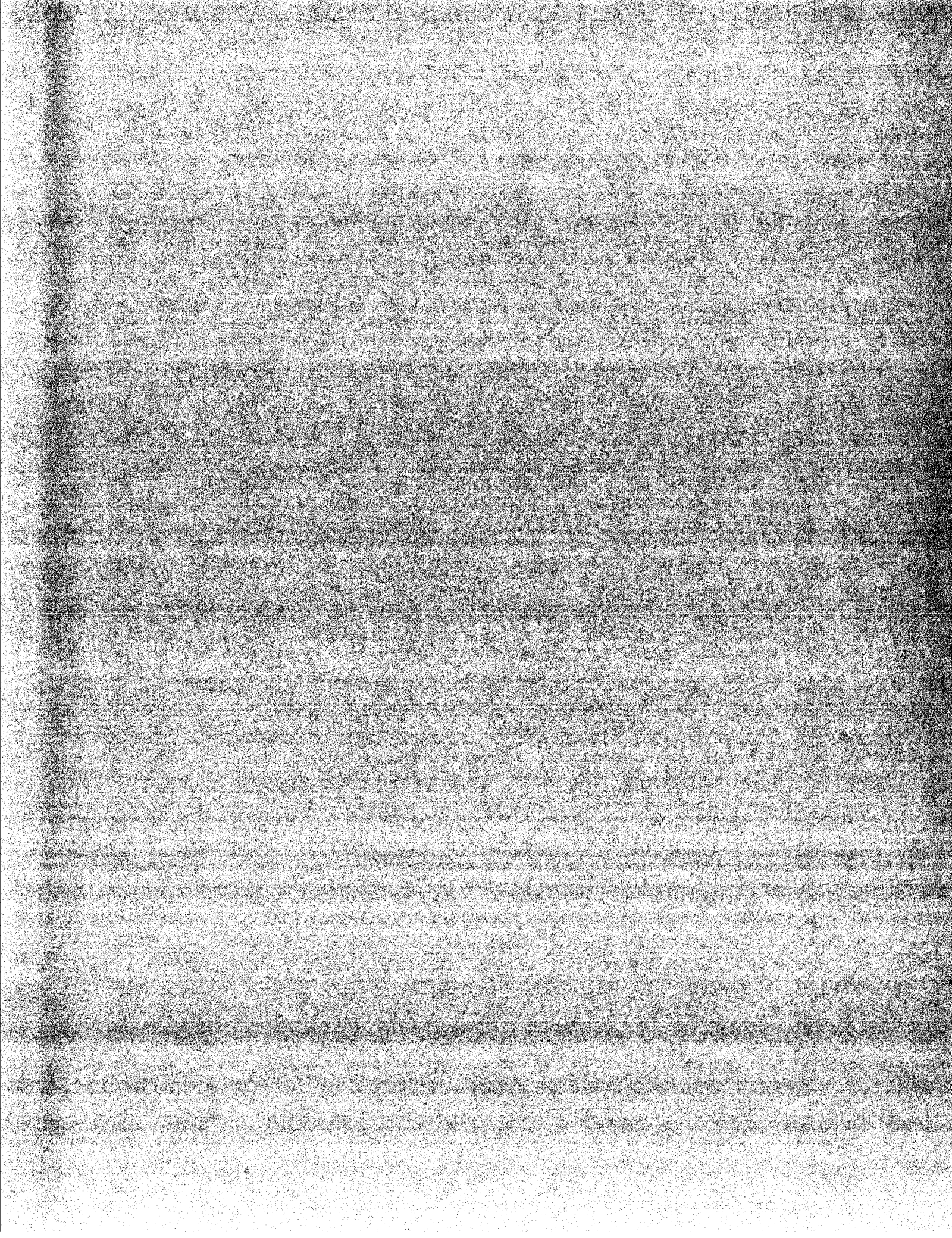
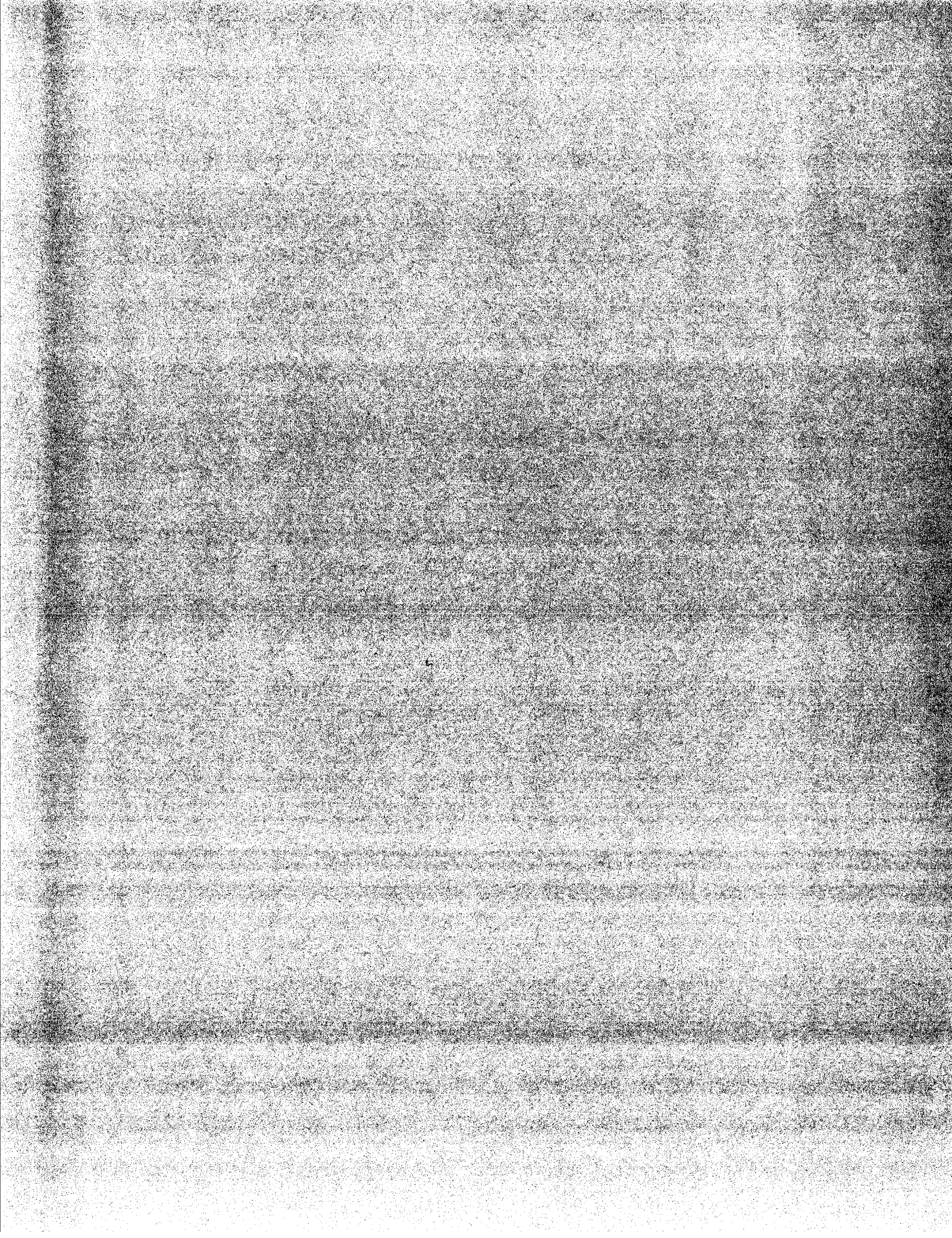


