisory board meeting and was already instituted by the time of this survey. Comments ranged from the need for more commercial service techs. to adding internships to the 2-year program. Most of the comments and concerns have been and are being worked on by the department with the help of the advisory board.

SURVEYS ANALYSIS

Graduate Exit Survey:

Most graduates referred to the current student survey given within a close time period for most comments. Students are required to be part of at least one professional organization, especially the seniors. Students are happy with the curriculum and advising. Students were very favorable with the new facility which has enhance the learning and helped with recruiting new students. The students only concern was the limited access to computer labs after hours due to the need for remote access for on-line students. This is a problem that is currently being worked on by the program and University. Most students have multiple job offers across the US. No students responding noted no job offer. Most jobs were with global companies such as Trane, Siemans, Johnson Controls, Honeywell and the US government.

Current Student Survey:

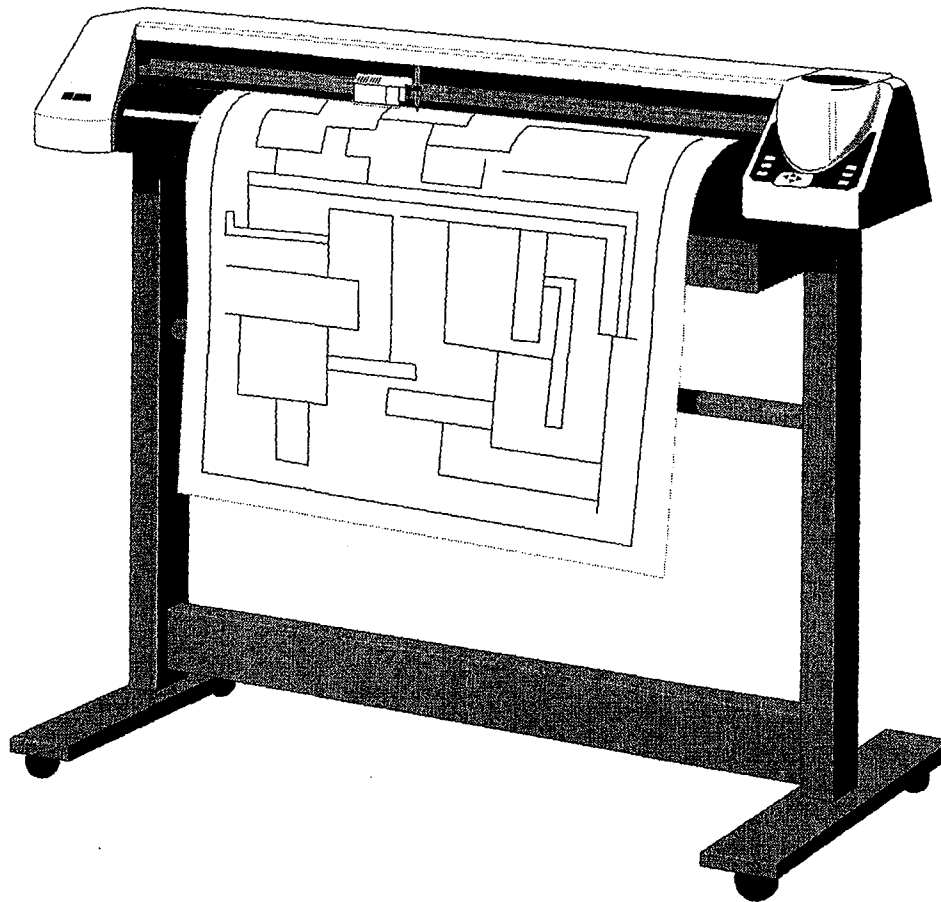
For all questions, the average answer was 4.31, which is between agree and strongly agree. The students gave consistent grades to curriculum, building, computer resources, advising. The lowest average was 3.69 for availability of tutors. This is difficult at time in the core technical courses. The program tries to pair up students that need help with students that a good understanding of the topic. The professors also try to add time before and after class to help with this, but is a little more difficult with the current overload situation. Student comments were mostly positive. High marks were given to the facility, curriculum and faculty in general. Some concern was voiced on the turn over of faculty and dealing with new faculty every year. The program now has a stable faculty again. The other concern was the computer availability voiced in the graduate exit survey above.

Faculty Perception Survey: Faculty average response to the general questions was 3.67, between neutral and agree. The lowest mark was in the curriculum review process at 2.14. The time and the process was sited as a concern in this area. The highest score was given to the facility and department chair at 4.86 and 4.43 respectively. Positive features were stated as facility, co-workers, working with students. Negative aspects ranged from computer support, lack of leadership from deans office (due to no official dean but is now successfully corrected), course overloads, past enrollment numbers (also now improved due to success of marketing person, stable staff and state of the art facility.) The new building was the most significant accomplishment along with the continuing success of the students in the ASHRAE design competition. The mentoring process with new professors needs some help, but a majority of the faculty is relatively new and all are under overload situations.

**Advisory Perceptions:**

The advisory responses to all questions averaged at 3.86 between neutral and agree. The lowest ave. question was the program has an adequate number of graduates at 2.6. This looks better considering the current enrollment increase. The highest was would hire graduate and the adequacy of the facilities and faculty. Overall comments were to help with getting the word out to help with enrollment.

GRADUATE FOLLOW-UP SURVEY
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY





FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY
CONSTRUCTION DEPARTMENT
HVACR PROGRAMS

March 14, 2006

Dear Ferris AAS HVACR Graduate:

**Ferris State University Could Enhance the HVACR Programs!
We Need YOUR Input!**

The University's Academic Program review Committee is reviewing our HVACR Programs. As a graduate of Ferris State University HVACR program, we need your viewpoint! The results of this review can range from increasing our programs' resources, to placing the program in a probationary status. This process requires your **input!**

The value of your diploma from FSU varies with time and is determined by the reputation of the HVACR Programs. You can help us to enhance the value of your degree by simply completing and returning the enclosed survey by **March 24, 2006.**

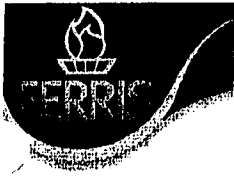
Note: The result of the last program review in 2000 resulted in a **new building for the HVACR Programs**, your input is taken very seriously by the university!

In advance, we thank you for your quick response.

Sincerely,

Michael J. Korcal
Assistant Professor
HVACR Programs

Enclosed: AAS Graduate Survey



FERRIS STATE UNIVERSITY
 HVACR Program Review
 Graduate Perception of the HVACR
 Programs

**AAS GRADUATE
 SURVEY**

Please complete the following survey, place in the self address envelope and mail (no postage needed) by February 28, 2006.

A. Education:

Name: _____ Check the degree(s) earned at Ferris below:
 HVACR AAS Year _____ HVACR BS Year _____ Other _____

B. Current Location Information:

Home address (if it is incorrect) _____
 Home Phone: _____ Work Phone: _____
 Company Name: _____
 Position Title: _____
 Company Address: _____
 e-mail address: _____

C. Program Enhancements:

- A. Is there an industry need to increase the number of students? Yes No
 B. When you attended, were the class sizes too large (number of students per faculty)? Yes No
 C. When was the last time you visited the HVAC building? _____

D. Initial Salary Range: (mark the box corresponding to your initial salary range)

- Below \$20k \$26k - \$30k \$36k - \$40k \$45k - \$50k
 \$20 - \$25k \$31k - \$35k \$41k - \$45k Above \$50k

E. Current Salary Range:

- Below \$25k \$31k - \$35k \$41k - \$45k \$51k - \$60k
 \$25 - \$30k \$36k - \$40k \$46k - \$50k Above \$60k

F. Career Avenue Which Most Closely Describes Your Daily Activities (check one):

- Estimating/Design Marketing/Sales Field/Shop Service
 Company Management/Ownership Lab Technician Application Engineer
 Controls Other (Describe)

G. Scientific and Technical topics for Your Career:

Please circle your choices in each of the two columns to the right of each topic

Relevance: Under this column, rate the relevance of the topic to your career using, 5 = Very important, 4 = Important, 3 = Relevant, 2 = Not Very Important, 1 = Unimportant

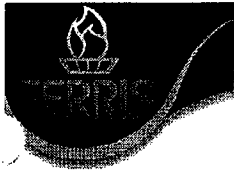
Preparation: Under this column, rate the preparation that you received from your HVACR program using, 5 = Very Well Prepared, 4 = Well Prepared, 3 = Fairly Prepared, 2 = Barely Prepared, 1 = Poorly Prepared.

<u>Course Topic</u>	<u>Relevance</u>					<u>Preparation</u>				
Basic Refrigeration	5	4	3	2	1	5	4	3	2	1
Electrical	5	4	3	2	1	5	4	3	2	1
Commercial Refrigeration	5	4	3	2	1	5	4	3	2	1
Commercial Air Conditioning	5	4	3	2	1	5	4	3	2	1
HVAC Design	5	4	3	2	1	5	4	3	2	1
Oil	5	4	3	2	1	5	4	3	2	1
Gas	5	4	3	2	1	5	4	3	2	1
Controls	5	4	3	2	1	5	4	3	2	1
Psychrometrics	5	4	3	2	1	5	4	3	2	1
Math	5	4	3	2	1	5	4	3	2	1
English	5	4	3	2	1	5	4	3	2	1
Computer Skills	5	4	3	2	1	5	4	3	2	1
Communication Skills	5	4	3	2	1	5	4	3	2	1

H. Course Content and Mix

- | | | |
|--|-----|----|
| A. Does the program need more technical content? | Yes | No |
| B. Does the program need more social awareness courses? | Yes | No |
| C. Does the program need more cultural enrichment courses? | Yes | No |
| D. Does the program need more communication courses? | Yes | No |
| E. Does the program need more writing intensive courses? | Yes | No |

Please use the area below to add any additional comments:



FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY
CONSTRUCTION DEPARTMENT
HVACR PROGRAMS

March 14, 2006

Dear Ferris BS HVACR Graduate:

Ferris State University Could Enhance the HVACR Programs!
We Need YOUR Input!

The University's Academic Program review Committee is reviewing our HVACR Programs. As a graduate of Ferris State University HVACR program, we need your viewpoint! The results of this review can range from increasing our programs' resources, to placing the program in a probationary status. This process requires your **input!**

The value of your diploma from FSU varies with time and is determined by the reputation of the HVACR Programs. You can help us to enhance the value of your degree by simply completing and returning the enclosed survey by **March 24, 2006.**

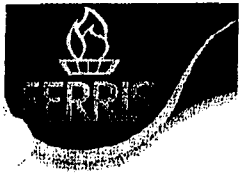
Note: The result of the last program review in 2000 resulted in a **new building for the HVACR Programs**, your input is taken very seriously by the university!

In advance, we thank you for your quick response.

Sincerely,

Michael J. Korcal
Assistant Professor
HVACR Programs

Enclosed: BS Graduate Survey



FERRIS STATE UNIVERSITY
 HVACR Program Review
 Graduate Perception of the HVACR
 Programs

**BS GRADUATE
 SURVEY**

Please complete the following survey, place in the self address envelope and mail (no postage needed) by February 28, 2006.

A. Education:

Name: _____ Check the degree(s) earned at Ferris below:
 HVACR AAS Year _____ HVACR BS Year _____ Other _____

B. Current Location Information:

Home address (if it is incorrect) _____
 Home Phone: _____ Work Phone: _____
 Company Name: _____
 Position Title: _____
 Company Address: _____
 e-mail address: _____

C. Program Enhancements:

A. Is there an industry need to increase the number of graduates? Yes No
 B. Should the number of faculty per students be increased? Yes No
 C. When was the last time you visited the HVACR building? _____

D. Initial Salary Range: (mark the box corresponding to your initial salary range)

Below \$20k \$26k - \$30k \$36k - \$40k \$45k - \$50k
 \$20 - \$25k \$31k - \$35k \$41k - \$45k Above \$50k

E. Current Salary Range:

Below \$30k \$36k - \$40k \$46k - \$50k \$61k - \$70k
 \$31 - \$35k \$41k - \$45k \$51k - \$60k Above \$70k

F. Career Avenue Which Most Closely Describes Your Daily Activities (check one):

Bidding/Estimating Marketing/Sales HVACR Design
 Company Management/Ownership Performance Control Engineering
 Control Application Engineer Other (Describe) _____

Respond to the following statements:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
	SA	A	N	D	SD	NA
1 The HVAC design courses are important to your job	5	4	3	2	1	NA
2 You were well prepared in the area of HVACR Design	5	4	3	2	1	NA
3 The use of CAD is important to your job	5	4	3	2	1	NA
4 You were well prepared in the area of CAD	5	4	3	2	1	NA
5 The ability to do a load calculation is important to your job	5	4	3	2	1	NA
6 You were well prepared in the area of load calculations	5	4	3	2	1	NA
7 Equipment selection is an important part of your job	5	4	3	2	1	NA
8 You were well prepared in the area of equipment selection	5	4	3	2	1	NA
9 Control theory is an important part of your job	5	4	3	2	1	NA
10 You were well prepared in the area of control theory	5	4	3	2	1	NA
11 Control application is an important part of your job	5	4	3	2	1	NA
12 You were well prepared in the area of control application	5	4	3	2	1	NA
13 The ability to read a blue print is an important part of your job	5	4	3	2	1	NA
14 You were well prepared in the area of blue print reading	5	4	3	2	1	NA
15 The ability to understand job specs is an important part of your job	5	4	3	2	1	NA
16 You were well prepared to deal with job specifications	5	4	3	2	1	NA
17 Math is an important part of your job	5	4	3	2	1	NA
18 You were well prepared in the area of math	5	4	3	2	1	NA
19 Written communication skills is an important part of your job	5	4	3	2	1	NA
20 You were well prepared in the area of written communications	5	4	3	2	1	NA
21 Verbal communication skills is an important part of your job	5	4	3	2	1	NA
22 You were well prepared in the area of verbal communication	5	4	3	2	1	NA
23 The ability to troubleshoot is an important part of your job	5	4	3	2	1	NA
24 You were well prepared in the area of troubleshooting	5	4	3	2	1	NA
25 Energy audits are an important part of your job	5	4	3	2	1	NA
26 You were well prepared to do an energy audit	5	4	3	2	1	NA
27 The ability to commission an HVAC system is important to your job	5	4	3	2	1	NA
28 You were well prepared to commission HVAC equipment	5	4	3	2	1	NA
29 Overall, you were well prepared for the job that you are doing	5	4	3	2	1	NA
30 The advising was adequate in the HVAC program	5	4	3	2	1	NA
31 The placement services were adequate at Ferris	5	4	3	2	1	NA
32 The mix of technical / social & cultural courses were adequate	5	4	3	2	1	NA
33 You had no problem finding a job after graduation	5	4	3	2	1	NA
34 You were able to be productive in your job right out of school	5	4	3	2	1	NA
35 There is a high demand for the HVACR - 4 year graduate	5	4	3	2	1	NA

AAS GRADUATE PERCEPTION SURVEY RESULTS

C. Program Enhancements:	<u>YES</u>	<u>NO</u>
A. Is there an industry need to increase the number of graduates?	56.00%	44.00%
B. Should the number of faculty per students be increased?	80.00%	20.00%

Starting Salary		Current Salary		Daily Activities & Responsibilities	
D.	%	E.	%	F.	%
\$21-\$25	8%	\$21-\$25	0%	Estimating/Design	19%
\$26-\$30	24%	\$26-\$30	8%	Company Management/Ownership	3%
\$31-\$35	12%	\$31-\$35	8%	Controls	13%
\$36-\$40	16%	\$36-\$40	4%	Marketing/Sales	16%
\$41-\$45	28%	\$41-\$45	24%	Lab Technition	0%
\$46-\$50	12%	\$46-\$50	4%	Field/Shop Service	25%
\$51-\$55	0%	\$51-\$55	0%	Application Engineer	6%
\$56-\$60	0%	\$56-\$60	8%	Install	3%
>\$60	0%	>\$60	44%	Project Management	6%
				HVACR Engineering	6%
				Plant Operation	3%

G. Question	Relavance (Ave.)	Preparation (Ave.)
Basic Refrigeration	3.96	3.96
Electrical	4.32	3.84
Commercial Refrigeration	3.52	3.52
Commercial AC	4.24	3.84
HVAC Design	3.80	3.68
Oil	2.40	3.40
Gas	3.96	3.96
Controls	4.16	3.64
Psychrometrics	3.32	3.64
Math	4.00	4.04
English	3.64	4.04
Computer skills	3.88	3.88
Communication skills	4.52	3.64

Results of relevance vs. preparation in subject areas:

Relevance: 1 = Unimportant - 5 = Very Important
Preparation: 1 = Poorly Prepared - 5 = Well Prepared

H.	<u>YES</u>	<u>NO</u>
A. Does the program need more technical content:	72%	28%
B. Does the program need more social awareness courses:	20%	80%
C. Does the program need more cultural enrichment courses:	12%	88%
D. Does the program need more communication courses:	44%	56%
E. Does the program need more writing intensive courses:	28%	72%

- When I entered HVAC 101 I knew nothing about mechanical, electrical, etc. I wish I would have been 1st instructed at this level. I would have understood the basics much better when instructors assume the students know nothing about HVAC. I still don't know electrical and didn't understand the very first electrical diagram I did.
- Learned more in six months in the field, than at school. First year with a particular instructor was a waste of money as an instructor. Work with many current students and graduates. Need a 2 year tech track and a 4 year tech track. Too many kids know theory but not how to run a meter or wrenches.
- While I attended the structure was pretty good. The social awareness and cultural enrichment classes were OK, but a HVACR speech class (how to give a bill) and reasons for doing things like maintenance and various specialized systems (UV, lights, dehumidification, humidification, zoning, etc.) would be beneficial.
- I hope you got rid of all the temp-instructors for HVACR, I learned nothing in oil's—could use more control training! Troubleshooting. Psychrometrics do not play a roll in anything I have encountered in the past 5 years in the field. A past refrigeration instructor was a good instructor but he focused to much on the back ground he was from the design area, I feel as though his classes should have focused more on refrigeration cycle and troubleshooting.
- Scientific and technical understanding is covered very well at Ferris. An understanding of the real world technical service should be covered a bit more. I really enjoyed my time at Ferris and would like to return someday to get my BS degree.
- The program needs more business courses, CAD courses, math courses. The program needs to step it up, companies view graduates as solutions. Graduates are not prepared to solve many problems out there. Most if not all HVAC BS or ASS graduates would fumble through a basic thermodynamics book. The point is that most graduates fail to recognize/memorize basic thermodynamic equations directly related to what we do day in and day out. It is not OK to not understand what every equation in the ASHRAE handbooks. I was content with my instructors and our director. I was satisfied with my education.
- I would recommend and wished I would have had an assignment on a clean and check or routine service, because that's how I see everybody starting out. More how to clean burners and work on older furnace models.
- The need for more graduates in the state of Michigan does not seem required at this time. If students are willing to work outside the state they would be warmly welcomed. While speaking to some of my classmates from my post graduate training course, they stated their markets are booming with business.
- Do not cut any technical classes it is what sets Ferris grad apart from the rest of the pack. I have gotten job interviews based on just the fact that I was a Ferris grad.
- A course that specifically trains project managers for mechanical contractors. Both the HVACR and the COMM that I had were wonderful but I would have liked to see more involvement with the MCAA. This I feel would better train future mechanical project managers.
- The AAS program needs to have more “real life” troubleshooting involved in lab time. Show students methodical ways to go about it. The BS degree classes were excellent. The controls classes prepared me very well. I was able to be productive almost immediately and before my peers. We had experience with JCI at Ferris, this should be expanded to include Siemens, Honeywell, etc.
- The background that I received from FSU could not be matched by any other college grad entering this industry. I was able to produce for my company right out of the gate. Thank you!

BS GRADUATE PERCEPTION SURVEY RESULTS

Question	Average
1. The HVAC design courses are important to your job:	4.48
2. You were well prepared in the area of HVACR Design:	4.22
3. The use of CAD is important to your job:	3.61
4. You were well prepared in the area of CAD:	3.41
5. The ability to do a load calculation is important to your job:	3.63
6. You were well prepared in the area of load calculations:	3.81
7. Equipment selection is an important part of your job:	3.96
8. You were well prepared in the area of equipment selection:	3.89
9. Control theory is an important part of your job:	4.22
10. You were well prepared in the area of control theory:	4.15
11. Control application is an important part of your job:	4.27
12. You were well prepared in the area of control application:	4.08
13. The ability to read a blue print is an important part of your job:	4.63
14. You were well prepared in the area of blue print reading:	3.67
15. The ability to understand job specs is an important part of your job:	4.78
16. You were well prepared to deal with job specifications:	3.22
17. Math is an important part of your job:	4.22
18. You were well prepared in the area of math:	4.15
19. Written communication skills is an important part of your job:	4.52
20. You were well prepared in the area of written communications:	3.93
21. Verbal communication skills is an important part of your job:	4.89
22. You were well prepared in the area of verbal communications:	4.04
23. The ability to troubleshoot is an important part of your job:	4.41
24. You were well prepared in the area of troubleshooting:	4.00
25. Energy audits are an important part of your job:	3.50
26. You were well prepared to do an energy audit:	4.08
27. The ability to commission an HVAC system is important to your job:	3.96
28. You were well prepared to commission HVAC equipment:	3.76
29. Overall, you were well prepared for the job that your are doing:	4.22
30. The advising was adequate in the HVAC program:	3.96
31. The placement services were adequate at Ferris:	3.83
32. The mix of technical / social and cultural courses were adequate:	3.62
33. You had no problem finding a job after graduation:	4.48
34. You were able to be productive in your job right out of school:	4.30
35. There is a high demand for the HVACR - 4 year graduate:	4.30
Overall Average for Questions 1 - 35	4.06

C. Program Enhancements:	YES	NO
A. Is there an industry need to increase the number of graduates?	74%	26%
B. Should the number of faculty per students be increased?	63%	37%

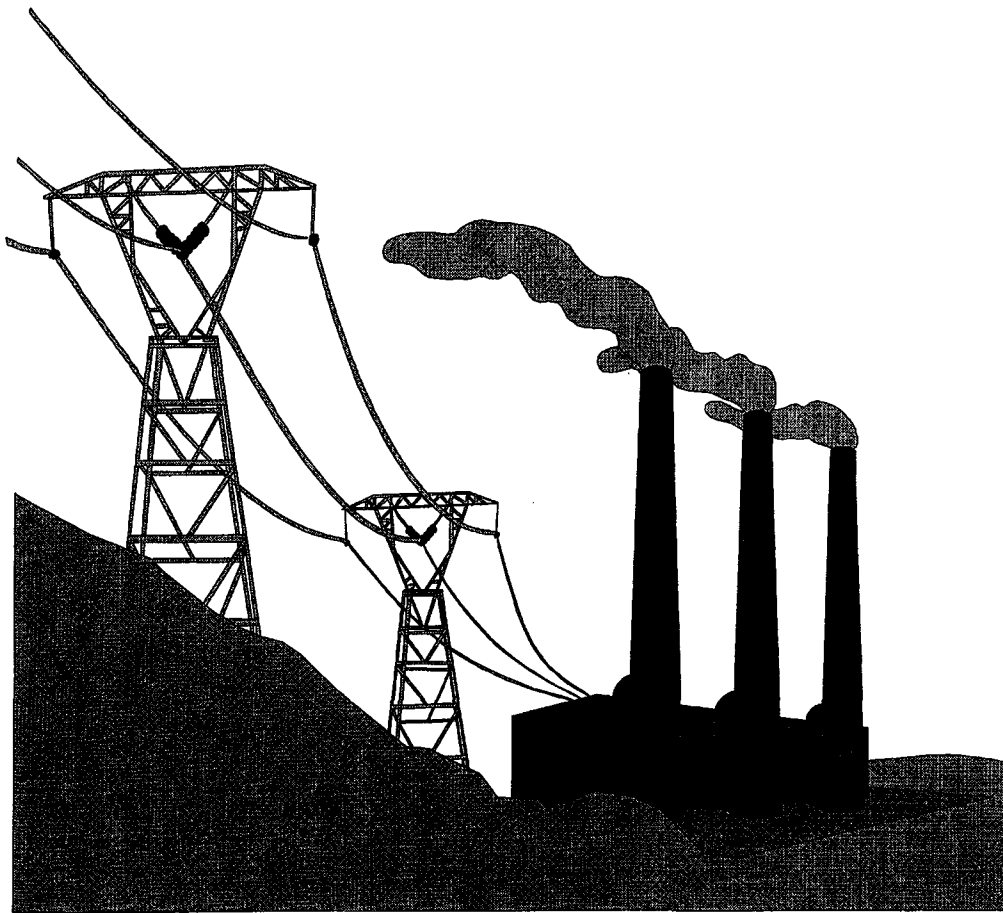
BS GRADUATE PERCEPTION SURVEY RESULTS - Cont.