Industrial + Environmental  
Health Management

APRC 1997-1998

section 1 of 3





**INDUSTRIAL AND ENVIRONMENTAL HEALTH MANAGEMENT  
PROGRAM  
COLLEGE OF ALLIED HEALTH SCIENCES  
FERRIS STATE UNIVERSITY**

**ACADEMIC PROGRAM REVIEW REPORT**

September 15, 1997

**Program Review Panel**

**Mr. Kevin Besey  
Mr. Michael Ells (Chair)  
Dr. Frederick Heck  
Mr. Brad McCormick  
Dr. Gary Rodabaugh  
Mrs. Lori Seiler  
Dr. Khagendra Thapa**

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## **Section One: Overview of the Program**

### **Introduction**

The Industrial and Environmental Health Management program at Ferris State University includes four distinct option tracks within one curriculum. The Industrial Safety option serves students whose goal is to work within government or industry in the area of accident prevention. In industry, these graduates help prevent accidents that cause personal injury or property damage. In government, they work as state or federal occupational safety and health compliance officers inspecting industrial sites for accident potentials. A required part of the curriculum is an internship in a governmental or occupational safety setting. Successful completion of the curriculum plus one year of relevant experience allows the graduate to sit for the Associate Safety Professional (A.S.P.) certification examination offered through the Board of Certified Safety Professionals. Following additional years of experience, the graduate will qualify to sit for the Certified Safety Professional (C.S.P.) certification examination. In addition following graduation with a BS in IEHM, and four years of professional level experience, program alumni may apply for the Certified Hazard Control Manager (C.H.C.M.) certification offered by the Board of Hazard Control. The Board has waived the examination for FSU-IEHM graduates and requires only the experience.