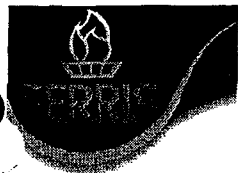
Starting Salary		Current Salary		Daily Activities & Responsibilities	
D.	%	E.	%	F.	%
< \$20	0%	< \$30	0%	Bidding / Estimating	13%
\$20-\$25	0%	\$30-\$35	0%	Company Management / Ownership	6%
\$26-\$30	0%	\$36-\$40	2%	Control Application Engineer	9%
\$31-\$35	11%	\$41-\$45	0%	Marketing / Sales	25%
\$36-\$40	33%	\$46-\$50	3%	Performance	6%
\$41-\$45	33%	\$51-\$60	30%	HVAC Design	13%
\$46-\$50	7%	\$61-\$70	11%	Control Engineer	16%
>\$50	15%	>\$70	41%	Install / Commissioning	3%
				Project Management	6%
				Education	3%

- It is important to maintain and continue good marketing strategies to increase enrollment in the HVAC program. I feel that emphasis should be placed on filling more positions in the consulting engineering field, both for internships and post graduate placement. There is a real need in this field for competent, well skilled professionals who have a basic understanding of HVAC applications which this curriculum can offer.
- Moving the program toward being accredited would be great. Getting a PE is tough after Ferris. Fundamentals of HVAC is one of the most important areas! I always recommend FSU-HVAC to anyone looking for employees.
- The HVACR BS Program provided several unique advantages for me in my current employment. The control logic, equipment selection, heat load calculations and the classtime spent in the field were very helpful. If I were to improve areas, it would include more written communication skills. Letters and formal documents. I would also include some elements of the construction management program so the graduate has an understanding of specifications and how the engineers documents impact construction. I believe the instructors and training materials are excellent. I stress that FSU keep the technology up to date with this fast changing industry. An area of improvement I would like to see is the placement program. Although I was part of a night program which is no longer intact. We felt the placement department paid very little attention to our group. It was disturbing in light that our group had placed 1st in the ASHRAE international design competition. I filled out the paperwork and it was nearly a year before anyone approached me. By that time I had made other arrangements. I have heard my employers state that they are finding very good people in the field, who, with the technical training, make some of the best designers. The real life experiences appear to have a great value. The night program offered the older student a door into this niche position. It would be nice to see this available again in some form.
- I have not worked in the HVACR field for over 5 years. My input may not be valid because of my extended absence. However, an area where improvement can benefit the students is in the area of controls on commercial equipment for the 2 year program. I struggled with control theory on commercial equipment. My rankings on the survey are based on experience of 5—10 years ago.
- The biggest advantage of being a Ferris State graduate is you have the ability to be productive as soon as you are hired. I can not say enough on how impressed I am with the HVACR program. It is a BIG advantage to have this degree. As far as suggestions are concerned, I would consider adding 1 semester of basic plumbing design even though it is just a HVACR program. Also, more CAD classes would be very useful since many engineering firms are requiring designers to do their own CAD work. The only other thing I would consider adding is the calculus and other prerequisites needed to obtain a PE license. FSU has the best HVACR program in the country, and I am very proud to be a graduate. Keep up the good work and thank you.
- More work experience, more site audits and visits, less lab and more lecture.
- Some focus should be put on how to evaluate offers form companies. Many of my fellow graduates looked heavily at salary and not so much at impact of benefits and stability of the company. While extra efforts by students to join and be active in associations like ASHRAE is not directly associated with the purpose of this survey, they needed to be encouraged, they help to develop a more well-rounded individual, prepare for work, develop networks, etc. The energy audit course was excellent, prepared me to hit the ground running. It could be strengthened with some more focus on operational savings associated with improvements and a financial evaluation that many customers look at. LCCA, NPV, IRR etc. This is an excellent program.
- It would be helpful for 4yr students to have more real life problem solving. Number crunching is good to know; however, thinking on your feet is priceless. When I went thru the program the professors made the difference, with real world problems and solutions.

- Should be some type of program of installing complete furnace and air & ductwork from scratch in a new house, maybe with construction.
- Besides internship, students should spend maybe a day or two at different job types in the industry.
- I believe there is a high demand for 4 year graduates in HVACR. In my position, skills like load estimating, control theory, control applications, specification reading and general HVAC design principals are all vital. There is a real need in the industry for students who truly grasp these concepts.
- Recommend branching out from autocad to Microsoft visio
- Develop courses in understanding plans and specifications
- The area I feel I was the weakest in after graduating was troubleshooting. If I was to walk up to a broken down rooftop, I would have had no idea where to even begin troubleshooting. As far as controls go, the instructor did a great job. I wish I could have taken all my controls courses with him.
- When I attended Ferris, the faculty and staff members were excellent. Control theory was strong, but programming was weak. Leaving Ferris I was able to perform all aspects of my job except programming. With the set-up Ferris has, you should be able to increase the amount of programming time that the student gets.
- I am currently seeing a trend of new graduates who are unable to write / understand HVAC sequence of operations.
- If the number of students is increased, then there could be an excess of graduates without jobs. It is important to maintain 100% placement.
- Equipment selection and design needs strengthening.
- Controls was excellent
- Is it possible to replace liberal arts requirements with technical electives
- Job placement services need to attract more companies and get more students hired

EMPLOYER FOLLOW-UP SURVEY
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY





FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY
CONSTRUCTION DEPARTMENT
HVACR PROGRAMS

March 14, 2006

Dear Ferris HVACR Graduate Employer:

Ferris State University Could Enhance the HVACR Programs!
We Need YOUR Input!

The University's Academic Program review Committee is reviewing our HVACR Programs. As a employer of Ferris State University HVACR program graduates, we need your viewpoint! The results of this review can range from increasing our programs' resources, to placing the program in a probationary status. This process requires your **input!**

This review process is also important in making changes to the HVACR curriculum in order to improve the quality of the graduate we turn out. You can help us keep the HVACR programs at a high level of quality by completing the enclosed survey and returning it by **March 28, 2006**. Again, your input regarding the HVACR programs and its' graduates is vital to the continued success of this program. Note: Two surveys were included so that one could be filled out relating to a two year graduate and one survey could be filled out regarding a four year graduate if you employ both. Please note on the survey which type of graduate you are responding to.

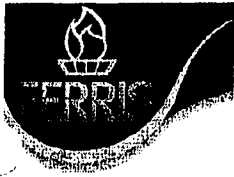
Note: The result of the last program review in 2000 resulted in a **new building for the HVACR Programs**, your input is taken very seriously by the university!

In advance, we thank you for your quick response.

Sincerely,

Michael J. Korcal
Assistant Professor
HVACR Programs

Enclosed: Graduate Employer Survey



FERRIS STATE UNIVERSITY
 HVACR Program Review
 Employer Perception of the HVACR
 Programs

EMPLOYER SURVEY

Name: _____

Title: _____

Company Name: _____

Types of Ferris Graduates Employed?

Address: _____

Associate Degree

Bachelor Degree

Indicate the approximate number of Ferris HVACR graduates employed by your company: _____

Competencies & Foundation Skills:	Excellent	Good	Acceptable	Below Expectations	Poor	Not Applicable
	E	G	A	BE	P	NA
1 Uses written and oral communication skills effectively	5	4	3	2	1	NA
2 Possesses adequate overall technical skills in HVACR	5	4	3	2	1	NA
3 Possesses adequate mathematical skills	5	4	3	2	1	NA
4 Uses critical thinking, problem solving and decision making skills	5	4	3	2	1	NA
5 Exhibits an appropriate level of responsibility and self management	5	4	3	2	1	NA
6 Chooses ethical courses of action	5	4	3	2	1	NA
7 Identifies, organizes, plans, and allocates resources	5	4	3	2	1	NA
8 Participates as a team player	5	4	3	2	1	NA
9 Works well with individuals from diverse backgrounds	5	4	3	2	1	NA
10 Acquires, interprets and uses information effectively	5	4	3	2	1	NA
11 Possesses the ability to gain rapport with clients	5	4	3	2	1	NA
12 Uses technologies effectively (computer, telecommunications, etc)	5	4	3	2	1	NA
13 Possesses leadership and negotiation skills	5	4	3	2	1	NA
14 Ability to read and interpret blueprints	5	4	3	2	1	NA
15 Ability to use and apply job specifications	5	4	3	2	1	NA
16 Recognize and understand all HVACR systems	5	4	3	2	1	NA
17 Knowledge of control theory and terminology	5	4	3	2	1	NA
18 Understand and develop electrical and control schematics	5	4	3	2	1	NA
19 Ability to troubleshoot a single simple HVACR system	5	4	3	2	1	NA
20 Ability to troubleshoot a complex or multiple HVACR systems	5	4	3	2	1	NA
21 Understand HVACR safety sequences	5	4	3	2	1	NA
22 Ability to work on CAD	5	4	3	2	1	NA
23 Ability to develop an HVACR bid	5	4	3	2	1	NA
24 Ability to commission an HVACR system after install or repair	5	4	3	2	1	NA
25 Ability to install HVACR components or systems	5	4	3	2	1	NA
26 Understands the importance of time management	5	4	3	2	1	NA
27 Completes a job with minimal re-work	5	4	3	2	1	NA
28 Understands HVACR codes, standards and regulations	5	4	3	2	1	NA

EMPLOYER PERCEPTION SURVEY RESULTS

Question	Average
1. Uses written and oral communication skills effectively:	3.87
2. Possesses adequate overall technical skills in HVACR:	3.73
3. Possesses adequate mathematical skills:	3.80
4. Uses critical thinking, problem solving and decision making skills:	3.60
5. Exhibits an appropriate level of responsibility and self management:	3.87
6. Chooses ethical courses of action:	4.21
7. Identifies, organizes, plans, and allocates resources:	3.64
8. Participates as a team player:	4.13
9. Works well with individuals from diverse backgrounds:	4.13
10. Acquires, interprets and uses information effectively:	3.87
11. Possesses the ability to gain rapport with clients:	4.00
12. Uses technologies effectively (computer, telecommunications, etc.):	3.87
13. Possesses leadership and negotiation skills:	3.47
14. Ability to read and interpret blueprints:	3.64
15. Ability to use and apply job specifications:	3.57
16. Recognize and understand all HVACR systems:	3.53
17. Knowledge of control theory and terminology:	3.67
18. Understand and develop electrical and control schematics:	3.40
19. Ability to troubleshoot a single simple HVACR system:	3.73
20. Ability to troubleshoot a complex or multiple HVACR systems:	3.13
21. Understand HVACR safety sequences:	3.60
22. Ability to work on CAD:	3.73
23. Ability to develop and HVACR bid:	3.30
24. Ability to commission an HVACR system after install or repair:	3.50
25. Ability to install HVACR components or systems:	3.36
26. Understands the importance of time management:	3.67
27. Completes a job with minimal re-work:	3.47
28. Understands HVACR codes, standards and regulations:	3.40
Average of all questions:	3.67

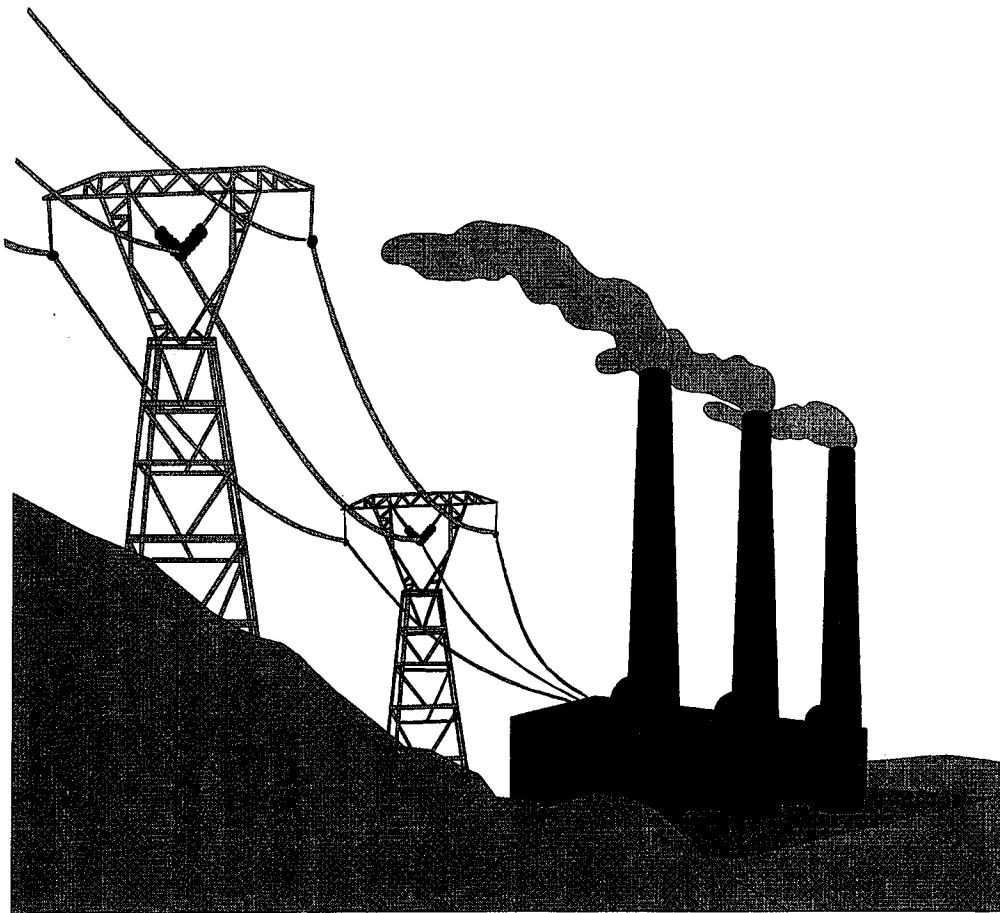
Other Comments:

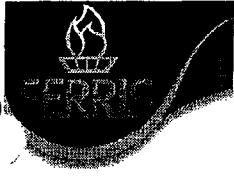
- Review is for our most recent hire with whom we are well pleased!
- Would like to develop a research partnership with Ferris. We manufacture commercial refrigeration and are in the need of improving energy efficiency and providing innovative features and benefits to our customers. We believe this would be a good opportunity for Ferris students and our company.
- I have interviewed several students graduates from Ferris. While their theory knowledge may be adequate they generally have a weakness when it comes to applying it in the field under different installation conditions. This creates a problem with their expectation of starting as a service technician. Maybe more training in air flow, duct sizing and skills in dealing with customers.
- Written communication and documentation skills are becoming more and more important to us. This is hard to get a tech to do well but so necessary. Job site investigation reports for the problem jobs, sit reports, product quality reports, and even the work order needs to be descriptive and detailed. It would be awesome if these techs learned in school the importance of documenting their work.
- You have a great program, keep up the good work.
- We would move an associate's degreed person into field supervision fairly quickly or into testing and balancing or controls work. An ability to pass NEBB certification fairly soon would be expected. Experience with lonworks and backnet would be helpful too.
- For a BS degree, we would expect this person to be able to do those things we expect from an AS degreed person plus we would want the following: ability to become a project manager, run computerized load calculations and state mandated energy calculations. Ability to become an account sales person. Ability to design small commercial systems.
- We need more commercial service techs, BAC techs.
- We currently have 2 graduates from the HVACR program on staff as follows: The first student graduated in 1967 - worked in the industry at 3 manufacturers in an engineering capacity and was promoted to VP in 1990. The second person graduated in 1988, worked in the lab and later promoted to lab supervisor. Later promoted to a position of project engineer, was well prepared at FSU. The third person graduated in the early 1960's worked in the lab for about 35 years and retired, was well prepared at FSU. The final person is a 4 year graduate from 1990. Had good technical skills. No longer works for BARD. In general, I feel the HVACR program is outstanding. It teaches both theory and then how it is put to practice. Those coming out of the program have a good foundation on which to build.
- From our point of view (early in our relationship with FSU) anything you can do to help identify, train or create interest in the sales engineering area, would be excellent, thanks.
- We would be very interested in gaining a better understanding of how we could hire the best, brightest from your program. We would also be interested in: NATE commercial / industrial HVAC certification.
- On-line internet based training. Feel free to call. (Note: this is from an employer that is not familiar with our program but felt compelled to contact us. This person was referred to our marketing person.)
- As service technicians they are well prepared as well prepared as any 2 year program, the diversity of our business does not allow them to be totally prepared after 2 or 4 years of college. I believe if Ferris is to go to the next level it is necessary to have a program that takes the 2 yr. student to a second 2 years in commercial and industrial HVACR (centrifugal, absorption, screws, high pressure steam and large boilers)
- I would recommend a minimum of 2 internships with an HVAC contractor for project management, design programming, or estimating. They need hands on experience in HVAC service field then engineering or EMS / DDC field.

Other Comments:

- Need extensive knowledge of electronics, electrical, power systems or a minor in CIS.
- I would recommend a summer internship between year 1 & year 2 in the HVAC field, service installation, etc.
- In todays market they need to have a good understanding of electronics, using a computer for connecting to an EMS.
- Increased knowledge on setting up a VFD

GRADUATE EXIT SURVEY
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY





FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY
CONSTRUCTION DEPARTMENT
HVACR PROGRAMS

Dear Graduating Senior:

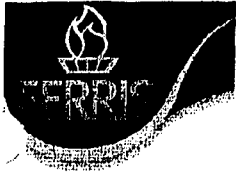
Congratulations on your upcoming graduation from our program. You are to be commended for your academic accomplishments in our program. You are also at a special point in time to offer our department faculty timely feedback and assessment of your undergraduate education experience.

Please consider carefully the following questions and answer appropriately. Your answers will be kept confidential and only used to develop a general understanding of student assessment. We ask for employment information, including salary, to develop a yearly average for future seniors to use in their employment negotiations and to contact you in the future. Again, all information will be kept confidential.

Please know that your input to be provided below is very important to us. You are in a unique position because of your current experience to directly affect the quality of education provided by our department. Thank you for your contribution.

Sincerely,

Michael J. Korcal
Assistant Professor
HVACR Programs



I. CURRICULA:

Please describe your assessment of our curricula (specific course material and sequencing of courses)

Course content:

Course sequencing:

Academic rigor of coursework:

Other elements:

II. STUDENT LIFE:

Please describe your experience as life on campus as a HVACR student:

Student organizations: Please list below all the student organizations that you were part of during your time at FSU.

Student competitions: List any student competitions that you were involved in while at Ferris.

III. PROGRAM FACILITIES:

Please describe your assessment of any aspect of program facilities:

Labs:

Classrooms:

Textbooks:

Computer equipment:

Other (please specify)

IV. STUDENT ADVISING:

Please describe your experience with our department advising system:

Was your advisor helpful?

Was your advisor knowledgeable:

Was your advisor accessible?

What impact did assistance in the department office play in your experience?

V. SUGGESTED IMPROVEMENTS:

Courses:

Textbooks:

Course sequencing:

Course scheduling:

Classrooms:

Labs:

Other:

VI. THINGS WE SHOULD MAINTAIN AS IS:

VII. OPEN RECOMMENDATIONS:

VIII. OPEN COMMENTS:

X. EMPLOYMENT:

Name of employer:

Address of employer:

Size of employer by number of employees (approximate):

Employer phone number:

Job title:

Position salary:

Description of duties:

Any other information you wish to share on your upcoming employment:

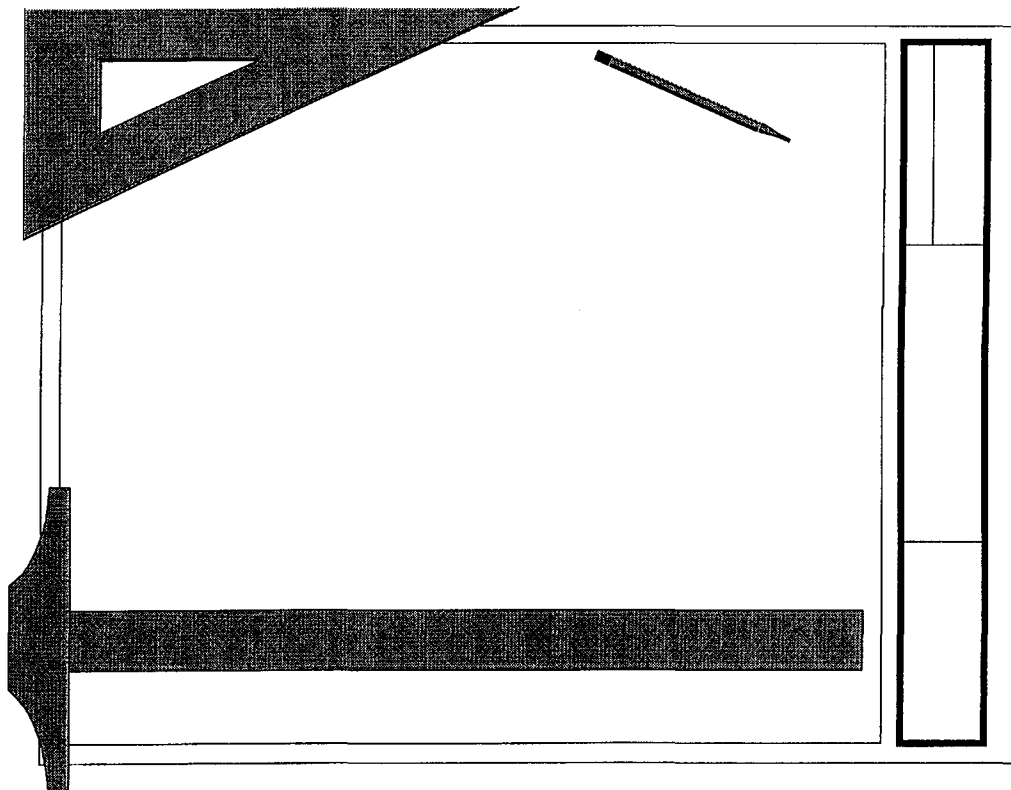
GRADUATE EXIT SURVEY RESULTS

It should be noted that at the time of this survey, the students were in the final phases of putting a 35 page document together for the ASHRAE design competition so the responses were not enthusiastic. It should also be noted that all the seniors participated in the student survey in section 2D and many referred to the comments that they made in this survey.

- I. **Curricula:** Comments were mostly favorable. Students were happy with the course content and sequencing. There were a few complaints regarding the amount of work in the senior year. Several projects are due at the same time requiring a considerable amount of the students time. Other students referred to comments made in the student survey in section 2D.
- II. **Student Life:** All graduates are members of ASHRAE and competed in the ASHRAE international design competition. 25% of the students responding were members of at least one other student organization, including ACCA and MSCA. 10% of the students entered in some other professional organizations competition other than the required ASHRAE competition.
- III. **Program Facilities:** All responses were very favorable regarding the facilities, labs, classrooms and text books. The one major complaint was the computers being tied up in the evenings and weekends for the on-line students to use. This situation is discussed further in the facilities section of the report.
- IV. **Student Advising:** The responding students were happy with the advising and appreciated the fact that the professors were located in the same building as most of the classes. It was also noted that the advisors were readily available.
- V. **Suggested Improvements,** see section 2D.
- VI. **Things we should maintain as is:** see section 2D.
- VII. **Open recommendations and open comments:** see section 2D.
- VIII. **Employment:** Of the students responding, only a handful had made up their mind where they were going to work. Note: Most students had multiple job offers from all over the nation. The students that had decided on a job where going to work for: Trane, Carrier, Johnson Controls, Siemens, Honeywell and the US government.

Note: further information regarding employment will be followed up on.

CURRENT STUDENT SURVEY
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY





FERRIS STATE UNIVERSITY
 HVACR Program Review
 Employer Perception of the HVACR
 Programs

STUDENT SURVEY

Please Rate the Following:

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Opinion
		SA	A	N	D	SD	?
COURSES IN YOUR PROGRAM AREA ARE:							
1	Available and conveniently located	5	4	3	2	1	?
2	Based on realistic prerequisites	5	4	3	2	1	?
WRITTEN OBJECTIVES FOR COURSES IN YOUR PROGRAM:							
3	Are available to students	5	4	3	2	1	?
4	Describe what you will learn in the course	5	4	3	2	1	?
5	Are used by the instructor to keep you aware of your progress	5	4	3	2	1	?
TEACHING METHODS, PROCEDURES & COURSE CONTENT:							
6	Meet your projected career needs, interests and objectives	5	4	3	2	1	?
7	Provide supervised practice for skill development	5	4	3	2	1	?
PROGRAM FACULTY:							
8	Know the subject matter and occupational requirements	5	4	3	2	1	?
9	Are available to provide help when needed	5	4	3	2	1	?
10	Provide instruction so it is interesting and understandable	5	4	3	2	1	?
RELATED COURSE FACULTY:							
11	Know the subject matter and occupational requirements	5	4	3	2	1	?
12	Are available to provide help when needed	5	4	3	2	1	?
13	Provide instruction so it is interesting and understandable	5	4	3	2	1	?
PROGRAM COMPUTER LABORATORIES:							
14	Provide adequate lighting, ventilation, etc.	5	4	3	2	1	?
15	Include enough work stations for students enrolled	5	4	3	2	1	?
16	Are safe, functional, and well maintained	5	4	3	2	1	?
17	Are available on an equal basis for all students	5	4	3	2	1	?
OTHER PROGRAM LABORATORIES:							
18	Provide adequate lighting, ventilation, etc.	5	4	3	2	1	?
19	Include enough work stations for students enrolled	5	4	3	2	1	?
20	Are safe, functional, and well maintained	5	4	3	2	1	?
21	Are available on an equal basis for all students	5	4	3	2	1	?
PROGRAM INSTRUCTIONAL EQUIPMENT IS:							
22	Current and representative of the industry	5	4	3	2	1	?
23	In sufficient quantity to avoid long delays in use	5	4	3	2	1	?
24	Safe and good condition	5	4	3	2	1	?

Please Rate the Following:

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Opinion
		SA	A	N	D	SD	?
INSTRUCTIONAL MATERIALS ARE:							
25	Current and meaningful to the subject	5	4	3	2	1	?
26	Available and conveniently located for use	5	4	3	2	1	?
INSTRUCTIONAL SUPPORT SERVICES (TUTORING) ARE:							
27	Available to meet your needs and interests	5	4	3	2	1	?
28	Provided by knowledgeable, interested staff	5	4	3	2	1	?
PLACEMENT SERVICES ARE AVAILABLE TO:							
29	Help you find employment opportunities:	5	4	3	2	1	?
30	Prepare you to apply for a job	5	4	3	2	1	?

Answer the following questions:

31. What are the HVACR programs greatest strengths? _____

32. What are the HVACR programs greatest weaknesses? _____

33. Which course would you consider least valuable in the HVACR Program and why? _____

34. Are you a transfer student? YES NO

35. If you are a transfer student from what school and curriculum? _____

36. What year in the program are you? First Second Third Fourth

37. Use the remaining space below to add any additional comments that would be helpful in evaluation the HVACR Programs: _____

CURRENT STUDENT PROGRAM EVALUATION SURVEY RESULTS

Question	Average
Courses in your program area are:	
1. available and conveniently located.	4.45
2. based on realistic prerequisites.	4.38
Written objectives for courses in your program:	
3. are available to students.	4.48
4. describe what you will learn in the course.	4.45
5. are used by the instructor to keep you aware of your progress.	4.02
Teaching methods, procedures and course content:	
6. meet your projected career needs, interests and objectives.	4.38
7. provide supervised practice for skill development.	4.34
Program faculty:	
8. know the subject matter and occupational requirements.	4.59
9. are available to provide help when needed.	4.47
10. provide instruction so it is interesting and understandable.	4.35
Related course faculty:	
11. know the subject matter and occupational requirements.	4.25
12. are available to provide help when needed.	4.16
13. provide instruction so it is interesting and understandable.	4.04
Program computer laboratories:	
14. provide adequate lighting, ventilation, etc.	4.65
15. include enough work stations for students enrolled.	4.18
16. are safe, functional, and well maintained.	4.46
17. are available on an equal basis for all students.	4.23
Other program laboratories:	
18. provide adequate lighting, ventilation, etc.	4.44
19. include enough work stations for students enrolled.	4.28
20. are safe, functional, and well maintained.	4.43
21. are available on an equal basis for all students.	4.42
Program instructional equipment is:	
22. current and representative of the industry.	4.47
23. in sufficient quantity to avoid long delays in use.	4.21
24. safe and in good condition.	4.45
Instructional materials are:	
25. current and meaningful to the subject.	4.41
26. available and conveniently located for use.	4.39
Instructional support services (tutoring) are:	
27. available to meet your needs and interests.	3.69
28. provided by knowledgeable, interested staff.	3.74
Placement services are available to:	
29. help you find employment opportunities.	4.22
30. prepare you to apply for a job.	4.35
Overall Average for questions 1 - 30	4.3127

Q31: What are the HVAC programs greatest strengths:**Freshman - Non transfers:**

- Knowledgeable teachers
- Good teachers with a lot of personality and knowledge
- The labs help people learn so much better than lectures
- Supplies and building
- There are a lot of instructors who know there stuff. There is always help around because they want to help
- The building and all the equipment is very nice
- Job placement, laboratories
- There strengths are the way they set up the building
- Lots of up to date equipment, instructors who understand what employers are looking for in potential employees

Freshman - transfers:

- Knowledge of the instructors, new building and laboratory
- Teaching from experienced professionals. This program is very unique and exclusive
- Labs and faculty
- The staff, the building
- Labs
- Knowledge of instructors, lab facilities and tools

Sophomore - Non transfers:

- The hands on programs and staff involvement
- The knowledgeable staff and faculty and the modern building
- Small class sizes, great labs
- The facility we learn in is awesome
- The hands on learning, the new facility
- The labs and the teaching staff
- Low class/lab student/teacher ratio, provides good one-on-one training
- Great labs and well maintained classrooms, awesome computer chairs
- The program is great at teaching the basics of refrigeration and some troubleshooting
- Labs
- The lab equipment, there is no way to learn without hands on training
- The professors are aware of changes made in the industry and keep the students informed of changes
- The building, most of the professors, the job opportunities
- Labs with updated equipment
- Focus on troubleshooting

Sophomore - transfers:

- The classes that are in the program are well taught
- Hands on experience in the field that I am going in to.
- Hands on training
- Is very in depth
- The labs and how it touches on some 4 year material along with covering 2 year material extensive
- Good instructors and up to date labs

Q31: What are the HVAC programs greatest strengths:(cont.)**Junior - Non transfers:**

- The hands-on learning aspect and specialization in the industry
- It is just an overall good program
- Learn a lot in labs
- Its new building and its dedicated staff
- It's faculty
- They have good teachers
- Knowledgeable staff and small classes with labs and one on one time with professors
- The practical work in the field of HVAC

Junior - transfers:

- Learn a lot
- Classes are all in one building, most of the classes are small
- Demanding field, good pay
- Involved beyond Ferris campus
- Always trying to improve to meet the needs of the student and the HVACR industry
- Instructor knowledge
- Preparing for a real job in the industry
- Good program
- HVAC 331
- Wide variety of courses that encompass the HVAC field
- Comprehensive material, covers lots of areas
- The laboratories and energy lab used in teaching
- Control class
- Availability of internships / jobs: relationship with industry, country, leading HVACR program
- Applied education. We don't learn out of boring textbooks, we learn by working on the equipment we have.

Senior - Non transfers:

- That we have some of the new technology and knowledgeable instructors
- The ability to go to any staff member about job openings and questions
- The labs
- Controls, design and selection faculty
- The facility
- Dedication of faculty, industry support
- The granger building
- The building and all it offers
- The greatest strength in the program are have a couple of teachers that really know the material
- None that stick out
- Design and controls

Q31: What are the HVAC programs greatest strengths:(cont.)**Senior - transfers:**

- The labs
- Realistic knowledge gained, prepared for the workplace
- Up-to-date equipment and controls, knowledgeable staff
- The instructors
- The current teaching staff, they are knowledgeable and care about teaching the student
- Helps to prepare for real life jobs
- Its uniqueness and specialization. The facility is a big plus. The senior design class is a big advantage
- The knowledge of all the instructors. If you have a question one of them can answer it
- Good professors
- The biggest strength is that you learn what you need to know to do your job and career.
- The new building

Q32: What are the HVAC programs greatest weaknesses:**Freshman - Non transfers:**

- None
- A lot of materials are not in sufficient quantity for all of us to use.
- The professors tell you to do something, not how to do it.
- Lack of diversity for times HVAC classes are given, recruiting, no incentives for freshman & sophomore grants and scholarships.
- Seems kind of tough, seems a little much for it being air conditioning
- Could use more instructors for some classes with labs

Freshman - transfers:

- No summer classes, 4 year degree classes offer no scheduling flexibility.
- None
- New controls for the 132 course
- Only one gender

Sophomore - Non transfers:

- Sometimes we worked on the same equipment to long. I like to work on other equipment, also.
- I think the program has no weaknesses
- Don't have a strong enough grading policy
- Not enough teachers. Classes only offered certain times
- No ductwork class
- To many students in a single lab due to not splitting the class into 2 labs
- HVAC 132 and 134 mesh together too much, no calc. needed or other advanced math.
- Pointless ISYS prerequisites
- The program focuses on residential equipment too much. The program should be based on more commercial equipment.
- Lack of controls in the 2 year program. Even service techs should be introduced to controls operation.
- There are not enough summer courses for the students to take
- In one semester a lot of ground has to be covered in a lot of different subjects.
- None
- Could focus more on job practice

Q32: What are the HVAC programs greatest weaknesses:(cont.)**Sophomore- transfers:**

- Even though classes have been removed, could have more in the program to go into more detail.
- Amount of student teacher one on one time.
- Scheduling
- They should separate program just for people going on to the 4 year program

Junior - Non transfers:

- Having to fight with on-line students for computers
- Teachers sometimes not in offices when they should be/or said they would be
- Need more computers
- The courses with new instructors often lack organization, but that can be expected
- Student programs for lab work
- No real tutoring assistance after hours
- Adjunct teachers in the past... this has been taken care of.
- Adjunct professors
- The program had 2 teachers that could have did a better job during my attendance
- Too many adjunct professors over my 4 years, think my education could have been better
- Load calcs, hydronics
- I had too many fill-in type teachers over my four years

Junior - transfers:

- None
- More hands on can be used
- Lack of writing support, in that the writing center has difficulties with technical papers.
- Politics
- A little too much name brand specific training
- Games and other junk on computers, also locking out students from computer lab, should put on-line students on their own server.
- It seems to me that there is a lot of effort into recruitment for the program, but once here, the people that recruited you disappear, what happens?
- We only learn Johnson Programming in the control lab.
- Computer resources after 5pm and weekends
- Need to be a little tougher for those who want to just slide by.

Senior - Non transfers:

- Some associate degree classes I have taken have been less than I expected
- Not many companies aware of it
- The somewhat old technology that is in the labs in the 2 year portion of the degree
- Understanding of what is expected from the students
- They pack you with too much info in so little time
- Not diversified enough with industries equipment

Q32: What are the HVAC programs greatest weaknesses:(cont.)**Senior - transfers:**

- Need more lab time
- Some of the classes meet every day
- Have to work outside sometimes in peak winter
- No tutoring
- More hands on things
- Would like to see more real life situations / examples
- A lot of info in a short amount of time
- HVAC 331
- Too much material to cover in certain classes, example: HVAC 331
- HVAC 331 should be split to two classes. Too many pointless electives and too many required classes not related to HVAC
- Always cold in the laboratory
- None
- Limited availability of classes (one class each semester offered)
- Many classes only have one section, scheduling is difficult

Q33: Which course would you consider least valuable in the HVACR program and why:**Freshman - Non transfers:**

- Isys 105
- Isys
- I don't know
- Isys

Freshman - transfers:

- None so far
- None
- None
- Isys 105
- None at this point of time

Sophomore - Non transfers:

- HVAC 102
- They all apply
- I agree with the classes
- I think they are all important
- HVAC 101 too vague
- Oil lab
- HVAC 235, the class focuses on oil burners at the residential level, which is outdated.
- HVAC117, needs to be more general in the material and no specific to boilers
- None
- HVAC235, the material and workload are not understandable
- None
- EET115, basically the same as EET117

Sophomore - transfers:

- Oils class
- Oils class
- HVAC234, because it's an introduction to some stuff you'll see in the 4 year and introduces the 2year students to life situations with roof top units.

Q33: Which course would you consider least valuable in the HVACR program and why:(cont.)

Junior - Non transfers:

- All are valuable except visual basic in the related courses
- No opinion
- FSUS or ISYS 204
- I find non that fit this area

Junior - transfers:

- I am not sure because this is only my second semester here.
- Visual basic
- Only taken 3 classes at Ferris and all have been good
- No opinion at this point
- Isys 101
- Isys 204 and all electives
- None
- I think most courses were valuable in the HVACR program
- Social awareness has nothing to do with HVACR, waste of time and money!
- Social awareness and cultural enrichment. Waste of time, money and is a distraction from the major.

Senior - Non transfers:

- ISYS 105 & 250 they didn't help me learn anything
- ISYS class, I learn nothing that will help me in my career down the road.
- HVAC245
- Visual Basic and autocad
- ISYS
- I think the courses are all valuable just some more than others
- Energy Audit
- Auditing
- Isys 221, didn't seem very relevant to the HVACR field

Senior - transfers:

- 451
- Energy audit course
- Economics and visual basic
- Energy audit - new instructor
- I am not sure, I feel all classes have their place
- Some of the gen ed requirements do not prepare a student for anything
- Principles of macroeconomics does not fit job needs
- Energy analysis and audit
- They all are very important, but I would have liked the 451 (energy audit) course updated and re-organized.
- I think that every course is valuable
- Energy analysis, because it was uninteresting and all other courses are extremely valuable
- The 300 level load course because I didn't really learn anything in there

Q37: Additional comments:**Freshman - Non transfers:**

- I am a MET student and took the class as a technical elective and enjoyed it very much
- I think incentives, recruiting and more classes would do the program justice
- Good program
- HVACR is an excellent place to learn and to be at
- No opinion

Freshman - transfers:

- The program would benefit from a structured job placement program for summer jobs and internships
- A sheet metal class would be useful for the people in the 2 year degree

Sophomore - Non transfers:

- I could not think of any
- The HVACR program could use more commercial equipment in the heating side of the program. The program has no boilers that are common in commercial buildings today. The program could use a lot of help on the heating side
- Working on real equipment is the best way to learn the trade
- The HVAC program provides a very wide variety of expertise and a lot of information
- None

Sophomore - transfers:

- Have more equipment (furnaces, freezers, etc.) more readily available for use by students, if upon students and faculty request

Junior - transfers: (Note: no comments from Non transfer Juniors)

- This is NOT a liberal arts university! Stop treating it like one
- This is not a liberal arts school. Don't pretend like it is one and don't pretend like we like it.

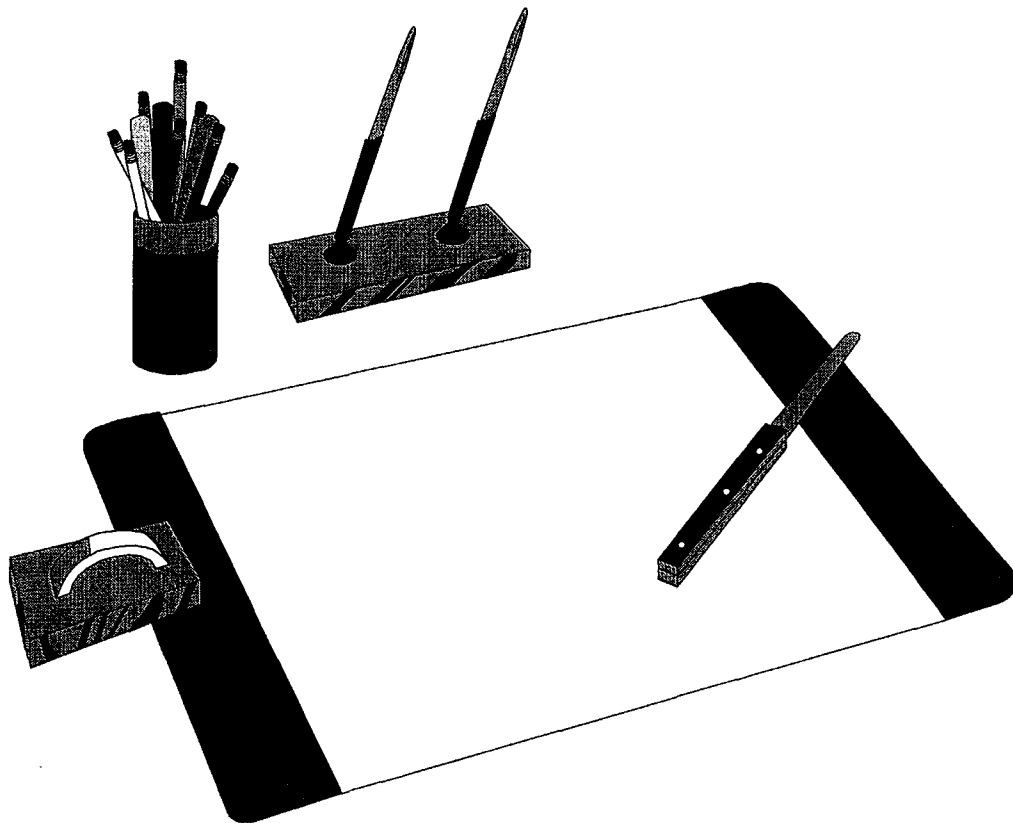
Senior - Non transfers:

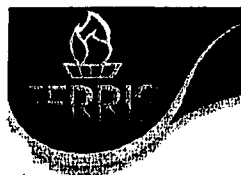
- Need to have a teacher teach the loads class well, so students do not struggle in 499 and outside of school.
- I feel it would be better to provide on-line students with the software needed to complete the program, instead of shutting down the computer's used by the on-campus students
- Have more autocad and sheetmetal work and design
- Would like to see evening classes so that people who work to pay for school can get a job other than bartending.
- Too many useless classes outside of the HVAC classes that are needed. ISYS, social awareness, scientific understanding

Senior - transfers:

- More computers available to students, greater cooperation with career center. Offer gen ed classes more local at Granger.
- More real world applications, I think a class having to do with program management or an HVAC business management
- You only get out as much as you put into it
- Need a full time staff member to place students in internships. I have a business minor and they could place me in an internship. Why can't the program in the major do this? Greater job placement in a central location.
- I think both the 451 and the 342 class could be updated. The 451 material is very interesting, but the class did not quite live up to my expectations. Also, the 342 class needed new instruction, but that has been taken care of.
- 331 class should be a writing intensive course
- I feel that the current instructors are some of the best in their field. I feel that this is one of the main reasons why this program is so successful and why it was successful for me.

FACULTY PERCEPTION SURVEY
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY





Survey Statement:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Response
	SA	A	N	D	SD	NR
1. The Granger Center facilities are adequate.	5	4	3	2	1	NR
2. The student advisory loads are reasonable.	5	4	3	2	1	NR
3. The HVACR Dept. is well represented on the COT Curriculum Committee.	5	4	3	2	1	NR
4. The HVACR Dept. is well represented on the promotion committee.	5	4	3	2	1	NR
5. The HVACR curriculum review process is effective.	5	4	3	2	1	NR
6. There are sufficient meeting times for the HVACR faculty.	5	4	3	2	1	NR
7. Course assignments are appropriate.	5	4	3	2	1	NR
8. Course assignments are equitable.	5	4	3	2	1	NR
9. Faculty teaching loads are appropriate.	5	4	3	2	1	NR
10. Course textbook approval policy is appropriate.	5	4	3	2	1	NR
11. Travel funds are sufficient.	5	4	3	2	1	NR
12. Representation in professional societies by faculty is appropriate.	5	4	3	2	1	NR
13. The Chair has done an effective job.	5	4	3	2	1	NR
14. The HVACR Dept. receives a proper share of COT resources.	5	4	3	2	1	NR
15. The HVACR Dept. has enough visibility in the HVACR industry.	5	4	3	2	1	NR
16. The HVACR Dept. advisory board does an effective job.	5	4	3	2	1	NR

17. List (at least) the 3 most positive features of being a faculty member in the HVACR Dept.

18. List (at least) the 3 most negative aspects of being a faculty member in the HVACR Dept.

FACULTY PERCEPTION SURVEY RESULTS

<u>Question</u>	<u>Average</u>
1. The Granger Center facilities are adequate:	4.86
2. The student advisory loads are reasonable:	3.80
3. The HVACR Dept. is well represented on the COT Curriculum Committee:	3.75
4. The HVACR Dept. is well represented on the promotion committee:	3.75
5. The HVACR curriculum review process is effective:	2.14
6. There are sufficient meeting times for the HVACR faculty:	3.00
7. Course assignments are appropriate:	3.71
8. Course assignments are equitable:	3.86
9. Faculty teaching loads are appropriate:	4.14
10. Course textbook approval policy is appropriate:	3.43
11. Travel funds are sufficient:	4.14
12. Representation in professional societies by faculty is appropriate:	3.86
13. The Chair has done an effective job:	4.43
14. The HVACR Dept. receives a proper share of COT resources:	3.43
15. The HVACR Dept. has enough visibility in the HVACR industry:	3.00
16. The HVACR Dept. advisory board does an effective job:	3.43
Average of all questions	3.67

Q17: List (at least) the 3 most positive features of being a faculty member in the HVACR Dept:

- The faculty, the faculty (great group), the specific and appropriate focus of the curriculum.
- Working with good people
- Being part of a unique educational team
- Helping to mold young adults into productive professionals
- Professional development time and money
- Time in summers to professionally consult
- Learning time with students
- Learning time with co-workers
- Working in Granger
- Working with unselfish individuals (team approach)
- New facility is great
- Good rapport with industry
- Working with an excellent staff, very professional, cooperative, desire to educate
- Working in a state of the art facility
- Working to educate students at a personal level
- Group gets along well and helps each other out
- Funding for projects
- Progressive activity to make program better

Q18: List (at least) the 3 most negative aspects of being a faculty member in the HVACR Dept:

- Computer support
- Amount of time it takes to get things done
- Lack of support for online
- Support from other departments on campus
- Stress of online pioneering (24/7)
- Due to faculty turn over, all current faculty have been overloaded with responsibilities
- Class schedules are throughout the day and erratic
- Lots of wasted time in curriculum development meetings
- Low enrollment worries and high faculty turnover in past 5 years
- Poor leadership at deans level in past 5 years
- Trying to implement changes at the university level
- Support for new initiatives at the university level
- Time required to accomplish tasks (changes)
- Masters program completion in 3 years is hard to be effective at all phases in teaching and student
- Not just HVAC, bureaucratic red tape of the university
- Issues with TAC and computer support on getting issues addressed in a timely fashion
- Proper support from university for on-line courses, especially from computer support
- Need the university to get program recognition out to public, such as program winning many international awards
- Cumbersome processes to accomplish certain tasks and goals (computer support or lack thereof)
- Inconsistent grading between faculty members
- The stress of enrollment numbers being low
- The extra activity outside the classroom

Q19: Describe the most significant accomplishments of the HVACR Dept. in the past few years:

- ✓ #1, stable faculty!!!, new building, on-line
- The most significant accomplishment is the completion of our Web Based Design and having cohort 1 finishing this semester.
- New building
- The relative success of the online program. Opening of the Granger Center
- The new building, on-line expansion
- The new building, success of on-line program and continuation of the program domination in student international competitions.
- Faculty member continues to be a nationally recognized author.
- Our four year program continues to do well in the national ASHRAE Design competition.