The Industrial Hygiene option serves students who wish to work within government or industry in the prevention of industrial disease. These diseases result from workers exposure to hazardous dusts, smokes, fumes, gases, vapors, fogs, mists, heat, noise, etc. and may be either acute or chronic in nature. A required part of the curriculum is an internship within a governmental or occupational industrial hygiene setting. Successful completion of the curriculum plus one year of relevant experience allows the graduate to sit for the Industrial Hygienist In Training (I.H.I.T.) certification examination offered through the American Board of Industrial Hygiene. Following an additional four years of experience, the graduate will qualify to sit for the Certified Industrial Hygienist (C.I.H.) examination.

In addition, any graduate of the IH or IS option may apply for the Occupational Health and Safety Technologist certification jointly offered through the American Board of Industrial Hygienists and the Board of Certified Safety Professionals. Eligibility for this certification is any degree (A.A.S or BS). Graduates may apply for and take the examination immediately upon graduation.

The Hazardous Waste Management option serves students who wish to work within government or industry in the management of hazardous materials and hazardous wastes. These graduates may work for governmental regulatory agencies such as the U.S. Environmental Protection Agency (USEPA) or state departments of Health, Agriculture, Natural Resources or Environmental Quality. In industry, they may work for large manufacturing industries (automotive, chemical, etc.), for hazardous waste site remediation firms, or for environmental consulting agencies. A required part of the curriculum is an internship within a governmental, industrial or consulting setting. Successful completion of the curriculum immediately allows the graduate to sit for the Certified Hazardous Materials Manager (C.H.M.M.) national certification examination offered by the Academy of Certified Hazardous Material Managers.

The General Environmental Health option serves students who wish to work within government or industry in the prevention of diseases transmitted by air, water, wastewater or food. The primary

employment site for these graduates is the environmental health division of a state, district, county or city health department. Other employers of these graduates are the pest control industry, food manufacturers, and other governmental units including the U.S.E.P.A., Food and Drug Administration (F.D.A.), and the U.S. military. A requirement of the curriculum is an internship within a governmental or industrial environmental setting. Successful completion of the curriculum and a variable (by state) length of full time professional experience allows the graduate to sit for the Registered Sanitarian (R.S.) or Registered Environmental Health Specialist (R.E.H.S.) examination.

A unique feature of the IEHM curriculum is that no matter which option the student selects, each will be familiar with the role and function of each of the other options through the completion of a core curriculum. In other words, the general environmental health option student will have knowledge of the role and responsibilities of the industrial safety, industrial hygiene and hazardous waste management professionals.

In fact, a significant proportion of the IEHM graduates do not remain in their singular option tract within government or industry. Rather, it is typical that the hazardous waste management graduate, for example, works for industry and performs all of the duties relative to industrial hygiene, industrial safety, hazardous materials management and all environmental compliance including federal and state wastewater and air permitting. In other words, they "do it all."

### **Mission and Goals**

The Mission of the Department of Environmental and Clinical Sciences:

Practitioners of the environmental and clinical sciences provide a significant portion of the nation's health care. The department serves as a major Michigan and national provider of clinical laboratory and industrial and environmental health specialists who possess the knowledge and the technical and human relations skills necessary for entry level practice.

The Goals of the Department of Environmental and Clinical Sciences:

1. To continue to provide competent graduates for entry level positions.
2. To increase the number of minority graduates, based on the 1992-93 enrollment, by 20% by the year 2000.
3. To assess the need for a graduate program, and implement if feasible.
4. To assess the need for expansion of non-traditional course offerings and implement if feasible.
5. To provide an environment that promotes mutual trust and support among the various units of the college, through increased opportunities for faculty, staff and student participation.
6. To provide entry level graduates who are competent in their respective disciplines and who aspire to further professional growth.

7. To provide creative and flexible curricula to meet the educational needs of a diverse student population and the health care needs of a changing world.
8. To instill in students a sense of ethical and moral responsibility and a community and global consciousness to prepare them for providing appropriate services to diverse populations.
9. To maintain alliances with leaders in industry, government and the health care industry to assure that the programs remain current and responsive to their needs.
10. To respond to the needs of faculty and staff for continuing education to enable them to respond to the changing knowledge base.
11. To provide an atmosphere in which all elements of the department are sensitive to the needs of culturally diverse students, faculty and staff.

### **Program History**

The Associate Degree Program:

The environmental health side of the program began in 1955 when Victor F. Spathelf, then President of Ferris, directed his Vice-President for Academic Affairs to study the feasibility of an associate degree program designed to prepare sanitarian technicians. The move was stimulated by conversations between President Spathelf and friends in Southeastern Michigan who were engaged in food quality control. Subsequent meetings with public health officials in the state confirmed the viability of such a program.

The Environmental Sanitarian Assistant program was launched as an AAS degree offering by FSU in 1957 following consultant visits by Harold Adams, University of Indiana and meetings with public health officials and environmental health practitioners in Michigan. The college employed David McMullen as the first environmental health faculty member and gave him the assignment of developing the curriculum and initiating the program.

The original program brochure stressed preparation in four major areas of sanitary inspection: general food inspection, milk and dairy inspection, restaurant inspection and environmental inspection. The curriculum was quite progressive for its time, particularly in its inclusion of a course in the elements of statistics and a required academic quarter (10 weeks) of internship (field training) with a full-time local health department.

The curriculum underwent modifications over the ensuing years in order to maintain viability with the field of practice, and it became the initial two years of study required for the BS degree in Environmental Health in 1964. This is believed to be one of the first ladder degrees at Ferris. The name of the degree was changed to Environmental Health Technician in 1975 to better reflect workforce terminology at the time.

Administratively the initial program was located within the Collegiate Technical Division (CTD) of the College. This later became the School of Technical and Applied Arts (TAA). The program was transferred from TAA into the newly organized School of Allied Health in 1967.



## The Baccalaureate Degree in Environmental Health:

The BS degree in Environmental Health, was approved in 1963 by the Board of Control as the third and fourth year extensions of the A.A.S. degree for Environmental Health Technician. This new upper level degree program developed as a response to A.A. S. degree graduates from the field who now sought baccalaureate degree opportunities in environmental health technologies. A prior effort by the University of Michigan to develop an undergraduate program in environmental health had failed and Ferris moved to fill the vacuum. Concurrently, a movement within Michigan to enact a sanitarian registration act gave impetus to the new degree program. The environmental health faculty was expanded with the employment of Richard Hunter at the time the BS degree program was implemented.

With Mr. Hunter's expertise in pest management an A.A.S. degree in Pesticide Technology was implemented in 1968. This proved to become a popular entry point to the program until discontinued by the University in 1985.

Major curriculum modifications were made to the B.S.E.H. degree in 1968. In 1972 the B. S. degree received its initial accreditation through the National Council for the Accreditation of Environmental Health Curricula. It was the second program so accredited in the nation. Both the BS and the A.A.S. degrees were approved during this initial accreditation visit/process.

Following advice of the Advisory Committee and alumni, the B. S. degree was further modified in 1974 in order to reflect changes in the field of practice and in the promulgation of new national and state Occupational Safety and Health Laws. The 1974 modification saw the introduction of four options within the B.S.E.H. degree: General Environmental Health, Vector Control, Environmental Planning and Management and Occupational Safety and Health (OSH). The latter option (OSH) was intended as a ladder curriculum for the A.A.S. degree in safety technology, which Robert Allen had developed early in 1972 in TAA. All options retained the core of general environmental health courses but allowed students an opportunity to develop some expertise in the option areas.

The Vector Control option provided a ladder baccalaureate degree opportunity for students graduating from the A.A.S. in Pesticide Technology, and proved itself to be a popular option with an active workforce market for graduates.

The Environmental Planning and Management option was a response to recommendations of geography consultants to the campus. It correlated studies in geography with environmental health studies in a curriculum designed to provide entry competencies for the area of environmental planning such as in regional planning agencies.

The General Environmental Health option continued to train a large number of sanitarians for the environmental health divisions of local health departments however some students did become sanitarians for food manufacturing industries.