Q20: What are your thoughts on the HVACR Dept. mentoring process for tenure:

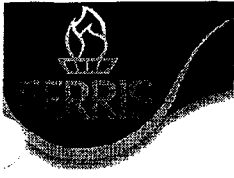
- None yet
- I think it is difficult for faculty to find the time to spend in the classroom with other faculty
- Good mentoring process, coordinator has too much say in tenure process
- There needs to be a little more structure put to this with approval from the Dean's office
- Not well organized, not enough time to mentor-should be very high priority, *4-non-tenured faculty to 3-tenured faculty is not conducive to good mentoring
- All faculty are currently under overload condition which leaves little time to mentor new professors, considering the large number of relatively new professors in the Dept.
- Everyone's heart is in the right place, but people are so busy that it is difficult to do much to help.
- People are willing to give time and material if asked. We are doing as good as can be expected for as many faculty seeking tenure as there are.

Q21: Please discuss any other item(s) of concern:

- Enrollment is my main concern. We are trying all we can think of and I'm sure our efforts will bear fruit. I believe that the multiple year instability in the faculty due to turnover and incompetents of some faculty has led to poor PR via word of mouth, and that has contributed to our under enrolled classes. All tenure track positions are now finally filled with highly competent and energetic people. I believe that word of mouth will be positive and enrollment will grow as a result. My next concern is the pressure from administration to dilute technical content. Yes, other schools have reduced credits and content, but that doesn't mean the students are being served as well. I fear that our quality may suffer as we weaken our program.
- I see our department turning a corner (for the good) and provided our group stays together, I believe the future is bright. I believe enrollment will increase and our department will gain additional recognition (campus, ASHRAE and industry)
- I have been surprised at the isolation of the departments and service groups within the University. There is a "yours / mine" mentality that exists and is counter productive. I am not aware of any incentive for departments or support groups to work together.
- Enrollment in the 2-yr program and viability of our program
- We now have a new building and stable, qualified and energetic staff. This should help the program again move in the right direction. New blood in the 2-year program by adding more advanced curriculum should set us apart from other 2-year programs and help increase the enrollment. Support from other campus departments needs to be faster and easier. Lack of action of some issues, computer support for on-line students could hurt this fledgling program. Work of mouth either good or bad does a lot for a programs viability.

ADVISORY COMMITTEE PERCEPTIONS
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY





FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY
CONSTRUCTION DEPARTMENT
HVACR PROGRAMS

March 14, 2006

Dear Ferris HVACR Program Advisory Board Member:

Ferris State University Could Enhance the HVACR Programs!
We Need YOUR Input!

The University's Academic Program review Committee is reviewing our HVACR Programs. As a member of the Ferris State University HVACR program advisory board, we need your viewpoint! The results of this review can range from increasing our programs' resources, to placing the program in a probationary status. This process requires your **input!**

Note: The result of the last program review in 2000 resulted in a **new building for the HVACR Programs**, your input is taken very seriously by the university!

In advance, we thank you for your quick response.

Sincerely,

Michael J. Korcal
Assistant Professor
HVACR Programs

Enclosed: Advisory Board Member Survey

Advisory Board Perceptions

Name:

Title:

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
		SA	A	N	D	SD	NA
Respond to the following statements:							
1	The advisory committee is diversified enough to meet the needs of what is taught in the program Comments:	5	4	3	2	1	NA
2	The advisory committee meets often enough Comments:	5	4	3	2	1	NA
3	The program adequately utilizes the advisory committee Comments:	5	4	3	2	1	NA
4	The advisory committee members are knowledgeable about the program Comments:	5	4	3	2	1	NA
5	Suggestions from the advisory committee are encouraged and adopted by the program Comments:	5	4	3	2	1	NA
6	The program has adequate lab facilities Comments:	5	4	3	2	1	NA
7	The program has adequate computer facilities Comments:	5	4	3	2	1	NA
8	The program has adequate financial support from the University Comments:	5	4	3	2	1	NA
9	The program has adequate financial support from industry Comments:	5	4	3	2	1	NA
10	The graduates from the program are adequately prepared to go to work Comments:	5	4	3	2	1	NA
11	The program curriculum meets the needs of the industry Comments:	5	4	3	2	1	NA
12	The program has an adequate number of graduates Comments:	5	4	3	2	1	NA
13	The program has an adequate number of faculty Comments:	5	4	3	2	1	NA
14	The faculty in the program has adequate expertise Comments:	5	4	3	2	1	NA
15	Your company would hire a student from this program Comments:	5	4	3	2	1	NA
16	Faculty in the program keep-up with changing technologies Comments:	5	4	3	2	1	NA

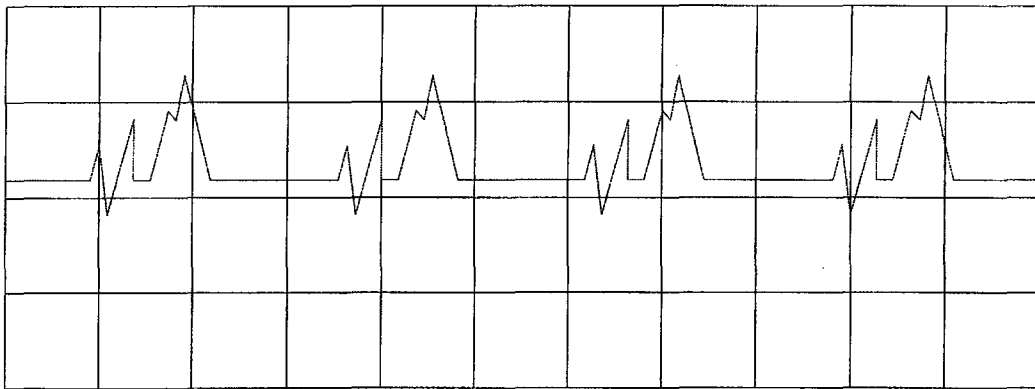
ADVISORY PERCEPTION SURVEY RESULTS

Question	Average
1. The advisory committee is diversified enough to meet the needs of what is taught in the program:	4.50
2. The advisory committee meets often enough:	3.70
3. The program adequately utilizes the advisory committee:	3.50
4. The advisory committee members are knowledgeable about the program:	4.40
5. Suggestions from the advisory committee are encouraged and adopted by the program:	3.80
6. The program has adequate lab facilities:	4.40
7. The program has adequate computer facilities:	4.40
8. The program has adequate financial support from the University:	3.20
9. The program has adequate financial support from industry:	3.30
10. The graduates from the program are adequately prepared to go to work:	4.10
11. The program curriculum meets the needs of the industry:	4.00
12. The program has an adequate number of graduates:	2.60
13. The program has an adequate number of faculty:	3.00
14. The faculty in the program has adequate expertise:	4.20
15. Your company would hire a student from this program:	4.70
16. Faculty in the program keep-up with changing technologies:	4.00
17. The program has current and adequate instructional equipment to teach with:	4.10
18. The graduates of the program are competitive with graduates of similar programs from other universities or community colleges:	4.40
19. The program is doing all it can to recruit new students:	3.20
Average of all questions	3.87

Other Comments:

- The program has improved dramatically in its recruitment effort. There needs to be more resources spent on bringing in more students.
- Maybe need a smaller committee meeting every quarter
- Would like to see more commercial and industrial class instruction
- Good basics, too light in commercial
- Need more 2 year graduates
- The advisory group is not used enough to advance the program. Every person would help with the recruitment of new students with a good program. Almost none are used. You have the best facility, very good teachers but where are the students. It takes a peoplet to find students the university needs to get behind this program and push.
- I think that the upper management needs to focus on the original intent or mission of the college of technology. If this is lost, so will the appeal and future of the University
- The labs are the best in the country.
- I think the program is second to none. The story needs to be told, over and over and over at the right places
- The HVAC industry is in need of qualified technical people, it provides good employment at good wages
- Push it, then push it some more, then push it even harder. Double, then triple the enrollment. Do not give up!
- I am very impressed with the dedication, commitment and overall involvement by the chair and faculty. The new facility utilized by students is truly "state of the art". Feedback from contractors regarding graduate students has been overwhelmingly positive. From my prospective, the HVACR programs at FSU maintain high standards and a long standing reputation of success.
- We currently have 2 FSU graduates working for us and are very pleased!

PROGRAM PROFILE
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY



PROGRAM PROFILE

The following information pertains to the profile of students, program enrollments, program capacities, student success and retention, access to courses, curriculum requirements, quality of instruction, faculty quality and workloads, assessment and administrative effectiveness. In the following section, 4 year students will be indicated as HVACR students and 2 year students will be indicated as HVAC.

A. Profile of Students:**1. Student Demographic Profile**

- a. **Gender, Race/Ethnicity and age:** HVACR Engineering Tech. (2005): the average age of these students was 22.7 years. 2 of 64 students were female and 5 of 64 reported being non-white. HVACR Tech. students (2005): The average age was 19.8 years. One of 61 students was female. 2 of 61 students reported being non-white.
- b. **In-State and Out-of-State:** In 2005, 18 of 64 HVACR Engineering Tech. students were non-residents. 2 of 61 HVACR Tech. were none residents.
- c. **Full– Time and Part-Time:** in 2005, All 64 HVACR Engineering Tech. students were full time. 2 of 61 HVACR Tech. students were part-time.
- d. **Class Attendance:** HVACR classes are offered during the day on the Big Rapids Campus and the HVACR Engineering Tech. courses are offered on-line. There are no weekend classes.
- e. **Course Delivery:** Classes are offered in Big Rapids and on-line.
- f. **Impact of Student Profiles on Curriculum, Scheduling and Delivery Methods:** Because of the uniqueness of the HVACR Engineering Tech. Program, and the number of 2-year graduates across the country desiring the degree, the on-line courses are offered through out the year, including the summer semester, requiring faculty to cover this.

2. Quality of Students:

- a. **Ranges an Average GPA's and ACT's of Current Students:** The 2005 HVACR Engineering Tech. students had an average GPA of 3.0 and an average ACT score of 20.0. The HVACR Tech. students had an average GPA of 2.757 and an average ACT of 20.0. ACT scores have increased about of 1 to 2 points since the last program review, indicating a significant increase in the quality of students.
- b. **Ranges and Average GPA's and ACT's of Graduates:** The 2004 average ACT of HVACR graduates was 17.8, down from 18.1 in 2000. Their average GPA was 3.009, compared to 3.000 in 2000. The average ACT of HVAC students was 18.2 compared to 17.2 in 2000. Their average GPA was 2.99, compared to 2.89 in 2000. The average ACT of HVAC students was 18.7, compared to 17.3 in 2000. Their average GPA was 3.146, compared to 2.81 in 2000.
- c. **All students entering the HVACR programs must have a math ACT of 19, or complete MATH 110 with a C– or better before they may take technical courses. In addition, all students entering the third year HVACR courses must have a minimum 2.30 GPA, having completed all freshman and sophomore coursework, and have earned a C– or better in MATH 126.**

HVACR Programs

APR C 2006-2007

section 2 of 2

- d. HVACR students have earned a large number of scholarships. The scholarships are offered through a variety of different sources including professional organizations, companies, private individuals and the program itself. Scholarships and other awards total over \$20,000 not including scholarships the students go out on their own to procure.
 - e. The Ferris HVACR students have participated in a variety of other scholarly activities. For example, most years the students participate in the Heats-on program. This is offered to low income and needy persons looking to get there heating equipment up and running prior to the heating season. The students work together with local HVACR contractors in this endeavor. The students get valuable experience not only dealing with equipment but learning soft skills. As mentioned before, all students are required to compete in international competitions, which has raised the visibility of the Ferris HVACR programs to the nation and the world. Students attend professional organization conventions and workshops and regularly attend professional organization meetings.
 - f. Other accomplishments of the HVACR students at Ferris include the activities of the professional student organizations, student chapters of ASHRAE, ACCA and MSCA. These organizations have monthly guest speakers in current HVACR topics.
3. Employability of students:
- a. The 2004-2005 Graduate Follow-up Survey Report indicates that 100% of the BS and the AAS graduates found full-time employment within one month of graduation if not immediately.
 - b. Since the last program review, average starting salaries were \$46,200 for BS students and \$33,100 for AAS students. These are the averages, the range is from the low 40s to the high 50s for the BS program and low 30s to low 40s for the AAS program.
 - c. Typically, all students find full time employment, and none were employed as temporary or part-time employees.
 - d. Career assistance is available at Ferris both through the Job Fairs and also through Career Services, where students may sign up for interviews. In addition, some interviews are arranged directly through the HVACR office. Assistance in resume preparation is available through program faculty. In general, students seem to appreciate the available career assistance.
 - e. Again according to our internal data, virtually all HVACR graduates continue to remain employed in the HVACR industry. This could be due to the wide range of career paths available to HVACR graduates. Those that enter the field are very career-focused.
 - f. A considerable number of HVACR graduates are employed in Michigan. However, a significant number have left the state, due in part to active on-campus recruiting by global firms like Carrier, Trane, Siemens and Johnson Controls. Therefore, there are graduates located all over the United States.

- g. 40% of the 2-year graduates ramp up to the 4-year degree program. In the past, some 2-year graduates returned to the 4-year program when it was offered in Grand Rapids at the ATC. There is now the possibility that the 2-year grads can take the 4-year program in the future by taking the classes on-line.
- h. Most additional education is earned on-line.

B. Enrollment

1. The enrollment number as of July 12, 2006 are as follows: (Freshman, 32 for Fall and 16 for Winter semesters), (Sophomore: 32), (Juniors: 46), and (Seniors: 32). On-line new enrollment is currently at 17 and a total of 80 on-line students. This is a total enrollment for all HVACR programs of 238 students.
2. The total enrollment in HVACR Engineering Tech. has increased from 79 to 158 (100%) since 2000. SCH's have increased from 1027 to approx. 1896 (85%). The total enrollment in HVACR Tech. has increased from 68 to 80 (17.6%) since 2000. SCH's have increased from 1005 to 1200 (19.4%).
3. According to information obtained from the Admissions office, the data is for the upcoming 2006-2007 school year. In the AAS program, there are 84 applicants of which there are 50 admits and 48 enrolled. In the BS program, there are 50 applicants of which there are 49 admits and 46 enrolled.
4. It is the goal of the HVACR programs to continue to grow enrollment, especially in the HVAC Tech. program, but to also improve the quality of students.

C. Program Capacity:

1. The program capacity is currently set at 32 students for each year, freshman through senior. Note: In the AAS program there can be a Freshman class starting in the Winter with a capacity of 32. The upcoming F06 semester is showing 48 students currently enrolled as incoming freshman and 46 students currently enrolled as Juniors. Note: These numbers do not include the on-line students. These are the starting points for the 2 year and the +2 year programs. Added sections will need to be looked at to accommodate the increased enrollment. It should be noted, the HVACR program now have a stable faculty, facility and a dedicated marketing person and the increased enrollment for this next year show the program is going in the right direction.

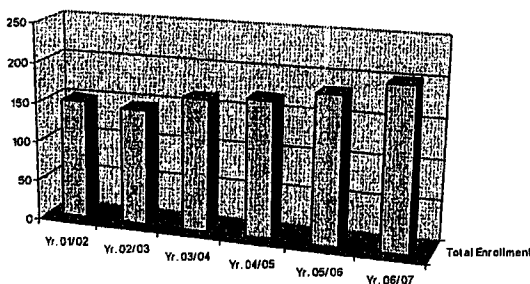
D. Retention and Graduation

Total Enrollment	Yr. 01/02	Yr. 02/03	Yr. 03/04	Yr. 04/05	Yr. 05/06	Yr. 06/07
BS	56	50	50	62	55	70
AAS	68	77	70	60	57	57
pre-BS	0	1	3	4	2	2
pre-AAS	15	16	12	9	11	13
off-BS	11	1	30	35	59	60
Total Enrollment	150	145	165	170	184	202
Degrees						
BS	23	30	21	29		
AAS	27	27	27	22		
Total Degrees	50	57	48	51		

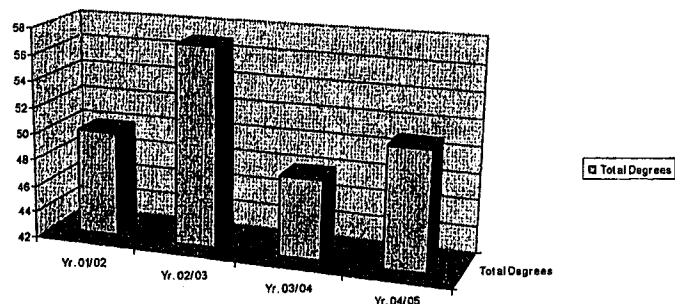
D. Retention and Graduation

1. For the AAS program, according to FSU05/06 Fact book, the average enrollment for the years 01/02 thru 04/05 was 34 students. The average AAS graduates per year for the same time period was 26 students. This would be an average retention rate of 76%. This is average values. For the BS program for the same time period the average enrollment was 27 students. The average BS graduates per year for the same time period was 25 degrees given. This would be an average retention rate of 93%. The actual numbers over this time period are given below. This represents initial students that start and either are not ready for college academically or decide that the field of HVACR is not for them. By the time students get to the 4-year program, they are focused and have a high success rate. Note: off-campus and on-line are figured into this due to the extended time for students to graduate.
2. Students are retained in the program through a number of efforts. Faculty are always available to help students. Students are encouraged to call faculty at home, if necessary. Incoming freshman must be ready for MATH 115/116 prior to taking technical coursework. However, a number of students come to Ferris from career technical centers, where they have good skills, but lack sufficient math and English to be successful. Therefore, a certain failure rate is not unexpected.
3. The number of degrees in the AAS and BS programs has remained relatively steady from 2000 to 2004.
4. Most students who enter the HVACR Engineering Tech. program graduate within two years.
5. On average, most two-year students graduate from HVACR Tech. program graduate in two years, with pre-techs taking an extra semester to graduate.

Total Enrollment



Total Degrees



E. Access

1. The HVACR programs have endeavored to make themselves accessible to more students in a number of ways. First, the HVACR Engineering Tech Program has been available on-line and has graduated the first class. This has gone a long way to bringing a unique and highly sought after degree to students unable to come to Big Rapids or stop working and become a traditional student. This is the ultimate in accessibility. Further, in order to get the students through the degree in a timely manner, courses are now offered during the summer. This also expands the availability of the program.
2. The results of offering classes in on-line has been to provide better visibility for Ferris and its HVACR programs. However, offering classes during the summer semester has contributed to the need for most program faculty to be on overloads every year.
3. The items listed in (1) above certainly serve to improve enrollment and visibility for the programs. When a full contingent of faculty is brought into the program, all these things will help in recognizing the program's goals and priorities.

F. Curriculum: attached in the appendix of this report are check sheets and sample syllabi.

1. The curriculum for both programs are driven to prepare the students to be immediately productive to employers. This is constantly monitored through surveys and input from our advisory board. Since the two-year HVACR Tech. program make up the first two years of the HVACR Engineering Tech. program, the curriculum in the 2-year program also helps prepare the students to enter the 4-year program. Ferris has requirements for such things as cultural enrichment and social awareness electives.
 - a. The program-related courses for all the programs include hands-on practices, blue print reading, troubleshooting and critical thinking, design and layout, installation, electrical, systems, digital control. The junior and senior years include commercial design, load calculation, energy audit, primary equipment selection and the capstone course which includes the ASHRAE design competition. These are very adequate as demonstrated by the students competing with other prominent universities .
 - b. For the AAS program, directed electives and general education courses include: EET115, MATH 115 or 116, ENGL150, ISYS105, ENGL211, COMM121 and one scientific understanding course, one social awareness and one cultural enrichment course. In the BS program, directed electives and general education courses include: MATH126, ISYS204, ECON221, ARCH110, COMM221 and one scientific understanding course, 2 cultural enrichment courses and 1 social awareness course. There is also 1 directed elective of the students choice.
 - c. There are no hidden prerequisites for any required courses.
2. The program has considered some curriculum changes since the last program review, but no changes have taken place at the date of this report.
3. Curriculum changes currently in progress are all relatively minor. The two heating courses would be combine into 1 course and the would be an added sheet metal course..

4. There are no additional plans for curriculum change in the near future.

G. Quality of Instruction

1. As noted in the compiled Current Student Survey (found in Section 2 of this report), the students spoke favorably, in fact very highly, of the core HVACR courses. In addition, they felt their faculty advisors were very helpful, and the HVACR faculty members were an asset to the programs. Results were somewhat mixed regarding courses from outside the curriculum. Program alumni (as found in the survey in Section 2) similarly felt that graduates were well prepared for their career positions. Curricula, relative coursework and quality of faculty were all cited as positives elements of the programs.
2. The advisory committee surveys (Section 2) indicates that both the BS and AAS programs provide excellent skills and training, have high demand for graduates, and have excellent lab and teaching facilities. The BS program provides the skills and education needed by industry, has a high demand for graduates, has excellent computer and lab facilities and meets the needs of industry. They note a need for additional faculty resources.
3. The learning environment has been vastly improved by the construction of the Granger Center, its new computer and lab facilities, and multi-media podiums available in all classrooms and the auditorium. There are no graduate assistants.
4. Each faculty member has attempted to attend at least one continuing education class or seminar annually to improve the level of instruction. Most faculty are active in the professional organizations and work closely with industry.
5. Students are encouraged to interact with faculty and peers in a number of ways. First, all are encouraged to join ASHRAE, MSCA, and ACCA professional organizations that have several social and community service initiatives. Their activities include field trips to industry construction sites, attending monthly membership meeting to here top industry guest speakers, attend international conventions, meetings and workshops. Finally, the program supports several competition teams as described earlier. These competitions help the students hone skills in the field and gauge abilities with top schools from around the world. At the awards banquets, the students give presentations and must speak in front of large crowds, excellent experience for the real world. Students can interact with students and professors from other countries, expanding the real life global awareness and cultural enrichment encouraged by the University.
6. It is felt that the new Granger Center feedback from our advisory committee, infuse teaching and learning in these programs.
7. The qualities of teaching and learning have been enhanced due to state-of-art facilities and a strong interaction between students, faculty and the industry.