## The Environmental Management Studies Block:

In 1972, a three year grant (\$31,036) was obtained to explore and develop an interdisciplinary approach to teaching environmental planning and management competencies. Faculty teaching courses in Environmental Conservation (Biology Department), Environmental Engineering and

Environmental Management (IEHM Program), and Cultural Geography (Social Sciences Department), were brought together as a team to teach in a combined classroom and field study format. The basin of the Muskegon River adjoining the campus comprised the laboratory and real life projects assisting local governments comprised the field exercises. The "Block" continues to this day to provide real world experiences in environmental assessment to students in the program. The course content has changed however with the removal of the Cultural Geography course and the modification of the biology course to Environmental Biology. Two new course additions are Environmental Management Systems Techniques, and Environmental Assessment and Impact Analysis. The faculty serve as policy makers and professional consultants and the students are organized as staff. The students carry out field research, interviews, mapping, photography and report writing in addition to corollary studies. Final reports developed by students are published and distributed to the concerned governments.

This has proven to be a highly successful educational process which greatly improves job readiness and develops competencies not otherwise possible in a traditional academic role. The courses/experience is offered each summer to students in the final phase of the BS degree curriculum as a capstone experience. This phase of the program has been continued as a permanent curriculum requirement for both the general environmental health option and the hazardous waste management option.

#### External Degree:

In 1974, the college adopted the concept of external degree programming for environmental health and non-traditional curricula were approved for both the A.A.S. and the BS degree programs. The effort was stimulated by requests from the field for an educational program which would recognize the knowledge gained by non-degreed practitioners in full time professional level environmental health employment, and which would provide a study program leading to a degree which did not dislocate and disrupt employment or family relationships. The Michigan board of Sanitarian Registration and the U.S. Public Health Service, Indian Health Service were among those seeking such a program. A five year Allied Health workforce grant (\$160,182) was obtained in 1976 to develop and initiate a Model Program for the External Degree in Environmental Health. The external degree process continued until 1995 when it was phased out. This phasing out was primarily the result of a lack of available personnel time and academic quality control, and was NOT the result of a lack of students. As a matter of fact, the IEHM department head continues to maintain a list of several hundred potential students who have indicated an interest in the process.

#### Internship Quality Improvement:

In 1976, concern for the need to improve the quality of internship and to develop improved linkage between the clinical or field training of environmental health students and the theoretical phase of the program, led to the development of a five year demonstration program supported by an Allied Health workforce grant of \$207,304. Extensive documentation was produced and published as a monograph at the closure of the project. The Council on Internship of the National Environmental Health Association was also kept abreast of the project progress.

In addition, it has been a policy of the program to utilize every opportunity to involve students in real-life field activities throughout their college experience at FSU. The campus and city of Big Rapids were utilized in the past as practical laboratories. Under the supervision of Mr. Hunter, and through arrangements with the Campus Maintenance and Student Housing offices, students in the Pesticide

Technology program conducted vector control surveys and provided control activities across campus. Students have also used the welding laboratories, heavy equipment laboratories, and auto service floor as laboratories. Within the city, the program has used the water and wastewater treatment plants, Fitzsimons Manufacturing, and many other industries as field trip sites and as work sites for classroom projects. At one time, all campus safety and health responsibilities were coordinated by another program faculty member, Mr. Michael Tillotson. Under a released time arrangement, Tillotson and the students in the occupational safety and health option and later in the B.S.O.S.H. were utilized as campus safety staff under a part-time student employment arrangement. This arrangement was phased out in 1981 in favor of a full time campus safety and health officer.

In 1977 the BS degree was further modified. The OSH option was dropped from the B.S.E.H degree, and offered as a separate Bachelor of Science in Occupational Safety and Health (B.S.O.S.H.). In a cooperative venture, the School of Allied Health offered the Industrial Hygiene (health) specialty courses and Technical and Applied Arts (TAA) offered the Industrial Safety specialty courses. As such, it was the first degree to be offered jointly by two schools within the college.

In 1980, the TAA part of the B.S.O.S.H. curriculum and its principal faculty member Mr. Robert Allen were transferred to the School of Allied Health. In 1982 with the retirement of Mr. John Fleming as Department Head, the enrollment of the two degrees was discovered to be less than 50 students total and the department was directed to reduce faculty numbers (from 9), revise and update the curriculum, and recruit students. A major recruiting drive was initiated by the faculty and acting department head (Michael Ells). By 1986, the enrollment was approaching 150 students; two faculty had retired and two faculty had been transferred to other units within the university; and a new curriculum had been approved.

In 1985, the last major curriculum revision prior to changing to semesters was instituted. This revision was precipitated two forces; first, FSU President Robert L. Ewingleben had directed a review of all A.A.S. degree curricula. Second, surveys of alumni indicated that few students graduated with the A.A.S. degrees and left college for jobs. Instead, they laddered into and completed the B.S. in E.H. degree. As a result, the associate degrees in Environmental Health Technician and in Pesticide Technology were deemed not justified and were administratively eliminated. The second force was simply one of survival based on student numbers. A combined curriculum of 50 students, for example, would seem better than two curricula of only 25 students each. In addition, the faculty saw a curriculum combining E.H. and O.S.H. as an opportunity to cross train students and open new career opportunities. The new curriculum abandoned all former names and was called Industrial and Environmental Health Management and offered four options: general environmental health, industrial hygiene, industrial safety and hazardous waste management. Unfortunately, the demise of the Pesticide Technology A.A.S. and the Environmental Health Technician A.A.S. degrees closed a popular entry level door to student recruitment.

Enrollment climbed to approximately 170 students by 1994. Since that time it has begun a somewhat steady decline due primarily to inadequate faculty time being available to leave the campus to recruit. This lack of time is due in part to our success in increasing enrollment which necessitated additional laboratory sessions and, in some cases, overloads.

The last curriculum change occurred in 1993 when the courses within the curriculum were modified into the 15 week semester format. Several courses were merged, some dropped and some added although no additional options nor option changes were adopted.

With advice from the field and our advisory committee, the faculty now believe the time is right for another mid-stream correction and have been actively meeting to discuss a major curriculum revision.

### **Impact of the Program on the University, the State and the Nation**

The IEHM curriculum is one of only twenty four curricula in the Nation approved by the National Council for the Accreditation of Environmental Health Science and Protection Curricula. It is the only accredited curriculum in the State of Michigan. In this regard, the IEHM program is a testament to the term "Unique" often pictured on the FSU logo. While Oakland University offers some courses in the environmental area, they have never indicated an interest in becoming accredited. GVSU at one time entered the arena but phased out their unaccredited environmental health curriculum approximately 10 years ago. GVSU does have an OSH program with an emphasis in safety with some industrial hygiene. They have also begun preparations for an ABET accredited Master's curriculum in Safety. Their original plan was to enroll their first class in fall, 1996 but some delays have forced a change in their plan. The FSU IEHM curriculum has provided approximately 800 graduates for the professional field since the program began in 1955. Approximately 45% of all Registered Sanitarians currently practicing in Michigan are IEHM program graduates.

The Ferris Industrial and Environmental Health Association (F.I.E.H.A.) is a campus organization of IEHM program students recognized by the Michigan Environmental Health Association and the National Environmental Health Association. The association, which has existed on the campus since 1956, has conducted and continues to conduct many community service projects annually. Among these are community noise surveys, Adopt-a-Highway, residential radon assessment screenings, residential microwave oven leakage testing and the organization of the annual Earth Day celebration. F.I.E.H.A. has been the recipient of the Outstanding Student Affiliate in the Nation ten times since its inception in 1975. The award, given by the National Environmental Health Association, has been won by FSU-IEHM more times than any other academic program affiliate in the United States.

In the fall, 1995 a student chapter of the American Society of Safety Engineers was formed. This provides another professional association for students to join. One of the projects in which they have been involved in the Building Egress study. Members attend monthly meetings of the West Michigan Chapter of ASSE and interact with professional members. Mr. McCormick is the advisory of ASSE.

In December, 1995 the program was the recipient of a \$212,000 grant from OE Learning, Inc. for the purpose of developing proprietary safety training packages for UAW - Chrysler. That one year project (Phase I) was concluded in the Fall, 1996.

The IEHM program was chosen by UAW-Chrysler to begin delivering the second phase of the original grant (Health and Safety Specialist Certification Program), in fall 1996. This is intended to be an on-going 240 hour, training program for all health and safety representatives of UAW-Chrysler. Since that time Dr. Rodabaugh, Mr. McCormick and Mrs. Seiler have been involved in the delivery of this program, with Dr. Webster as the director of the program. These training programs have been conducted all over the United States by not only these three program faculty, but by other professionals under contract through the grant.