H. Composition and Quality of Faculty

1. The following are the names, rank and qualifications of all tenured and tenure-track faculty in the Construction programs.
 - a. John Tomczyk, Professor, M.S., 15 years, tenured
Michael Feutz, Associate Professor, M.S., 9 years, tenured
Michael Korcal, Assistant Professor, M.S., 6 years, tenured
J. Eric Quilitzsch, Assistant Professor, B.S., 5 years, tenure track
Doug Zentz, Assistant Professor, B.S., 4 years, tenure track
Joseph Compton, Assistant Professor, B.S., 3 years, tenure track
Joseph Pacella, Assistant Professor, B.S., 1 year, tenure track
 - b. Promotions and merit raises since last review: There has been promotion to Associate Professor, one positions tenured, one merit increase at the professor level.
 - c. Professional activities since last review: Only three professors were here at the time of the last review. John Tomczyk continues to be a co-author of the widely used Refrigeration and Air Conditioning book in the world. Mike Feutz is department chair, working on his Doctorate degree and sits on numerous committees. Mike Korcal spends considerable time doing professional consulting in all areas of the HVACR field and was a Regional Vice Chair for student activities for ASHRAE, Doug Zentz is on a product review board and is working on committees in Lansing and Washington DC., Joseph Pacella is on a document review panel for a manual that is used throughout North America, Eric Quilitzsch is working on special topics and considerations for on-line delivery of the 4-year program. Joseph Compton is active in the ACCA organization at several levels. All of the other professors are working on their Masters degrees.
2. Workload
 - a. All but one full-time faculty members were on overloads during the 2005-06 school year. A normal load is 12 credits or 18 contracts per semester, or 24/36 per year. Overloads are annualized. Some faculty credit overloads and some contact overloads. The overload is based as a overall percent overload for the year if by credit or contact hours. The 2005-06 overloads were: Korcal (106%), Compton (119%), Quilitzsch (100%), Tomczyk (104%), Zentz (114%) and Pacella (100%). Persons, an adjunct, is teaching a load equal to 97% of a full load for the year. There is also a summer workload that for the 2006 summer, equal to 19 credit hours and 33 contact hours due to the summer on-line courses. For the 2006-07 school year the following overloads will be: Korcal (139%), Compton (111%), Quilitzsch (121%), Tomczyk (100%), Zentz (131%) and Pacella (113%)
 - b. Release time is granted to the Department Chair (in 2004-05, Michael Feutz) to perform administrative duties. This person teaches one-fourth load and has three-fourths release time.

3. Recruitment
 - a. Typically, advertisements for new faculty are published both locally and nationally, in newspapers, the Chronicle, Engineering News Record, and the Associated Schools of Construction website. Applications are reviewed by faculty, and the top three or four candidates are invited to campus. They spend a day here, including a one hour discussion session with faculty and must also make an academic presentation.
 - b. Candidates must have a Masters degree or obtain a Masters degree according to the Universities guidelines. Work experience is based on the position needed and the courses to be taught. The program is so diverse that very few persons working in the field have experience in all the areas taught in the programs.
 - c. The programs are open faculty from diverse backgrounds.
4. All new faculty attend the faculty orientation sessions offered by the university during their first year at Ferris. These sessions provide teaching techniques, how to write on outline, etc. All new faculty are assigned a tenured faculty member as a mentor. New faculty are not assigned advisees during the first year so they may concentrate on teaching.
5. Reward Structure:
 - a. There is no reward structure in the college or department. Exceptional teachers may apply for promotion or merit raises. Professional Development and travel funds are dispersed proportionally, and as funding permits. Individuals seeking professional development may also apply for funds through the dean's office, and awards are based on the merits of the proposal.
 - b. The existing salary structure absolutely limits the ability of the programs to recruit new faculty. Salaries offered typically are less than current faculty members receive, and significantly less than a faculty candidate is currently earning. Therefore, it is difficult to attract highly experienced professionals. New faculty are likely to be younger and less experienced or do not stay causing a high turn over.
 - c. There is no reward structure. However, additional funding is needed for faculty development and travel. A minimum of \$10,000 in additional funding is needed.
 - d. There is no reward structure related to diversity.
6. Graduate Instruction: The HVACR program currently have no graduate instruction.
7. Non-Tenure Tract and Adjunct Faculty
 - a. During the 2005-06 school year, non-tenure track faculty who taught courses in the HVACR and HVAC programs included Bob Persons and Don Steeby.
 - b. AS noted, Persons is teaching the equivalent of 97% of a full load for the year 2005-06. Bob Persons was teaching a range of courses, including Electricity, piping and hydronics, and boilers. Don Steeby taught an electrical course.

- c. In the school year 2005, the HVACR program brought two new faculty on board, Joseph Pacella, experience in residential, light commercial and commercial. Joe also brings experience as a business owner. Michael Korcal has returned to work at Ferris, Mike was a tenured faculty and left to teach for Johnson Controls from 2001 to 2005. Mike returns with experience in teaching in the program and teaching experience in all the areas taught in the HVACR programs.
- d. The programs consider the minimal use of non-tenure track faculty to be appropriate. They often bring a different perspective. If the need for these faculty persists, we prefer to convert the position to tenure-track.

I. Services to Non-majors

- a. The HVACR offers no general education service courses to other departments.
- b. The HVACR program teaches two different courses to the Facility Management program (HVAC) and (HVAC483) This has provided wonderful interaction between departments.
- c. Since the number of service courses taught by our department is roughly equivalent to the courses taught by others for our students, there is no negative impact on the department
- d. It is likely that the number of services courses will remain the same for the foreseeable future.

J. Degree Program Cost and Productivity Data: Attached at the end of this section is data from Institutional Research and Testing. For the 2003-04 school year, the HVACR programs had the following:

SCH's: 2,581
FTEF's: 6.97
SCH/FTEF: 370.15

In addition, the 370.15 SCH/FTEF is slightly higher than the College of Technology average (360.57) and lower than the Ferris average (454.22).

K. Assessment and Evaluation

1. Several variables are tracked and assessed when assessing the effectiveness of the HVACR programs. These include:
 - a. Classroom examinations
 - b. Industry Advisory Committee feedback
 - c. Professional organization standards
 - d. Internal curriculum reviews
 - e. Employment rates
 - f. Success in HVAC 499 capstone course
 - g. Success in competing with other students from other Universities
 - h. Senior students exit surveys
2. In analyzing the factors above, it appears that the HVACR programs are on the right track. Our Industry Advisory Committee is very active and very committed. They indicate that we are teaching the appropriate material and providing the necessary support to our students. The strength of the curriculum is also demonstrated by the fact that a number of different instructors have advised and coached the past ASHRAE design competition winners. A major professional organization, ACCA, as mentioned earlier, awarded the Ferris HVACR programs the teaching excellence award. Employment rates for all programs have been at 100% since the last program review, with many employers returning annually to hire more graduates. Student success in HVAC 499 is typically very high. Normally, most or all students earn a grade of “C” or better in the course, indicating a good general knowledge and retention of HVAC-related coursework. Senior exit surveys indicate general satisfaction with construction-related courses.
3. All of the above are used to assess the curricula and make appropriate changes as deemed necessary. These programs have made significant changes annually to improve delivery, eliminate outdated subject matter, and respond to industry needs.
4. The success of students, high placement rates, and continued ASHRAE competition awards all indicate that the program goals are being met.

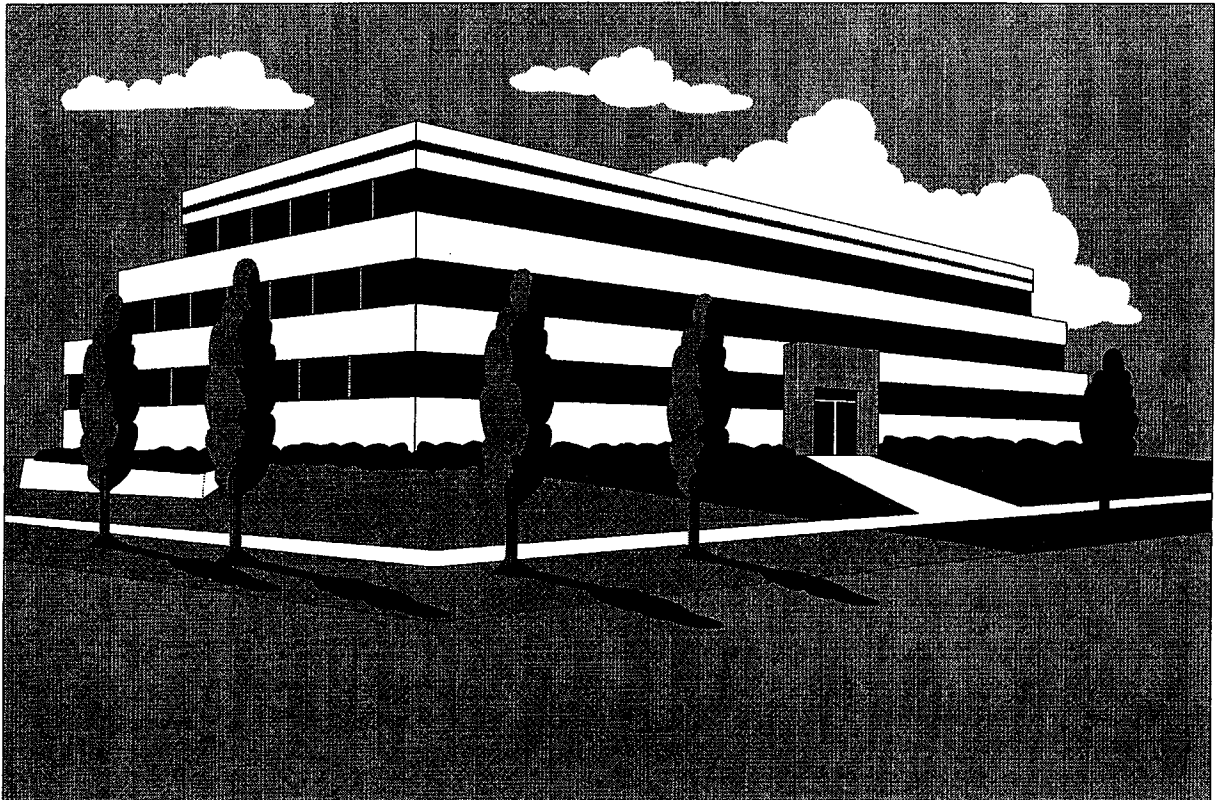
L. Administrative Effectiveness

1. Some of the concerns of the faculty, and the Industry Advisory Committee, has been the lack of consistent leadership in the College of Technology. These past concerns should now be alleviated due to the hiring of a permanent Dean of Technology. At the current time the department chair is experienced and is very effective.

2. It is believed that the programs and department have been run very well. However, on-going co-operation between other college support services, especially computer support, is necessary to keep the on-line HVACR program viable.
3. Class and teaching schedules are prepared with faculty input, and are effectively and fairly prepared. Where possible, schedules may allow a day or blocks of time without teaching duties, to allow faculty to pursue outside interest.
4. Students are able to take courses in a timely manner. Block schedules are prepared to allow all students to get needed courses. Multiple sections of courses are often available, and most core Construction courses are offered in both the fall and winter semesters.

Please note that Program Check sheets and the Administrative Program Review Documents are Included in the Appendix.

FACILITIES & EQUIPMENT EVALUATION
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY



FACILITIES and EQUIPMENT

The HVACR programs have been housed in the newly constructed Granger Center for about one year. This is arguable the finest HVACR teaching facility in the country.

- A. **Instructional Environment:** The HVACR programs operate at the Big Rapids Campus. It should be noted here that during the design phase of the Granger facility, some budget cuts were instituted that resulted in slightly smaller class sizes that were previously entertained. New class size is set to a limit of 32 persons and 16 persons to a lab. The old building had a class size limit of 40 persons and a lab size of 20 persons.

The HVACR programs on the Big Rapids campus are now completely housed in the newly constructed Granger Center, which is shared by the HVACR and Construction programs. The facilities and laboratories are excellent. All instructors have large, private offices. The building has four large classrooms (two dedicated to each program area) and a shared auditorium, all with multimedia podiums. There are four computer labs (two dedicated to each program area) with eighteen stations each. In addition, there are separate laboratories for basic refrigeration, commercial refrigeration, air conditioning and air & hot water heating. Therefore, the current condition of the building greatly enhances program delivery.

The programs' projected needs depend on enrollment. Currently, there are adequate facilities and equipment to accommodate growth. No additional facilities are required at this time. In addition, there are no projected needs for new facilities, with the exception of routine replacement of computers and other lab equipment.

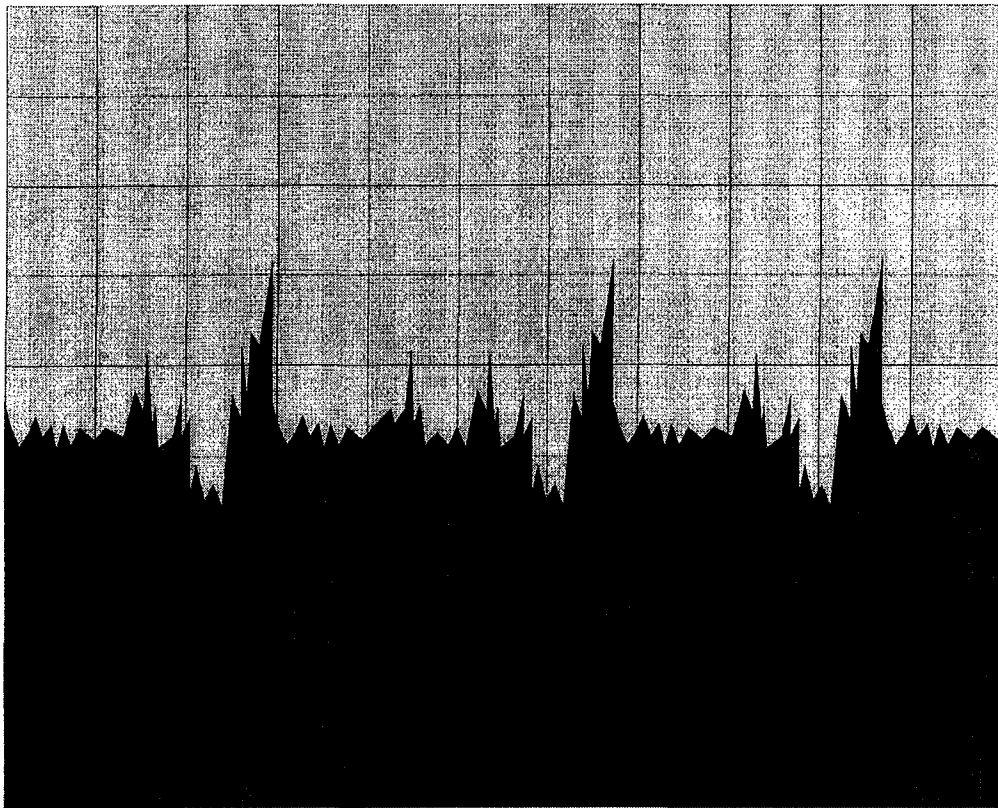
- B. **Computer Access and Availability:** Excluding the computers in faculty and secretarial offices, there are two computer labs with eighteen stations allocated to the HVACR programs. These computers are 2 years old, and were included as part of the new building project. They are loaded with all the software needed for our programs, including word processing, database and spreadsheet packages, AutoCad, and program specific software. Both labs are used for instruction. They are available for students use during the evenings, on weekends, and when no classes are scheduled. The off hours use of the computers has recently become an issue due to the need of our on-line students. On-line students need to access program specific software to complete assignments which ties these computers up during off hours. This problem needs further resolution so the on-campus students have access to adequate computer time with the appropriate software. Adjacent to the labs are available printers and plotters. In addition, there are thirteen general-use computers in the public area of the building that are available to the students from Construction and HVACR programs.

The Granger Center was designed and built to meet the needs of these programs without the inclusion of on-line student needs. The ability to deliver program specific software applications to on-line students is a key problem that must be resolved for the health of the fledgling HVACR on-line program. Also, computers will eventually need to be upgraded or replaced, but routine equipment replacement will not be addressed here.

- C. Other Instructional Technology: The HVACR programs have a wide range of additional resources in addition to computers. First, all classrooms are equipped with multi-media podiums which allow the user to use VHS tapes, DVD's or laptop computers. All the specialize laboratories have specialized instructional devices unique to the discipline being taught. For example, there are a number of test panels to help the students follow through a typical type of HVACR system and it's components. The building itself was designed to be an instructional tool. All of the HVACR equipment and delivery systems are exposed and are used as part of the learning experience. This type of building makes the Ferris HVACR programs unique amount other HVACR programs. Virtually all equipment and furnishings are new with the exception of the control equipment which was donated six years ago. The nature of controls is similar to computers and other highly technical equipment, it is difficult to keep up with the most updated material. Updating of this equipment will be necessary in the near future. It is the HVACR departments hope that the industry will step forward and donate the needed upgrades.
- D. Library Resources: The FLITE library has a variety of resources available to the HVACR programs. These include such things as the 2002 National Electric Code, the latest Michigan Mechanical Code and a variety of HVACR and engineering related references. When polled, the faculty felt that the available resources were adequate.

The faculty and staff at FLITE have been very generous and accommodating regarding group instruction in the use of the library and its resources. They are very helpful to FSUS 100 classes. Regarding budget allocations, Mr. Dickinson frequently requests lists of desired text and references, so the budget allocation is considered adequate.

CONCLUSIONS
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY



CONCLUSIONS

- A. **Relationship to FSU Mission:** It is felt that the FSU HVACR Programs provide education that is exactly aligned with the FSU mission. Students in the program receive practical, career-oriented education that leads to employment world wide.
- B. **Program Visibility and Effectiveness:** The FSU HVACR Programs have a reputation as the leading programs in the HVACR field. This is based on the continued success of the 4 year program competing on and an international level with other schools and honors being given by the industry professional organizations themselves. Students now learn in a state of the art building, enter student competitions on an international level and work for national and international prestigious firms which all serves to increase the FSU visibility and effectiveness.
- C. **Program Value:** The FSU HVACR Programs as of the coming semester with have added a section to the 4-year program due to increased enrollment. This is the first time this has happened in the history of the program. The total enrollment as of Aug. 9 2006 is 202 total students enrolled in HVACR Programs as HVACR majors and a total of 276 total students enrolled in HVACR courses for fall semester. This represents a significant percentage of the students enrolled in the College of Technology. The student credit hour per faculty ratio is high, making the HVACR Programs a valuable asset to the College of Technology.
- D. **Enrollment:** The enrollment in the HVACR BS Program for the coming semester is the highest it has ever been in the history of the program, prompting the addition of another section. The enrollment in the HVACR AAS Program is also increased from previous years, indicating the success of the HVACR marketing person. The HVACR BS on-line program continues to increase enrollment. The current enrollment is now beyond the normal loads of the current faculty. Overloads for the coming school year are as follows: Compton: 111%, Korcal: 139%, Pacella: 113%, Quilitzsch: 121%, Tomczyk: 100% and Zentz: 131%. New faculty is needed to alleviate the above overload problem.
- E. **Characteristics, Quality and Employability of Students:** AAS students are typically from Michigan, BS Students are a mix of Michigan and other states and on-line are mostly out-of-state. In this mix of students there are transfer and non-traditional students. ACT scores for incoming Freshman have risen slightly over the past several years. Most students who do not succeed fail because of poor math skills and usually leave before the sophomore year. Those completing the Freshman year has a good expectation for success. Employment rates for both AAS and BS graduates 100% with most students getting multiple offers.
- F. **Quality of Curriculum and Instruction:** The curriculum has been recognized by professional organizations in the field as being of the highest quality and has awarded this effort. The curriculum has also successfully demonstrated it's effectiveness in head to head competition with schools from around the world winning multiple international awards in consecutive years since 1997.
- G. **Composition and Quality of Faculty:** The faculty members are primarily full-time tenure track individuals who are involved in professional organizations, consulting, continuing education and authorship. All have significant industry work experience spanning the broad areas of study within the HVACR field.

Curriculum Guide Sheets
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY



**HVACR TECHNOLOGY
ASSOCIATE IN APPLIED SCIENCE DEGREE
FALL SEMESTER
Curriculum Guide Sheet**

NAME OF STUDENT _____ STUDENT I.D. _____

Total semester hours required for graduation: 67/68

NOTE: Meeting the requirements for graduation indicated on this sheet is the responsibility of the student. The student is also responsible for meeting all FSU General Education requirements as outlined in the university catalog. Your advisor is available to assist you.

FIRST YEAR-FALL SEMESTER		CREDITS	COMMENTS/GRADE
HVAC 101	Intro to Refrig & A/C Systems (co-req MATH 115/116)	4	
EEET 115	HVACR Electronics	3	
MATH 116	Intermediate Algebra and Trigonometry OR	4	
MATH 115	Intermediate Algebra (USE IN AAS ONLY)	3	
ENGL 150	English 1	3	
ISYS 105	Microcomputer Applications	3	
FIRST YEAR-WINTER SEMESTER			
HVAC 102	Thermodynamics of Refrig (HVAC 101, MATH 115/116)	4	
HVAC 117	A.C. Electrical Applications (EEET 115, MATH 115/116)	5	
HVAC 132	Fund of Heating and Mechanical Systems (MATH 115/116)	3	
_____	Scientific Understanding Elective **	3/4	
SECOND YEAR-FALL SEMESTER			
HVAC 207	Commercial Refrigeration Systems (HVAC 102/117)	5	
HVAC 245	Design of HVAC Systems (MATH 115 or 116)	5	
HVAC 235	Hydronic Residential Oil Heating (HVAC 117 & 132)	5	
ENGL 211	Industrial and Career Writing	3	
SECOND YEAR-WINTER SEMESTER			
HVAC 208	Air Conditioning Applications (HVAC 117)	5	
HVAC 234	Residential Gas Heating (HVAC 117)	3	
_____	Social Awareness (Race/Eth/Gen)*	3	
_____	Cultural Enrichment*	3	
COMM 121	Fundamentals of Public Speaking	3	
OPTIONAL COURSES & DIRECT ELECTIVES			
HVAC 100	Survey of HVACR	1	
HVAC 225	Ductwork	1	
HVAC 290	Special Topics		
HVAC 297	Special Studies		

NOTE: MATH 115 - Intermediate Algebra may be used in the Associate Degree only. Those students laddering into the Bachelor Degree program *must* take MATH 116.

*If planning to pursue the baccalaureate degree in HVACR Engineering Technology, from among the Cultural Enrichment and Social Awareness coursework, at least one global consciousness course should be taken.

** Course must include a laboratory section.

**CURRICULUM REQUIREMENTS
HVACR TECHNOLOGY
ASSOCIATE IN APPLIED SCIENCE DEGREE
FALL SEMESTER**

<u>TECHNICAL</u>	<u>CREDIT HOURS</u>	<u>GENERAL EDUCATION</u>	<u>CREDIT HOURS</u>
HVAC 101 Intro. to Refrig. & A/C Systems	4	<u>Communication Competence</u>	
HVAC 102 Thermodynamics of Refrigeration	4	ENGL 150 English 1	3
HVAC 117 A.C. Electrical Applications	5	ENGL 211 Industrial and Career Writing	3
HVAC 132 Fund. of Heating & Mech. Systems	3	COMM 121 Fundamentals of Public Speaking	3
HVAC 207 Commercial Refrigeration Systems	5		
HVAC 208 Air Conditioning Applications	5	<u>Scientific Understanding</u>	
HVAC 234 Residential Gas Heating	3	Elective	3/4
HVAC 235 Hydronic Residential Oil Heating	5		
HVAC 245 Design of HVAC Systems	5	<u>Quantitative Skills</u>	
		MATH 116 Intermediate Algebra/Trigonometry	4
<u>Technical Related</u>		MATH 115 Intermediate Algebra (AAS Only)	3
EEET 115 HVACR Electronics	3		
ISYS 105 Microcomputer Applications	3	<u>Cultural Enrichment</u>	
		Elective	3
		<u>Social Awareness</u>	
		Elective	3

A.A.S. Degree Minimum General Educational Requirements in Semester Hours:

Cultural Enrichment Credits - 3
Communication Credits - 6

Social Awareness Credits - 3
Scientific Understanding Credits - 3/4

**HVACR ENGINEERING TECHNOLOGY
BACHELOR OF SCIENCE TECHNOLOGY
Curriculum Guide Sheet**

BS Degree Minimum General Education Requirements

(See the General Education webpage at www.ferris.edu/HTML/academics/gened/gened.html for details and acceptable courses in each program)

Communications Competence: 12 semester hours

Quantitative Skills: MATH 115 or ACT scores

Scientific Understanding: 7/8 semester hours,
including at least one lab course

Cultural Enrichment: 9 semester hours,
including at least one course 200 level or higher

Social Awareness: 9 semester hours,
including at least one Foundation course and at least one course
200 level or higher.

At least one Global Consciousness (G) course and
one Race/Ethnicity/Gender (REG) course
(within Cultural Enrichment or Social Awareness)

Meeting all requirements for graduation is the student's responsibility. Your advisor is available to assist you.

Name of Student _____ CWID _____

Total semester hours required for graduation: 64/65 (plus AAS degree)

THIRD YEAR-FALL SEMESTER

CREDITS/GRADE

HVAC 331	HVAC Secondary Equiq. Selection & Design (HVAC 235,245)	5 _____
_____	Scientific Understanding Elective	3-4 _____
MATH 126	Algebra and Analytic Trigonometry	4 _____
ISYS 204	Basic Programming	3 _____

THIRD YEAR-WINTER SEMESTER

HVAC 342	HVAC Load Calculations and Energy Code (HVAC 331)	3 _____
HVAC 312	HVAC Control Theory and Applications (HVAC 331)	4 _____
ECON 221	Principles of Economics 1	3 _____
_____	Cultural Enrichment Elective	3 _____
ARCH 110	Intro to Computer Graphics in Architecture for HVACR Students	2 _____

THIRD YEAR-SUMMER SEMESTER

HVAC 393	Summer Internship	4 _____
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FOURTH YEAR-FALL SEMESTER

HVAC 415	HVAC Dig. Control Systems (HVAC 312, MATH 126/130, ISYS 204)	4 _____
HVAC 462	Primary HVAC Equipment Selection (HVAC 342)	4 _____
HVAC 451	Energy Analysis and Audit [WIC] (HVAC 312 & 342)	5 _____
COMM 221	Small Group Decision Making	3 _____

FOURTH YEAR-WINTER SEMESTER

HVAC 499	Commercial HVAC System Design [WIC] (HVAC 451)	5 _____
_____	Social Awareness Elective (300+)	3 _____
_____	Cultural Enrichment Elective (300+)	3 _____
_____	Directed Elective	3 _____

OPTIONAL COURSES:

- HVAC 490 Special Topics in HVACR
- HVAC 497 Special Topics in HVACR

Students must complete 40 credits at or above the 300 level in the bachelor program. Six credits of 300 level coursework must be taken in the social awareness and/or cultural enrichment courses to meet this requirement. From among the Cultural Enrichment and Social Awareness coursework, at least one global consciousness course must be taken.

**CURRICULUM REQUIREMENTS
HVACR ENGINEERING TECHNOLOGY
BACHELOR OF SCIENCE DEGREE
FALL SEMESTER**

ENTRY CRITERIA:

AAS degree in HVAC Technology with 2.5 GPA.

TECHNICAL			CREDIT HOURS	GENERAL EDUCATION		CREDIT HOURS
HVAC	331	HVAC Second, Equip. Sel. & Design	5	<u>Communication Competence</u>		
HVAC	312	HVAC Control Theory & Applica.	4	COMM 221	Small Group Decision Making	3
HVAC	342	HVAC Load Calcula. & Engy. Code	3	<u>Scientific Understanding</u>		
HVAC	393	Summer Internship	4	Elective		3/4
HVAC	415	HVAC Digital Control Systems	4	<u>Quantitative Skills</u>		
HVAC	451	Energy Analysis and Audit	5	MATH 126	Algebra & Analytic Trigonometry	4
HVAC	462	Primary HVAC Equip. Selection	4	<u>Cultural Enrichment</u>		
HVAC	499	Commercial HVAC System Design	5	Elective		3
<u>Technical Related</u>				Elective (300 level or higher)		3
ARCH	110	Intro to Comp Graphics in Arch for HVACR Students	2			3
ISYS	204	Basic Programming	3	<u>Social Awareness</u>		
<u>Technical Elective</u>				Elective (300 level or higher)		3
Directed Elective			3	ECON 221	Principles of Economics 1	3

Administrative Program Review 2004
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY



9/26/05

**Administrative Program Review
Program:**

Purpose of Administrative Program Review

1. to facilitate a process led by the deans and department heads/chairs to assess and evaluate programs under their supervision
2. to facilitate long term planning and recommendations to the VPAA
3. to collection and analyze information that will be useful in the University's accreditation efforts; Academic Program Review deliberation; and assessment.

Instructions: Please prepare a report following the outline below:

I. Summary of modifications since last report:

No changes have taken place since the last report.

II. Program Assessment/Assessment of Student Learning

a. What is the program's learning outcomes?

The goal of the AAS program is to produce graduates that can design, install, service and systematically troubleshoot and repair unitary HVACR equipment.

The goal of the BS program is to produce graduates that can analyze, design, select, control and manage energy consumption of HVACR commercial and industrial systems.

b. What assessment measures are used, both direct and indirect?

For the AAS program, students are assessed using lab observation and written tests. No standardized tests are used.

For the BS program, the capstone course is used as an overall assessment instrument.

Culminates with a 35-page report submitted to the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) for judging in an annual system selection and system design competition. Ferris students have won this international competition for the past seven years, and have won or placed in both categories for the past five years. Encompasses all of the lessons learned in the upper-level coursework and provides students with opportunity to apply what they have learned. Involves a complete mechanical system design based on architectural drawings of a building provided by ASHRAE. Students perform Psychrometric analysis, load calculations, analyze several systems using numerous criteria, select a system based on criteria, economic analysis and adherence to ASHRAE standards, select primary HVAC equipment, write control sequences, design the distribution systems and perform friction loss calculations to select appropriate fans and pumps. Their findings are published in the submittal and include CAD drawings of the system.

c. What is the assessment cycle for the program?

The standard APR cycle, and we are conducting the surveys this semester.

d. What assessment data were collected in the past year?

No official standards are currently used for the AAS program. A number of national standards are available for AAS HVACR programs. The entities are in competition with one another and none have been established as the industry standard. All are lobbying the HVACR Department to become accredited under their banner. This will allow them to gain politically by advertising that Ferris State University endorses their organization. For political reasons, the HVACR Department has chosen not to choose one over the other. The

current thinking is that the HVACR Department will remain non-accredited, or will become accredited by all entities. At present, this represents an investment in time and funding that is deemed unnecessary.

The BS program is unique and no standard exists against which it can be measured. As such, no assessment data is collected for either program.

- e. How have assessment data been used for programmatic or curricular change?

NA

Course Outcomes Assessment

- a. Do all multi-sectioned courses have common outcomes? Yes
- b. If not, how do you plan to address discrepancies?
- c. How do individual course outcomes meet programmatic goals?

All course outcomes are targeted toward the programmatic goal

III. Program Features

1. Advisory Board

- a. Does the program have a board/committee? Yes. When did it last meet? October, 2005. When were new members last appointed? October, 2005. What is the composition of the committee (how many alumni, workplace representatives, academic representatives, etc.) 10 alumni, 23 workplace representatives, 1 academic representative, 1 recent graduate representative (not counted in the 10 alumni).
- b. If no advisory board exists, please explain by what means faculty receive advice from employers and outside professionals to inform decisions within the program.
- c. Has feedback from the Advisory Board affected programmatic or curricular change?

Feedback from the advisory board is being ignored. The advisory board strongly recommends that more lab hours be added to the AAS program, as recent graduates have not been as strong as those graduates from before the conversion from quarters to semesters. Faculty attempted to comply with this request through a curriculum change proposal. However, the VPAA has announced that no curriculum proposals containing more than 128 credits would be approved. Since the proposal on the table contained more than 128 credits, it was retracted.

Faculty feel that the program is being compromised, but feel that they have no choice in the matter. Faculty further wonder why the advisory board's views are sought if they are to be ignored.

2. Internships/Cooperative or Experiential Learning

- a. Is an internship required or recommended? Required.
- b. If the internship is only recommended, what percentage of majors elect the internship option?
- c. What challenges does the program face in regard to internships? What is being done to address these concerns?

The poor economy of the past several years have made securing internships difficult for some students, especially those with English as a second language. Faculty put forth extra effort to help students, but internships can be challenging to find.

- d. Do you seek feedback from internship supervisors? Yes. If so, does that feedback affect pedagogical or curricular change? Yes.

3. Online Courses

- a. Please list the web-based courses, both partial internet and fully online, offered last year.

Class		Section	Credits
HVAC	332	1	4
HVAC	342	1	3
HVAC	313	2	3
HVAC	415	2	
HVAC	462	1	4
HVAC	451	2	
HVAC	499	1	

- b. What challenges and/or opportunities have web-based instructions created?

Lack of university infrastructure, lack of faculty positions, lack of university support

- c. What faculty development opportunities have been encouraged/required in order to enhance web-based learning within the program?

Faculty have participated in WebCT training, and take advantage of our instructional designer.

- d. How has student feedback been used to enhance course delivery?
 Student feedback led us to develop a 'pre' online class. This class is offered on WebCT and shows students how to learn on WebCT. It also provides a self assessment tool, so they can see if learning online is for them. Student feedback has also led to numerous modifications to course delivery methods, to course information dissemination methods, to communication methods and to submittal methods. The online HVACR program is very dynamic in its approach, since we are new at it and challenges constantly crop up that require improved techniques and methods.
- e. Is there any plan to offer this program online? If yes, what rationale is there to offer this program online? (emerging market opportunity? expand enrollment? demand for niche program offering? etc.

4. Accreditation

- a. Is the program accredited or certified? No.
 b. By whom?
 c. When is the next review?
 d. When is the self-study due?
 e. How has the most recent accreditation review affected the program?

5. Student/Faculty Recognition

- a. Have students within the program received any special recognition or achievement? Yes.

- b. Have faculty within the program received any special recognition or achievement? Yes.

6. Student Engagement

- a. Is volunteerism and student engagement a structured part of the program? No.
- b. Does the program utilize service learning in the curriculum? No.
- c. Does the program participate in the American Democracy Project? No.

IV. Academic Program Review Recommendations

Please indicate the recommendations (enhancements or changes) made by APRC in the most recent review of the program by the APRC council. What actions have been taken in response to these recommendations?

Areas of strength:

The HVACR programs have long enjoyed a national reputation as a leader in HVACR education.

BS degree students won the international ASHRAE design competition again. This measures the program against other institutions that teach HVACR system design. No other school has won two years in a row. FSU has won five of the past six years and placed second once. No other school has taken first in two categories in the same year. FSU placed first in selection and design for three years in a row. With this year's first in design and second in selection, FSU has placed at the top in two categories for the past four years. FSU's record stands as follows:

- 1998 - 1st Place HVAC System Design
- 1999 - 2nd Place HVAC System Design
- 2000 - 1st Place HVAC System Design
1st Place HVAC System Selection
- 2001 - 1st Place HVAC System Design
1st Place HVAC System Selection
- 2002 - 1st Place HVAC System Design
1st Place HVAC System Selection
- 2003 - 1st Place HVAC System Design
2nd Place HVAC System Selection
- 2004 1st Place HVAC System Design
2nd Place HVAC System Selection
- 2005 3rd Place HVACR System Design

The MSCA Student Chapter has been named chapter of the year two out of four times the award has been given. Students from this chapter also placed third in the 2002/2003 MSCA Student Competition.

Compared to other HVACR programs, typically found at the community college or technical school level, the HVACR programs at FSU benefit from the economy of scale associated at the university level. Benefits include:

- more laboratories dedicated to specific sectors of the industry,

- a larger, more diverse inventory of lab equipment obtained through generous industry donations
- more faculty with diverse areas of expertise

Nearly 300,000 technicians have been certified to work with refrigerants through the program's CFC certification program. These certifications have given much exposure the Ferris State University.

The new Granger Center has given the HVACR Department the largest and most up-to-date facility in the nation. From a recruiting and educational perspective, the new facility is a tremendous asset.

The HVACR Department generates additional monies through its Institutes, and those sources are on the rise. After the breakup with ACCA, revenue dropped. Now, with Steve Eichenberg managing the Institutes, revenue of between \$20,000 and \$40,000 is expected annually. Additionally, income from endowment earnings, although light due to the low investment markets, does provide approximately \$100,000 of available funds on an annual basis.

Areas of concern (and proposed actions to address them):

Enrollment numbers are the primary concern of the department. Jill Trinklein was hired in fall 2004 as a marketing specialist and has been very active updating transfer guides with dozens of community colleges are arranging campus tours for students ranging from 8th grade through community college. New marketing materials have been developed that consolidated multiple other pieces of information and the web site is now updated on a regular basis. Despite these efforts, enrollment fell during fall 2005.

The secondary area of concern is perceived internal threats to the technical content of the program. Although technical programs require immersion in industry specific classes, and have for hundreds of years, current administration appears to be posturing to eliminate credits and water down remaining content by creating a First Year of Studies type of approach. This liberal arts approach is very successful and central to the mission of many institutions of higher learning, but is counter to the current mission of Ferris and poses a serious threat to the intensive content of the HVACR programs. The current curriculum proposal being forwarded by the HVACR Department confirms these threats and includes cuts to the time students can spend with faculty. The only action that could address this issue would be for administration to realize that technical programs do indeed require intensive hands on learning experiences. Students simply do not learn technology by reading it in a book or by doing it once in the lab. Faculty that have taught technical courses as a career have seen this first hand and know it to be true.

State funding has been and will continue to be a concern. No action can be taken to increase State funding.

Institute income and endowment earnings have and will continue to supplement HVACR income sources. This is good news, but is an area of concern because spending from this income source and the income source itself are both at the mercy of upper administration. The income and resulting funds have weathered threats from a previous Provost and a previous Dean. In the past five and one half years, there have been six changes in COT leadership at the dean level (soon to be seven), four VPAA's and two presidents. Each new administrator presents a potential threat to internal HVACR funds and income. The

change in leadership brings with it new administrative philosophies and has resulted in a lack of empowerment at the Department level to handle its own finances. At a minimum, administrative scrutiny of spending from internal income generated through the endowment and the Institutes, while important for oversight, has restricted the ability of the HVACR Department to act on its own behalf in a timely fashion. There is little the HVACR Department can do to protect internal income, other than trust the good judgment of upper administration and lobby new administrators to protect the income and funds.

Future goals:

Marketing and Recruiting:

Increase marketing and recruiting efforts with the goal of enhancing growth while attracting better prepared students to match the capacity of the new HVACR building and the distance learning program. Place emphasis on recruiting 2-year students. Work more closely with FSU personnel and consultants who have expertise in this area. Time frame is immediate and ongoing.

On-line Program

Improve quality of current on-line offerings. Time frame is immediate and ongoing.

Curriculum Review

As both a review of the past several years and a goal for the coming year, the following is submitted. Our goal is to complete the curriculum proposal that was finalized last year, submitted and then retracted. After years of study and significant faculty effort, the submitted proposal was retracted and contact and credit hours were trimmed from the program in a manner of minutes at a single faculty meeting. What started as an in depth study of our curriculum outcomes and assessments ended in a wholesale butchering of credit hours. The goal then is to get the proposal approved in time for fall 2006 and make the best of it.

Faculty

The faculty has undergone a complete turnover in the past seven and a half years with the exception of one. At this time, there are three tenured faculty, one first year, one second year, one third year and one fourth year tenure track faculty. An additional position is filled with a full time semester to semester faculty. All of the tenure track faculty are working on masters degrees. The goal is to retain current faculty so that they can mature and contribute more as their tenure and master degree work completes.

Other recommendations:

The major recommendation for now is not to take on additional initiatives until the faculty has gained experience, earned higher level degrees and settled in.

Ferris State University
 Administrative Program Review 2004
 College of Technology
 Pre-HVACR Technology AAS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount	15		15	9		9	14		14	9		9	6		6
Freshman SCH's	204		204	131		131	193		193	133		133	84		84
Sophomore Headcount	2		2	5		5			0	2		2	2		2
Sophomore SCH's	18		18	72		72			0	22		22	26		26
Junior Headcount			0			0	2		2	1		1	1		1
Junior SCH's			0			0	22		22	17		17	4		4
Senior Headcount	1		1	1		1			0			0			0
Senior SCH's	12		12	12		12			0			0			0
TOTAL HEADCOUNT	18		18	15		15	16		16	12		12	9		9
TOTAL SCH's	234		234	215		215	215		215	172		172	114		114

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates			0			0			0			0			0

Ferris State University
 Administrative Program Review 2004
 College of Technology
 HVACR Technology AAS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount	27		27	28		28	30		30	17		17	17		17
Freshman SCH's	415		415	417		417	448		448	248		248	273		273
Sophomore Headcount	26		26	25		25	31		31	41		41	25		25
Sophomore SCH's	393		393	391		391	500		500	608		608	372		372
Junior Headcount	14		14	13		13	12		12	11		11	14		14
Junior SCH's	182		182	154		154	183		183	166		166	224		224
Senior Headcount	1		1	2		2	4		4	1		1	4		4
Senior SCH's	15		15	28		28	61		61	15		15	28		28
TOTAL HEADCOUNT	68		68	68		68	77		77	70		70	60		60
TOTAL SCH's	1005		1005	990		990	1192		1192	1037		1037	897		897

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates	23		23	28		28	27		27	27		27	28		28

Ferris State University
 Administrative Program Review 2004
 College of Technology
 HVACR Engineering Technology BS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount		2	2		2	2			0		4	4	1	4	5
Freshman SCH's		4	4		6	6			0		16	16	16	16	32
Sophomore Headcount	3		3	1		1	1		1	2	1	3	1		1
Sophomore SCH's	45		45	12		12	12		12	27	4	31	16		16
Junior Headcount	20	4	24	17	2	19	13	1	14	15	4	19	16	13	29
Junior SCH's	297	10	307	252	8	260	206	2	208	244	16	260	215	52	267
Senior Headcount	43	7	50	38	7	45	36		36	33	21	54	44	18	62
Senior SCH's	653	18	671	563	22	585	553		553	477	74	551	678	75	753
TOTAL HEADCOUNT	66	13	79	56	11	67	50	1	51	50	30	80	62	35	97
TOTAL SCH's	995	32	1027	827	36	863	771	2	773	748	110	858	925	143	1068

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates	32		32	32	4	36	20	3	23	27	3	30	21		21

FERRIS STATE UNIVERSITY

Ranked Listing of Student Credit Hours (SCH) / Full Time Equated Faculty (FTEF) Aggregated by Course Prefix Fall + Winter Semesters 2003-2004

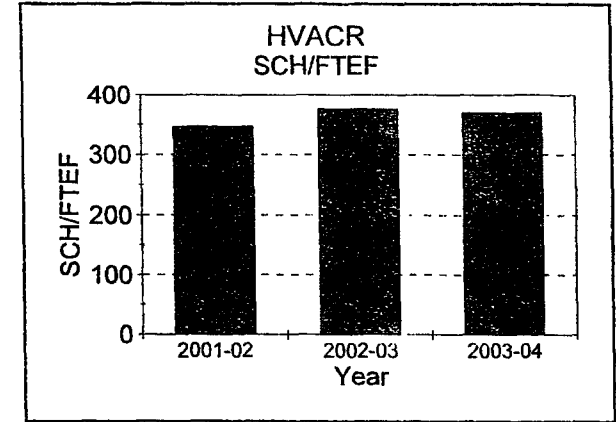
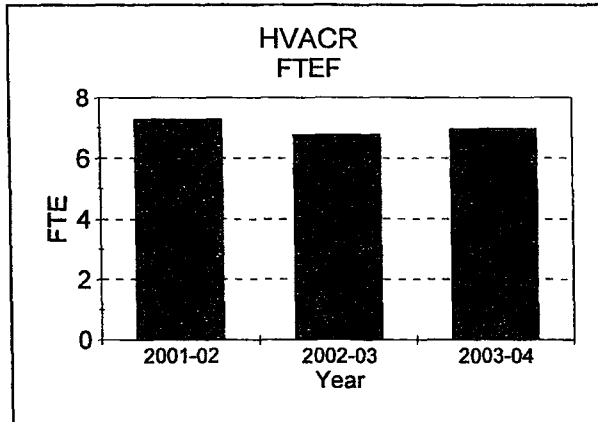
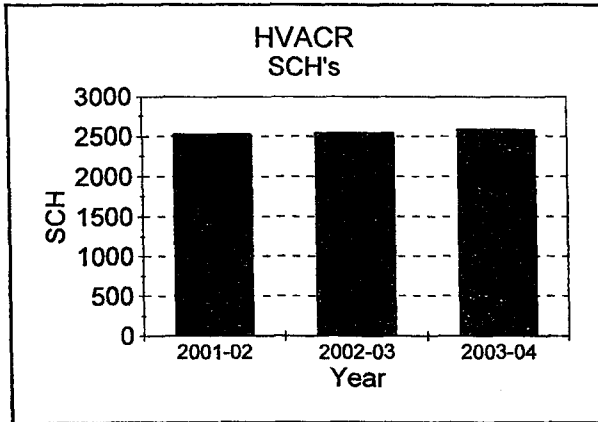
Course Description	Course Prefix	Student Credit Hours/ Full Time Equated Faculty (SCH/FTEF)
Heating, Ventilation, Air Conditioning & Refrig Tec	HVAC	370.15
Welding Engineering Technology	WELD	369.45
Facilities Management	FMAN	360.00
Respiratory Care	RESP	358.93
Kendall College Social Science	KCSS	358.14
Electrical and Electronics Engineering Technology	EEET	356.80
Television Production	TVPR	354.47
Computer Network and Systems	ECNS	354.04
Automotive Service Technology	AUTO	353.56
CAD Drafting and Tool Design	CDTD	347.86
Architectural Technology	ARCH	346.65
University College Program	UNCP	341.69
Diagnostic Medical Sonography	SONO	340.00
Visual Design and WEB Media	VISD	339.17

Ferris State University

Student Credit Hours (SCH), Full Time Equated Faculty (FTEF) and SCH/FTEF Aggregated by Department

Fall and Winter Terms Combined

HVACR (College of Technology)



<u>Year</u>	<u>SCH</u>	<u>FTEF</u>	<u>SCH/FTEF</u>
2001-02	2,527.00	7.28	346.94
2002-03	2,544.00	6.77	375.81
2003-04	2,581.00	6.97	370.15

<< New Department - - College of Technology Reorganized in 2000-01 >>
<< see detailed information for the FTE and SCH data prior to 2001-02 and/or previous Productivity Reports >>

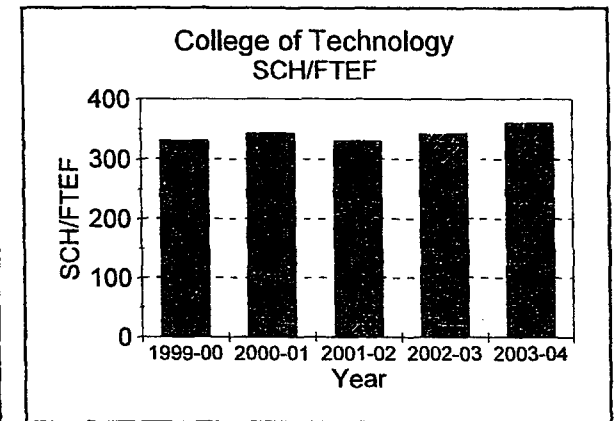
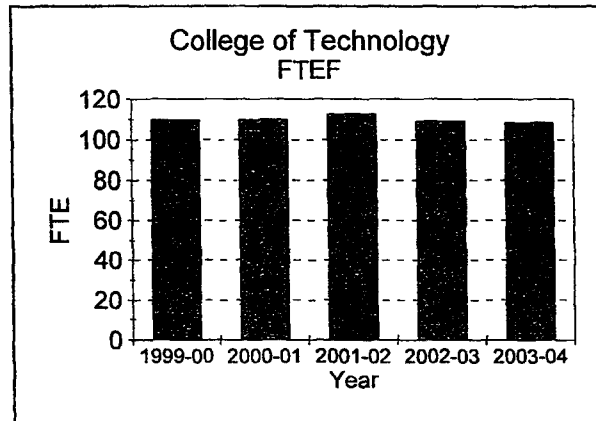
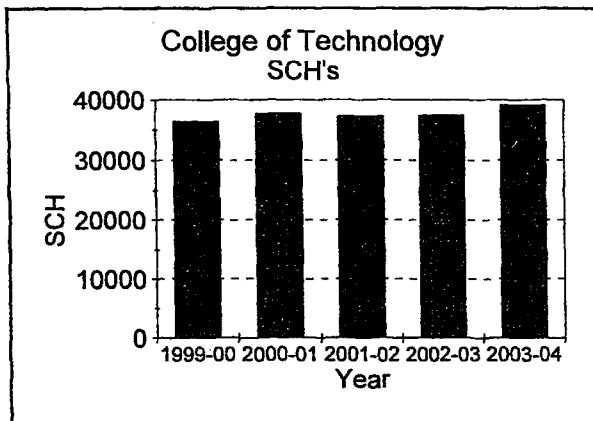
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Ferris State University

Student Credit Hours (SCH), Full Time Equated Faculty (FTEF) and SCH/FTEF Aggregated by College

Fall and Winter Terms Combined

College of Technology



<u>Year</u>	<u>SCH</u>	<u>FTEF</u>	<u>SCH/FTEF</u>
1999-00	36,389.00	109.73	331.62
2000-01	37,801.00	109.94	343.83
2001-02	37,308.00	112.84	330.62
2002-03	37,465.00	109.27	342.87
2003-04	39,117.00	108.49	360.57

Caution: When viewing graphs, please note the differences in scales

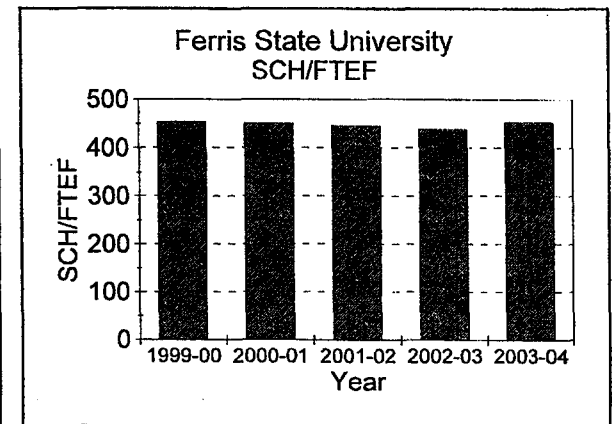
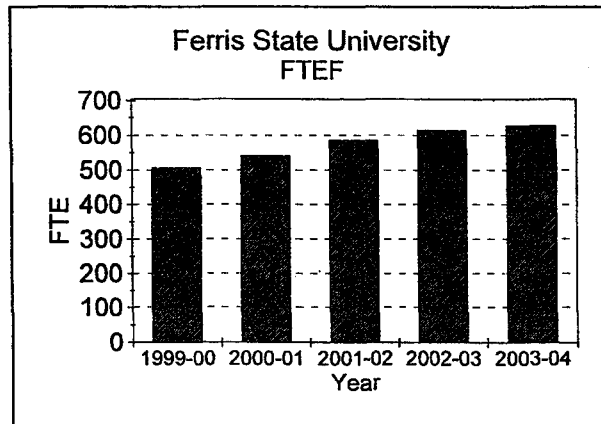
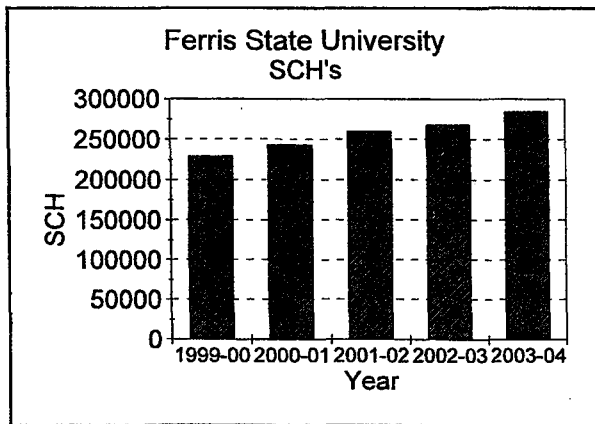
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Ferris State University

Student Credit Hours (SCH), Full Time Equated Faculty (FTEF) and SCH/FTEF Aggregated by University

Fall and Winter Terms Combined

FSU



<u>Year</u>	<u>SCH</u>	<u>FTEF</u>	<u>SCH/FTEF</u>
1999-00	229,276.50	504.43	454.53
2000-01	243,185.00	538.82	451.32
2001-02	260,521.00	583.23	446.69
2002-03	268,592.00	611.23	439.43
2003-04	284,155.00	625.59	454.22

Caution: When viewing graphs, please note the differences in scales

Source: Office of Institutional Research, g:\...fload\0304\prdungr.rsl

LABOR MARKET ANALYSIS
For
AAS in HVACR TECHNOLOGY
BS in HVACR ENGINEERING TECHNOLOGY



Heating, Air-Conditioning, and Refrigeration Mechanics and Installers

(0*NET 49-9021.01, 49-9021.02)

Significant Points

- Job prospects for heating, air-conditioning, and refrigeration mechanics and installers are expected to be good, particularly for those with technical school or formal apprenticeship training.
- The Air-Conditioning Excellence program, offered through North American Technician Excellence, is the standard for certification of experienced technicians.

Nature of the Work

What would those living in Chicago do without heating, those in Miami do without air-conditioning, or blood banks all over the country do without refrigeration? Heating and air-conditioning systems control the temperature, humidity, and the total air quality in residential, commercial, industrial, and other buildings. Refrigeration systems make it possible to store and transport food, medicine, and other perishable items. Heating, air-conditioning, and refrigeration mechanics and installers—also called technicians—install, maintain, and repair such systems. Because heating, ventilation, air-conditioning, and refrigeration systems often are referred to as HVACR systems, these workers also may be called HVACR technicians.

Heating, air-conditioning, and refrigeration systems consist of many mechanical, electrical, and electronic components, such as motors, compressors, pumps, fans, ducts, pipes, thermostats, and switches. In central heating systems, for example, a furnace heats air that is distributed throughout the building via a system of metal or fiberglass ducts. Technicians must be able to maintain, diagnose, and correct problems throughout the entire system. To do this, they adjust system controls to recommended settings and test the performance of the entire system using special tools and test equipment.

Technicians often specialize in either installation or maintenance and repair, although they are trained to do both. Some specialize in one type of equipment—for example, oil burners, solar panels, or commercial refrigerators. Technicians may work for large or small contracting companies or directly for a manufacturer or wholesaler. Those working for smaller operations tend to do both installation and servicing, and work with heating, cooling, and refrigeration equipment. Service contracts—which involve heating, air-conditioning, and refrigeration work for particular customers on a regular basis—are becoming more common. Service agreements help to reduce the seasonal fluctuations of this work.

Heating and air-conditioning mechanics install, service, and repair heating and air-conditioning systems in both residences and commercial establishments. *Furnace installers*, also called *heating equipment technicians*, follow blueprints or other specifications to install oil, gas, electric, solid-fuel, and multiple-fuel heating systems. *Air-conditioning mechanics* install and service central air-conditioning systems. After putting the equipment in place, they install fuel and water supply lines, air ducts and vents, pumps, and other components. They may connect electrical wiring and controls and check the unit for proper operation. To ensure the proper functioning of the system, furnace installers often use combustion test equipment, such as carbon dioxide and oxygen testers.

After a furnace has been installed, heating equipment technicians often perform routine maintenance and repair work to keep the system operating efficiently. During the fall and winter, for example, when the system is used most, they service and adjust burners and blowers. If the system is not operating properly, they check the thermostat, burner nozzles, controls, or other parts to diagnose and then correct the problem.

During the summer, when the heating system is not being used, heating equipment technicians do maintenance work, such as replacing filters, ducts, and other parts of the system that may accumulate dust and impurities during the operating season. During the winter, air-conditioning mechanics inspect the systems and do required maintenance, such as overhauling compressors.

Refrigeration mechanics install, service, and repair industrial and commercial refrigerating systems and a variety of refrigeration equipment. They follow blueprints, design specifications, and manufacturers' instructions to install motors, compressors, condensing units, evaporators, piping, and other components. They connect this equipment to the ductwork, refrigerant lines, and electrical power source. After making the connections, they charge the system with refrigerant, check it for proper operation, and program control systems.

When heating, air-conditioning, and refrigeration mechanics service equipment, they must use care to conserve, recover, and recycle chlorofluorocarbon (CFC) and hydrochlorofluorocarbon



Service contracts—which involve heating, air-conditioning, and refrigeration maintenance on a regular basis—are becoming more common.

(HCFC) refrigerants used in air-conditioning and refrigeration systems. The release of CFCs and HCFCs contributes to the depletion of the stratospheric ozone layer, which protects plant and animal life from ultraviolet radiation. Technicians conserve the refrigerant by making sure that there are no leaks in the system; they recover it by venting the refrigerant into proper cylinders; and they recycle it for reuse with special filter-dryers.

Heating, air-conditioning, and refrigeration mechanics and installers are adept at using a variety of tools, including hammers, wrenches, metal snips, electric drills, pipe cutters and benders, measurement gauges, and acetylene torches, to work with refrigerant lines and air ducts. They use voltmeters, thermometers, pressure gauges, manometers, and other testing devices to check airflow, refrigerant pressure, electrical circuits, burners, and other components.

Other craftworkers sometimes install or repair cooling and heating systems. For example, on a large air-conditioning installation job, especially where workers are covered by union contracts, ductwork might be done by sheet metal workers and duct installers; electrical work by electricians; and installation of piping, condensers, and other components by pipelayers, plumbers, pipefitters, and steamfitters. Home appliance repairers usually service room air-conditioners and household refrigerators. (Additional information about each of these occupations appears elsewhere in the *Handbook*.)

Working Conditions

Heating, air-conditioning, and refrigeration mechanics and installers work in homes, stores of all kinds, hospitals, office buildings, and factories—anywhere there is climate-control equipment. They may be assigned to specific jobsites at the beginning of each day, or if they are making service calls, they may be dispatched to jobs by radio, telephone, or pager. Increasingly, employers are using cell phones to coordinate technicians' schedules.

Technicians may work outside in cold or hot weather or in buildings that are uncomfortable because the air-conditioning or heating equipment is broken. In addition, technicians might have to work in awkward or cramped positions and sometimes are required to work in high places. Hazards include electrical shock, burns, muscle strains, and other injuries from handling heavy equipment. Appropriate safety equipment is necessary when handling refrigerants because contact can cause skin damage, frostbite, or blindness. Inhalation of refrigerants when working in confined spaces also is a possible hazard.

The majority of mechanics and installers work at least a 40-hour week. During peak seasons they often work overtime or irregular hours. Maintenance workers, including those who provide maintenance services under contract, often work evening or weekend shifts and are on call. Most employers try to provide a full workweek year-round by scheduling both installation and maintenance work, and many manufacturers and contractors now provide or even require service contracts. In most shops that service both heating and air-conditioning equipment, employment is stable throughout the year.

Employment

Heating, air-conditioning, and refrigeration mechanics and installers held about 249,000 jobs in 2002; almost half worked for cooling and heating contractors. The remainder was employed in a variety of industries throughout the country, reflecting a widespread dependence on climate-control systems. Some worked for fuel oil dealers, refrigeration and air-conditioning service and repair shops, schools, and stores that sell heating and air-conditioning systems. Local governments, the Federal Government, hospitals, office build-

ings, and other organizations that operate large air-conditioning, refrigeration, or heating systems employed others. About 15 percent of mechanics and installers were self-employed.

Training, Other Qualifications, and Advancement

Because of the increasing sophistication of heating, air-conditioning, and refrigeration systems, employers prefer to hire those with technical school or apprenticeship training. Many mechanics and installers, however, still learn the trade informally on the job.

Many secondary and postsecondary technical and trade schools, junior and community colleges, and the U.S. Armed Forces offer 6-month to 2-year programs in heating, air-conditioning, and refrigeration. Students study theory, design, and equipment construction, as well as electronics. They also learn the basics of installation, maintenance, and repair.

Apprenticeship programs frequently are run by joint committees representing local chapters of the Air-Conditioning Contractors of America, the Mechanical Contractors Association of America, the National Association of Plumbing-Heating-Cooling Contractors, and locals of the Sheet Metal Workers' International Association or the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada. Other apprenticeship programs are sponsored by local chapters of the Associated Builders and Contractors and the National Association of Home Builders. Formal apprenticeship programs normally last 3 to 5 years and combine on-the-job training with classroom instruction. Classes include subjects such as the use and care of tools, safety practices, blueprint reading, and the theory and design of heating, ventilation, air-conditioning, and refrigeration systems. Applicants for these programs must have a high school diploma or equivalent. Math and reading skills are essential.

Those who acquire their skills on the job usually begin by assisting experienced technicians. They may begin by performing simple tasks such as carrying materials, insulating refrigerant lines, or cleaning furnaces. In time, they move on to more difficult tasks, such as cutting and soldering pipes and sheet metal and checking electrical and electronic circuits.

Courses in shop math, mechanical drawing, applied physics and chemistry, electronics, blueprint reading, and computer applications provide a good background for those interested in entering this occupation. Some knowledge of plumbing or electrical work also is helpful. A basic understanding of electronics is becoming more important because of the increasing use of this technology in equipment controls. Because technicians frequently deal directly with the public, they should be courteous and tactful, especially when dealing with an aggravated customer. They also should be in good physical condition because they sometimes have to lift and move heavy equipment.

All technicians who purchase or work with refrigerants must be certified in their proper handling. To become certified to purchase and handle refrigerants, technicians must pass a written examination specific to the type of work in which they specialize. The three possible areas of certification are: Type I—servicing small appliances, Type II—high-pressure refrigerants, and Type III—low-pressure refrigerants. Exams are administered by organizations approved by the U.S. Environmental Protection Agency, such as trade schools, unions, contractor associations, or building groups.

Several organizations have begun to offer basic self-study, classroom, and Internet courses for individuals with limited experience. In addition to understanding how systems work, technicians must be knowledgeable about refrigerant products and the legislation and regulations that govern their use. The Air-Conditioning Excellence

program, which is offered through North American Technician Excellence (NATE), generally has been adopted as the standard for certification of experienced technicians.

Advancement usually takes the form of higher wages. Some technicians, however, may advance to positions as supervisor or service manager. Others may move into areas such as sales and marketing. Still others may become building superintendents, cost estimators, or, with the necessary certification, teachers. Those with sufficient money and managerial skill can open their own contracting business.

Job Outlook

Job prospects for heating, air-conditioning, and refrigeration mechanics and installers are expected to be good, particularly for those with technical school or formal apprenticeship training. Employment of heating, air-conditioning, and refrigeration mechanics and installers is expected to increase faster than the average for all occupations through the year 2012. As the population and economy grow, so does the demand for new residential, commercial, and industrial climate-control systems. Technicians who specialize in installation work may experience periods of unemployment when the level of new construction activity declines, but maintenance and repair work usually remains relatively stable. People and businesses depend on their climate-control systems and must keep them in good working order, regardless of economic conditions.

Renewed concern for energy conservation should continue to prompt the development of new energy-saving heating and air-conditioning systems. An emphasis on better energy management should lead to the replacement of older systems and the installation of newer, more efficient systems in existing homes and buildings. Also, demand for maintenance and service work should increase as businesses and homeowners strive to keep systems operating at peak efficiency. Regulations prohibiting the discharge of CFC and HCFC refrigerants took effect in 1993, and regulations banning CFC production became effective in 2000. Consequently, these regulations should continue to result in demand for technicians to replace many existing systems, or modify them to use new environmentally safe refrigerants. In addition, the continuing focus on improving indoor air quality should contribute to the creation of more jobs for heating, air-conditioning, and refrigeration technicians. Also, growth of business establishments that use refrigerated equipment—such as supermarkets and convenience stores—will contribute to a growing need for technicians. In addition to job openings created by employment growth, thousands of openings will result from the need to replace workers who transfer to other occupations or leave the labor force.

Earnings

Median hourly earnings of heating, air-conditioning, and refrigeration mechanics and installers were \$16.78 in 2002. The middle 50 percent earned between \$12.95 and \$21.37 an hour. The lowest 10 percent earned less than \$10.34, and the top 10 percent earned more than \$26.20. Median hourly earnings in the industries employing the largest numbers of heating, air-conditioning, and refrigeration mechanics and installers in 2002 were as follows:

Hardware, and plumbing and heating equipment and supplies merchant wholesalers	\$18.78
Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance	17.16
Direct selling establishments	17.14
Elementary and secondary schools	16.80
Building equipment contractors	16.03

Apprentices usually begin at about 50 percent of the wage rate paid to experienced workers. As they gain experience and improve their skills, they receive periodic increases until they reach the wage rate of experienced workers.

Heating, air-conditioning, and refrigeration mechanics and installers enjoy a variety of employer-sponsored benefits. In addition to typical benefits such as health insurance and pension plans, some employers pay for work-related training and provide uniforms, company vans, and tools.

About 20 percent of heating, air-conditioning, and refrigeration mechanics and installers are members of a union. The unions to which the greatest numbers of mechanics and installers belong are the Sheet Metal Workers' International Association and the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada.

Related Occupations

Heating, air-conditioning, and refrigeration mechanics and installers work with sheet metal and piping, and repair machinery, such as electrical motors, compressors, and burners. Other workers who have similar skills include boilermakers; home appliance repairers; electricians; sheet metal workers; and pipelayers, plumbers, pipefitters, and steamfitters.

Sources of Additional Information

For more information about opportunities for training, certification, and employment in this trade, contact local vocational and technical schools; local heating, air-conditioning, and refrigeration contractors; a local of the unions or organizations previously mentioned; a local joint union-management apprenticeship committee; or the nearest office of the State employment service or apprenticeship agency.

For information on career opportunities, training, and technician certification, contact:

- Air-Conditioning Contractors of America (ACCA), 2800 Shirlington Rd., Suite 300, Arlington, VA 22206. Internet: <http://www.acca.org>
- Refrigeration Service Engineers Society (RSES), 1666 Rand Rd., Des Plaines, IL 60016-3552. Internet: <http://www.rses.org>
- Plumbing-Heating-Cooling Contractors (PHCC), 180 S. Washington St., P.O. Box 6808, Falls Church, VA 22046. Internet: <http://www.phccweb.org>
- Sheet Metal and Air-Conditioning Contractors' National Association, 4201 Lafayette Center Dr., Chantilly, VA 20151-1209. Internet: <http://www.smacna.org>

For information on technician testing and certification, contact:

- North American Technician Excellence (NATE), 4100 North Fairfax Dr., Suite 210, Arlington, VA 22203. Internet: <http://www.natex.org>

For information on career opportunities and training, contact:

- Associated Builders and Contractors, Workforce Development Department, 4250 North Fairfax Dr., 9th Floor, Arlington, VA 22203.
- Home Builders Institute, 1201 15th St. NW., 6th Floor, Washington, DC 20005-2800. Internet: <http://www.hbi.org>
- Mechanical Contractors Association of America, 1385 Piccard Dr., Rockville, MD 20850-4329. Internet: <http://www.mcaa.org>
- Air-Conditioning and Refrigeration Institute, 4100 North Fairfax Dr., Suite 200, Arlington, VA 22203. Internet: <http://www.coolcareers.org> or <http://www.arl.org>

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship System. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their Web site: <http://www.doleta.gov>

Mechanical Engineers

(0*NET 17-2141.00)

Nature of the Work

Mechanical engineers research, develop, design, manufacture, and test tools, engines, machines, and other mechanical devices. They work on power-producing machines such as electric generators, internal combustion engines, and steam and gas turbines. They also develop power-using machines such as refrigeration and air-conditioning equipment, machine tools, material handling systems, elevators and escalators, industrial production equipment, and robots used in manufacturing. Mechanical engineers also design tools that other engineers need for their work. The field of nanotechnology, which involves the creation of high-performance materials and components by integrating atoms and molecules, is introducing entirely new principles to the design process.

Computers assist mechanical engineers by accurately and efficiently performing computations, and by permitting the modeling and simulation of new designs as well as facilitating changes to existing designs. Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM) are used for design data processing and for turning the design into a product.

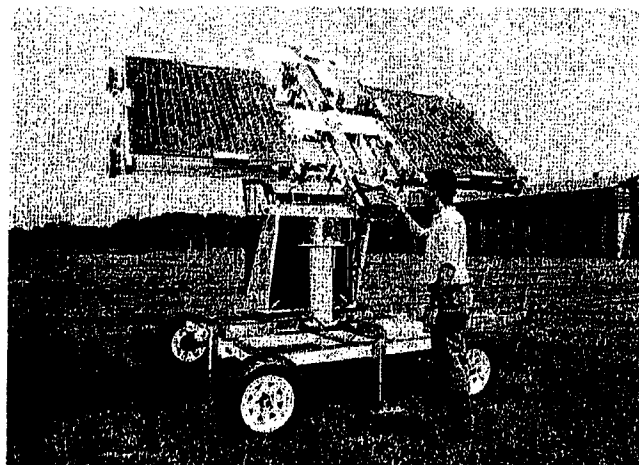
Mechanical engineers work in many industries, and their work varies by industry and function. Some specialize in energy systems; applied mechanics; automotive design; manufacturing; materials; plant engineering and maintenance; pressure vessels and piping; and heating, refrigeration, and air-conditioning systems. Mechanical engineering is one of the broadest engineering disciplines. Mechanical engineers may work in production operations in manufacturing or agriculture, maintenance, or technical sales; many are administrators or managers.

Employment

Mechanical engineers held about 215,000 jobs in 2002. More than half of the jobs were in manufacturing—mostly in machinery, transportation equipment, computer and electronic products, and fabricated metal products manufacturing industries. Architectural, engineering, and related services, and the Federal Government provided many of the remaining jobs.

Job Outlook

Employment of mechanical engineers is projected to grow more slowly than the average for all occupations through 2012. Although overall employment in manufacturing industries—where employment of mechanical engineers is concentrated—is expected to decrease slightly, employment of mechanical engineers in manufacturing should increase more rapidly as the demand for improved machinery and machine tools grows and as industrial machinery and processes become increasingly complex. Also, emerging technologies in biotechnology, materials science, and nanotechnology will create new job opportunities for mechanical engineers. Additional opportunities for mechanical engineers will arise because a degree in mechanical engineering often can be applied in other engineering specialties. In addition to job openings arising from growth, many openings should result from the need to replace workers who transfer to other occupations or leave the labor force.



Some mechanical engineers specialize in developing new energy systems.

Earnings

Median annual earnings of mechanical engineers were \$62,880 in 2002. The middle 50 percent earned between \$50,800 and \$78,040. The lowest 10 percent earned less than \$41,490, and the highest 10 percent earned more than \$93,430. Median annual earnings in the industries employing the largest numbers of mechanical engineers in 2002 were:

Federal government	\$72,500
Architectural, engineering, and related services	65,610
Navigational, measuring, electromedical, and control instruments manufacturing	65,430
Aerospace products and parts manufacturing	65,160
Other general purpose machinery manufacturing	55,850

According to a 2003 salary survey by the National Association of Colleges and Employers, bachelor's degree candidates in mechanical engineering received starting offers averaging \$48,585 a year, master's degree candidates had offers averaging \$54,565, and Ph.D. candidates were initially offered \$69,904.

Sources of Additional Information

General information about mechanical engineers as well as information on careers, education, and training is available from:

► The American Society of Mechanical Engineers, 3 Park Ave., New York, NY 10016. Internet: <http://www.asme.org>

Information about heating, refrigeration, and air-conditioning engineering, a mechanical engineering specialty, is available from:

► American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 1791 Tullie Circle NE., Atlanta, GA 30329. Internet: <http://www.ashrae.org>

Information about automotive engineering, a mechanical engineering specialty, is available from:

► Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA 15096-0001. Internet: <http://www.sae.org>

See the introduction to the section on engineers for information on working conditions, training requirements, and other sources of additional information.

HVACR Programmatic Marketing Plan & Budget Prepared: 10/17/06

Thomas Oldfield, College of Technology Dean
Mike Feutz, HVACR Department Chair
Jill M. Trinklein, PR Marketing and Distance Learning Officer

2006 New Enrollments:
HVACR Associate Degree: 32, up 228 %
HVACR Bachelor: 47, up 168%.
HVACR On-line Bachelor: 32

Current HVACR Marketing Strategy

Marketing to diverse youth and HVACR working professionals is the goal. They are people of ethnic, gender, race, income and age groups with varying backgrounds and needs specific to “in demand” career paths. Continually, our team has strived to provide the best customer service to those groups we serve by offering the Associate and Bachelor’s degree on site and the Bachelor’s degree on-line to meet the need. We also have a long history of supporting community activities important to the growth and visibility of our student’s, industry, and other HVACR two year instructors, as well but not limited to, our student organizations which include M.S.C.A., A.C.C.A., and A.S.H.R.A.E.

To remain effective and help ensure all of our marketing efforts remain consistent with both Ferris State University standards and the in-house HVACR principles specified above, we have formalized our long-standing practices by adhering to recommendations of alumni, incoming and former students, our Program Review Panel, and our advisory committee.

Best efforts to review and change marketing HVACR strategies have been implemented. The strategy is not limited to the targeting of youth only, but includes all target markets here in described. In addition, communication about marketing with faculty, students, industry, other instructors, and our advisory committee is key to our ability to remain a leader in the educational community. The marketing campaign review of HVACR materials is completed by including Ferris State University’s University Marketing and Advancement Department, as well as our Advisory Committee, who make up key parts of our industry (manufacturing, sales, contractors, alumni and faculty). These groups provide feedback, both verbally and in writing, to avoid the distribution of materials that are offensive and promote widely contentious and culturally sensitive materials that are safe as well as functional. Last but not least, materials are produced are representative of all the target groups we are seeking to attract to the program. If the marketing materials are not well received by the University or any other party, the marketing team adjusts the materials or campaign to alleviate any issues before they occur.

HVACR Diversity- An approach that builds community.

Embracing differences has allowed our HVACR marketing team to imagine more. The make up of our marketing team should be the model for most. The word diversity means different things to different people. Our team sees diversity as “differences and in common qualities that allow us to succeed while acting as a team to make effective decisions in education structures. Human differences can include, but are not limited to; race, gender, culture, physical and educational background make up of faculty members and students, alumni and advisory committee counterparts. Critical success, in regards to diversity, means to embrace and encompass all inclusive decisions, as it relates to faculty, class make up structure, advisory, and industry.

All media and educational materials that are produced are sensitive to the very nature of diversity and combine those differences and similarities in the pursuit of new ideas and individual relationships we make every day. Embracing these differences allows for unique approaches and personal growth in ways we never imagined or expected but allow for a diverse solution to any problem our program may come across.

Living our diverse values allows us to contribute positively to our communities and our educational environment. Giving back collective solutions is apart of the departmental culture and makes up for a large part of our continued success within the HVACR industry. To site an example of how diverse we are, consider the national A.S.H.R.A.E. competition where student projects have placed nationally eight out of the last ten years due to the make up of the team. In 2006, the winning student team’s cultural make up was of different nationalities and was representative of the vastly different geographical locations students were recruited from. Also, as apart of HVAC 451, innovative Energy Audits for large scale businesses are produced by HVACR seniors. Once again, student teams are of diverse make up allowing for innovative solutions for large scale businesses.

HVACR Demographics, Target Markets and Competition

Primary markets include: diverse high school graduates, transfer students and working professionals. Secondary markets: Industry professionals, Ferris State University alumni and instructors/school counselors. In addition, we target both men and women, equally.

Current demographical data indicates that most students, about 40% of Associate degree students, ladder in to the Bachelor degree program. The remaining 60 % of Bachelor students are transfer students from Community Colleges across the United States. Most Associate degree incoming students came from the following regions to include: Grand Rapids/Muskegon, Big Rapids (four county radiuses), Detroit, Lansing, and Traverse City.

The only direct competition to Ferris State University HVACR Bachelor degree program is Pennsylvania State Technical College who has a four year program that holds a “fast

follower” position. The competition facing the HVACR Associate Degree program is held by local Community Colleges and Technical Schools.

Current Enrollment Trends and rationale

Current HVACR students surveyed over the last four years have shown an increase in the amount of students **per school** where we have developed positive relationships with instructors or school counselors. Thus, we will continue to focus on the quality of our relationships by creating positive word of mouth amongst our partners in secondary schools, technical centers, community colleges and industry.

The success of this marketing plan is dependant upon how we, as a department, handle the growth that occurs as a result of such an aggressive plan. Our team’s ability to accomplish the goal of increased enrollment set forth by our marketing plan is primarily dependant upon the commitment to the plan and the ability to maintain timelines by involved faculty and staff. In order to do this, our team will have to focus on the students by providing small class sizes and more one on one student/instructor /faculty relationships in order to maintain retention. In order to accomplish this goal, three key factors must exist; quality students, instructors and support staff. In HVACR, you will find a commitment to excellence amongst all the partners; an emphasis of respect in how we treat our prospects, students, alumni, industry, and each other. In order to retain such numbers and keep up with intended growth, it is imperative to maintain key staff positions and reduce faculty overloads to the program.

2005/2006 Marketing Strategy-

Use the resource of HVACR students, advisory and instructors to promote the HVACR program by visiting schools and community colleges and to provide tours.

Highlights include:

- Coordinated Granger tours for 600 students for the following school districts; the Mecosta-Osceola, Newaygo, Kent Career, Muskegon M. Tech, Traverse City Vocational, Career Line Technical, Kent Career Center, Kalamazoo, TCI and Cuyahoga Valley.
- Set up in state visits with: Mecosta-Osceola Career Center, Grand Rapids Public Schools, Niles High School, Traverse City Public Schools, Grand Rapids Community College, Muskegon M. Technical, Kent Career Center, Newaygo Vocational Center.
- Set up out-of-state travels to Community Colleges:
Travel 1- November 2005, Ohio Visit- Mike Feutz
Cuyahoga Valley Career Center- Brecksville, Ohio
RETS Tech. Center- Centerville, Ohio
Cincinnati State Tech. & Community College- Cincinnati, Ohio
Miami Valley Career Technology Center- Clayton, Ohio
Columbus State Community College- Columbus, Ohio

University of North Western Ohio- Lima, Ohio
Belmont Technical College - Claivesville, Ohio

Travel 2- January 2006, Canada Visit- Vordyn Nelson & Jill Trinklein

Humber College- Ontario, Canada

Travel 3- February 2006, Ohio Visit to schools- Jill Trinklein-

Cuyahoga Valley Career Center- Brecksville, Ohio
Cincinnati State Tech. & Community College- Cincinnati, Ohio
Miami Valley Career Technology Center- Clayton, Ohio
Columbus State Community College- Columbus, Ohio
Terra State Community College- Fremont, Ohio
University of North Western Ohio- Lima, Ohio
Sinclair Community College- Dayton, OH
Vaterott Community College- Akron, OH
Stark State Community College- Akron, OH

Travel 4- March 2006, Chicago Visit- Vordyn Nelson & Jill Trinklein

Elgin Community College- Elgin, Illinois
College of DuPage- Glen Lake, Illinois
College of Lake College- Grayslake, Illinois
Gateway Community College-
Harper Community College- Chicago, Illinois
Triton Community College- Chicago Illinois

Travel 5- March/April 2006, Minnesota/Wisconsin Visit- Jill Trinklein

Minneapolis Community & Technical College- Minneapolis, MN
Minnesota State College South East Technical- Red Wing, MN
Gateway Technical College- Burlington, WI
Chippewa Valley Technical College- Eau Claire, WI
Moraine Park Technical College- Fon Du Lac, WI
Milwaukee Area Technical & Community College- Milwaukee, WI

- Mailings
 - ✓ September- 56 Community Colleges with Transfer Guides, CD and magnet
 - ✓ October- 750 Homecoming postcards to alumni
 - ✓ November- Thanksgiving cards- 150 to industry partners
 - ✓ December- Mailings to all fall prospects generated by EMT systems
 - ✓ April- AP Testing Event mailings to all freshman entering 2 year program
 - ✓ May- Scholarship mailings to all applied and admitted students
 - ✓ Ongoing- Mailings to all new HVACR admits

- “Lasting Impressions” recruiting with HVACR students at community colleges
 - ✓ Oakland Community College- Jason Kopychek in October, 2005
 - ✓ Lansing Community College- Chad Smith in November, 2005
 - ✓ Mid Michigan Community College- Scott Russell & Tia Manyen in March, 2006

- Develop relationships with 15 Community Colleges by visiting and creating transfer agreements for National ARI Instructors Summit in April, 2006
- Networking with industry partners to place students at AHR Trade Show- January, 2006.
- Providing personal calls and scheduling registration with all new admits in July and August.
- Preregistering 21 transfer students in April, 2006.
- Development of Virtual Tour by HVACR and Construction- Enid Carlson Nagel

2006/2007 HVACR Marketing Plan Summary

Use the resource of HVACR staff, students, advisory board and instructors to promote the HVACR program by visiting schools, providing tours and hosting ARI Regional Instructors Summit for the purpose of enhancing positive relationships with instructors, school counselors, students, alumni and industry partners.

• Granger Tours

Approximately 1400 students, instructors and school counselors will have attended Granger tours during Fall of 2006 to include: ARI Regional Summer Conference, Newaygo County Career Technical Center, Morley/Stamwood Schools. Mecosta/Osceola Career Center, Career Line Technical, Muskegon M. Tech, Kent Skills Center, Kalamazoo Community College, Mid Michigan Community College, TCI of New York, Big Rapids Middle School and Huron Valley Technical Center, and Traverse City Bay Technical School.

• Career Expos & College Visits:

Approximately 1, 200 students will have attended Career Pathway events to include J.A. Grand Valley Career Expo, Grand Valley Community Schools Career Expo. and Newaygo Career Pathway Expo during 2006 and 2007.

• HVACR Trade Shows:

HVACR Faculty and staff are scheduled to attend: Comfortech, A.C.C.A., State and National Conferences, M.S.C.A. State and National Conferences, A.H.R. Exposition and M.P.P C. Conference. Approximately 145, 500 HVACR industry representatives will have attended.

• HVACR Student Organizations

This year the team has or will have provided representation of the university and department at relevant career/job placement/recruiting to include: Women in HVACR, Women in Technology, M.S.C.A. Regional Student Summit, and M.S.C.A. –Vancouver. A.C.C.A. - Texas, Armstrong International Steam Training in Three Rivers, ASHRAE in Texas and National A.C.C.A. in California.

• **2007 ARI Regional Instructors Summit**

Our goal is to target 350 instructors from across the country to attend the second conference to be held at Ferris State University in June 2007. In 2005, 96 instructors attended. The HVACR team plans on doubling this number.

• **HVACR Community College Transfer Guide**

The HVACR department has developed professional relationships for the purpose of creating transfer agreements for individual student recruiting. Last year we developed in-house DB and Transfer Guides. To date, over 100 Transfer Guides have been created and 89 have been updated to the Ferris State University Website at: www.ferris.edu//technology/hvacr

- “Lasting Impressions” In-state Community Colleges
Recruiting with HVACR students
 - ✓ Oakland Community College- Jason Kopychek in October, 2006
 - ✓ Lansing Community College- Tim in November, 2006
 - ✓ Humber College- Lucky in January, 2007

- Out-of-State Community Colleges

Travel 1-April 2006, New York Visits- Jill Trinklein

* Dates to be determined for the middle part of February, 2007.

Suffolk County Community College Brentwood, N.Y.

Technical Career Institute New York City, N.Y.

Dutchess County Community College Poughkeepsie, N.Y.

Monroe Community College Rochester, N.Y.

Hudson Valley Community College Troy, N.Y.

Mohawk Valley Technical College Utica, N.Y.

Travel 2- May 2006, Maine Visit- Jill Trinklein

* Dates to be determined for the middle part of March, 2007.

Eastern Maine Technical College- Bangor, Maine

North Maine Technical College- Presque Isle, Maine

New Hampshire Community College- Manchester, N.H.

Massasoit Community College- Canton, Massachusetts

New England Institute - Warwick, R.I.

• **Further develop and update marketing mediums and giveaways:**

✓ Update web and develop a closer relationship with University Marketing and Advancement. *Fall HVACR program and web are being updated with prospective students as the key focus. Secondary markets include: current students, HVACR industry and alumni.* Website Layout complete. *Coordinating with this activity with Enid Carlson-Nagel.*

✓ Update the Alumni Website for the HVACR department. Site location: <http://www.ferrisalumni.org/>- All news releases to date are located at this site for alumni to view.

✓ 8 News articles have been sent for COT Newsletter.

✓ 2 News articles for FYI

✓ Develop Preliminary 2006/2007 Budget-

<i>Marketing Item Description:</i>	<i>Amount:</i>	<i>Total Price:</i>	<i>Target Audience/Event</i>
HVACR Pens	300	\$341.00	Incoming students, instructors and industry
HVACR T-Shirts	600	\$941.00	Incoming students, instructors and industry
Bumper Sticker	1000	\$295.00	Incoming students, instructors and industry
Safety Glasses	312	\$967.20	Students, instructors and industry
64 MB Flash Drive, 1 GIG	45, 4	\$1,022.00	Instructors and student recruiters
Carpenter Pencils	1000	\$332.64	Trade shows, CP fairs
Stainless Mug	150	\$692.21	Instructors, students, counselors
		\$4,815.05	

Marketing Medium	Amount	Total Price	
Marketing Virtual Tour CD	2000	\$2,600.00	All
Marketing Virtual Tour Brochure	2000	\$695.00	All
HVACR Instructors Animations			Instructors and students
Marketing Brochures-HVACR	2000	\$695.00	All
On-line Fliers	In house		On-Line students, instructors
Transfer Scholarship	In house		Transfer students, Community Colleges
HVACR Salaries Sheets	In house		College counselors, students
FSU Fast Facts Brochure			Students, instructors
CP Handouts	In house		High school students ,instructors
Magnets	50	\$150.00	Instructors
Cell Phone Rings	In House		New Admits
		\$4,140.00	

Joseph C. Compton
Vitae

EXPERIENCE

August 2004 – present

Ferris State University, *Big Rapids, MI*
Assistant Professor

January 1994 – August 2004

Ferris State University, *Big Rapids, MI*
HVAC Mechanic, service, install and retrofit HVAC equipment

July 1991 – January 1992

Intn'l Furniture Manufacturing Company, *Big Rapids, MI*
Quality Control, SPC evaluation, parts routing

June 1990 – February 1991

FitzSimons Manufacturing Company, *Big Rapids, MI*
Process Engineer

September 1993 – January 1994

Ferris State University, *Big Rapids, MI*
Groundskeeper

EDUCATIONAL BACKGROUND

Present

Ferris State University, *Big Rapids, MI*
36 credits toward MBA

2003

Ferris State University, *Big Rapids, MI*
Bachelor of Science: HVACR Engineering Technology

1997

Ferris State University, *Big Rapids, MI*
AAS: HVACR Technology

1992

Ferris State University, *Big Rapids, MI*
Bachelor of Science: Manufacturing Engineering Technology

1988

Ferris State University, *Big Rapids, MI*
AAS Degree: Machine Tool Technology

1978

Ferris State University, *Big Rapids, MI*
AAS Degree: Ornamental Horticulture Technology

PROFESSIONAL MEMBERSHIPS

Air Conditioning Contractors of America (ACCA)
American Society of Heating, Refrigeration and Air Conditioning
Engineers (ASHRAE)

CLASSES TAUGHT

HVAC 101, HVAC 102, HVAC 208, HVAC 245

Michael J. Feutz
Vitae

EXPERIENCE

May 1989 – present

Ferris State University
HVACR Department Chair, Associate Professor

May 1989 to May 1998

Western Michigan Sheet Metal Joint Apprenticeship Training Committee
(J.A.T.C.) *Muskegon, MI*
Training Coordinator, Instructor, and Certified Welding Inspector (CWI)

1993 to 1989

National Training Fund/Ohio State University, *Columbus, OH and Albuquerque, NM*
Training Consultant:

May 1977 to May 1989

Enterprise Construction Services, *Grand Rapids, MI*, J. Klanderman Company, *Grand Rapids, MI*, Franklin Holwerda Company, *Grand Rapids, MI*
Sheet metal worker, designer, TAB technician

EDUCATIONAL BACKGROUND

Present

Western Michigan University, *Kalamazoo, MI*
Doctoral candidate, Educational Leadership

2001

Ferris State University, *Big Rapids, MI*
Master of Science: Career Technical Education, distinction
Outstanding Student, 2001

1997

Ferris State University, *Big Rapids, MI*
Bachelor of Science: HVACR Engineering Technology, highest distinction

1995

Ohio State University, *Columbus, OH*
Certificate: Sheet Metal Apprentice Instructor

1981

Sheet Metal Workers Apprentice Program, *Grand Rapids, MI*
Certificate: Journeyman Sheet Metal Worker

1976

Grand Rapids Community College, *Grand Rapids, MI*
Associates Degree: Heating, Refrigeration, and Air Conditioning

PROFESSIONAL MEMBERSHIPS

American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
Air Conditioning Contractors of America (ACCA)
American Society for Engineering Education (ASEE)
Michigan Education Association (MEA)

CLASSES TAUGHT

HVAC 132, HVAC 337, HVAC 483, FSUS 100

PUBLICATIONS

Study Guide for EPA Section 608 Test
Study Guide for UA STAR Exam
Curriculum for UA Plumbers, San Jose, California

Michael J. Korcal
Vitae

EXPERIENCE

July 2005 – present	Ferris State University, <i>Big Rapids, MI</i> Assistant Professor, tenured
July 2001 – July 2005	Johnson Controls Inc., JCI Institute, <i>Orlando, FL.</i> Senior Instructional Technologist
August 1996 – July 2001	Ferris State University, <i>Big Rapids, MI</i> Assistant Professor, tenured
May 1994 – August 1996	Air-N-Energy Consulting, <i>Traverse City, MI</i> Senior Energy and Control Consultant
November 1992 – May 1994	Technical Energy Solutions, <i>Byron Center, MI</i> Project Manager for NOVAC controls, includes design & programming
November 1991 – November 1992	The Upjohn Company, <i>Kalamazoo, MI</i> HVACR Design & Project Manager for R&D division

EDUCATIONAL BACKGROUND

2000	Ferris State University, <i>Big Rapids, MI</i> Master of Science: Career Technical Education, highest distinction
1991	Ferris State University, <i>Big Rapids, MI</i> Bachelor of Science: HVACR Engineering Technology, highest distinction
1990	Ferris State University, <i>Big Rapids, MI</i> AAS: HVACR Technology, highest distinction
1979	Michigan State University, <i>East Lansing, MI</i> Bachelor of Science: Medical Technology, high distinction

PROFESSIONAL MEMBERSHIPS

American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
Michigan Education Association (MEA)
American Society of Clinical Pathologists (ASCP)

CLASSES TAUGHT

HVAC 132, HVAC 234, HVAC 245, HVAC 312, HVAC 331, HVAC 342, HVAC 393, HVAC 415, HVAC 451, HVAC 483, HVAC 497, HVAC 499

PUBLICATIONS

HVAC Electrical Troubleshooting CD

Joseph Pacella
Vitae

EXPERIENCE

July 2005 – present	Ferris State University, <i>Big Rapids, MI</i> Assistant Professor
2002 – July 2005	Advantage Heating & Air, L.L.C., <i>Houghton Lake, MI</i> Owner of commercial & residential HVAC Mechanical Contracting
1997 – 2002	Answer Heating & Cooling Inc., <i>Houghton Lake, MI</i> GM, all sales, project management and operations
1990 - 1997	Nelson Trane, <i>Flint, MI</i> Project Engineer & Manager/Sales
1987 - 1990	The Limbach Company, <i>Pontiac, MI</i> Project Engineer for commercial HVAC

EDUCATIONAL BACKGROUND

Present	Ferris State University, <i>Big Rapids, MI</i> 9 credits toward Master of Science: ISM
1987	Ferris State University, <i>Big Rapids, MI</i> Bachelor of Science: Energy Management
1982	Ferris State University, <i>Big Rapids, MI</i> AAS: HVACR Technology

PROFESSIONAL MEMBERSHIPS

American Society of Heating, Refrigeration and Air Conditioning
Engineers (ASHRAE)
Michigan Education Association (MEA)

CLASSES TAUGHT

HVAC 132, HVAC 245, HVAC 342, HVAC 451, HVAC 462

J. Eric Quilitzsch
Vitae

EXPERIENCE

May 2002 – present

Ferris State University, *Big Rapids, MI*
Assistant Professor

1997 – May 2002

Johnson Controls Inc., *Grand Rapids, MI*
Project Engineer, design, install, commission of control projects

1993 - 1997

Hurst Mechanical, *Comstock Park, MI*
Service Mechanic on commercial HVACR equipment

1992 - 1993

Mid State Industrial, *Big Rapids, MI*
System Engineer, layout and design of commercial equipment

Fall 2001

Ferris State University, *Big Rapids, MI*
Adjunct Faculty for HVAC 415

EDUCATIONAL BACKGROUND

2006

Ferris State University, *Big Rapids, MI*
Master of Science: ISM

2002

Ferris State University, *Big Rapids, MI*
Bachelor of Science: HVACR Engineering Technology

1992

Ferris State University, *Big Rapids, MI*
A.A.S., HVACR Technology, honors, Outstanding Student of the Year

PROFESSIONAL MEMBERSHIPS

American Society of Heating, Refrigeration and Air Conditioning
Engineers (ASHRAE)
Michigan Education Association (MEA)

CLASSES TAUGHT

HVAC 312, HVAC 314, HVAC 415, HVAC 451, HVAC 499

Douglas F. Zentz
Vitae

EXPERIENCE

2003 – present	Ferris State University, <i>Big Rapids, MI</i> Assistant Professor
January 1996 - 2003	Trane Company, <i>Novi, MI</i> Industrial Sales Engineer for commercial/industrial HVACR equipment
September 1994 – September 1995	EPPA Industries, <i>Detroit, MI</i> President of company that constructed custom air handlers
April 1992 – September 1994	W. J. O'Neil Co, <i>Livonia, MI</i> Manager of Industrial Sales of commercial HVAC equipment
June 1981 – April 1992	The Trane Company, <i>Farmington Hills, MI</i> Sales Engineer of commercial / industrial HVAC equipment
1981	The Trane Company, <i>La Crosse, WI</i> Sales Engineer Trainee

EDUCATIONAL BACKGROUND

Present	Ferris State University, <i>Big Rapids, MI</i> 18 credits toward Master of Science: Career Technical Education
1980	Purdue University, <i>West Lafayette, IN</i> Bachelor of Science: Mechanical Engineering Technology
1975	Purdue University, <i>West Lafayette, IN</i> A.A.S.: Mechanical Engineering Technology

PROFESSIONAL MEMBERSHIPS

American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
Michigan Education Association (MEA)

CLASSES TAUGHT

HVAC 331, HVAC 332, HVAC 333, HVAC 337, HVAC 342 HVAC 462,
HVAC 499

Academic Program Review Council
Questions for the HVACR Programs
6 pm, Tuesday, October 24, 2006—ASC 2082

1. Please supply vitae for the faculty.
2. Discuss the issue of seeking accreditation for the program, with one or both of the accrediting bodies.
3. Discuss how students in the program find internships.
4. Discuss the perceived need for greater technical content in the A.A.S. program.
5. Discuss how staffing numbers affect enrollment and program capacity.
6. Discuss how the problem of faculty overloads affects the program.
7. Discuss the effect on the program of the relatively high turnover in faculty.
8. The faculty survey indicates that faculty feel a mentoring program would be helpful to newer faculty. Discuss this observation.
9. The faculty survey reveals dissatisfaction with the HVACR curriculum review process. Discuss this issue.
10. Discuss the lack of diversity in the program and possible recruitment plans to increase it.
11. The point was made that much of the equipment available to the program was from a small number of manufacturers. Discuss the possibility of a program plan for industry solicitations to create a greater diversity of equipment.
12. Discuss the use, current and potential, of the program's advisory board.
13. A figure of \$10,000 for faculty development is mentioned as being needed in 8-3. Could this money come from revenue generated by program through its certificate programming?