Phase III is the Health and Safety Specialist Continuing Certification Program. This is a program in which those UAW-Chrysler workers certified under Phase II of the project will be required to obtain 24 hours of continued training each year to maintain their certification.

Faculty are active professionally at the regional, state and national levels. They have provided continuing education programs at regional, state and national meetings and serve as public and private consultants. Mr. Ells has also worked extensively with the Mecosta-Osceola Intermediate School District Math-Science Center making presentations to Monday Night Technology and Super Saturday groups and has served as a mentor for Math-Science Center research projects. He is also involved with the Muskegon River Watershed Team of the Michigan State Cooperative Extension Service. As a faculty member in the environmental Management Studies Block, he has participated in over twenty-five community and environmental assessments in the Mecosta, Osceola, Wexford and Lake Counties.

Dr. Rodabaugh is an active trainer throughout the midwest. He has taught Hazardous Waste Operating Training courses throughout Michigan; Ergonomics, Lockout/Tagout and Confined Space training in Michigan and Ohio. He owns his own consulting firm, "Expert Environmental Assessments," and conducts waste site and Phase I assessments throughout western Michigan. He serves as an expert witness and has conducted expert witness training seminars. He also serves as a graduate level course instructor for Wayne State University teaching courses in Environmental Auditing I & II, HW Management and HW Law.

Mr. Besey owns and operates his own consulting firm "Besey Environmental Consulting," and provides food service sanitation consultation to the food service industry and to the Michigan Department of Corrections. He also provides American Corrections Association (ACA) compliance for correctional institutions in areas of general sanitation, water supply, sewage disposal, solid waste disposal, ventilation, noise and lighting. He also provides consulting services with "Sierra Analytical Services," and is the company's main representative in west Michigan. He has also submitted an article for publication in the Michigan Environmental Health Association's quarterly newsletter.

Mrs. Seiler's courses have impacted the community and University through walk-through assessments, hazard identification and recommendations for the CLS labs and IEHM labs. They provided ergonomic assessments for the Reception Area in VFS 200 and have performed noise monitoring surveys for the FSU Auto Body Shop, Animal Care Facility in Pharmacy, and the Mecosta/Osceola Career Center Welding Shop. Mrs. Seiler is active nationally serving on the American Industrial Hygiene Association's (AIHA) WEEL (Workplace Environmental Exposure Limit) Committee, which reviews toxicological information as well as human use and experience data to determine occupational exposure limits. As a consultant, she has been active nationally working to develop a product stewardship consulting network for a beryllium producer, conducting workplace exposure assessments for the apple packaging industry, conducting workplace exposure assessments (inhalation and dermal) for the pear packaging industry, and has conducted indoor air quality assessments for several Big Rapids area schools and a community center in Midland.

Mr. McCormick has used the university as a laboratory for courses that he instructs. In addition, he was instrumental in the formation of the FSU student chapter of the American Society of Safety Engineers (ASSE). Both this organization and students in his laboratories completed 75% of the Fire Egressing planning for the campus. He also teaches two master's level courses for CMU in Safety Management. He serves as the Disaster Chair for the Mecosta County Red Cross and as a member of the Local Emergency Planning Committee. He served as a consultant, training materials developer and

instructor for the UAW-Chrysler project and consults with various Dental Laboratories, providing them with continuing education. Mr. McCormick served as the coordinator for the Building Egress project that was contracted by the Program through the University for \$8,000. To the extent possible, all of the work has been accomplished however the university has not as yet paid for any of the agreed upon \$8,000 in services.

### **Expectations**

Program faculty see no reduction in the market for IEHM program graduates. What is anticipated to continue however is a shift to fewer and fewer specific positions in industrial hygiene, industrial safety and hazardous waste/materials management, and toward more and more positions of broader professional responsibility. The IEHM curriculum at FSU enjoys an outstanding reputation across the United States in both the industrial health and the environmental health communities.

The faculty see an increasing need for Continuing Education of the professional workforce, especially in relation to the changing nature of the industrial IEHM professional's job.

The faculty see an increasing need for non-traditional methods of course delivery and non-traditional course formatting including the possible resurrection of the external degree curriculum. Resurrecting the external degree curriculum would add students to the IEHM program student count but would also increase faculty teaching time pressure which would tend to take time away from recruiting and retention activities.

The faculty feels a need to be state-of-the-art in multi-media presentation technology in order to meet the above demands and to meet student needs for workplace learning tools.

Upon the completion and acceptance of this Academic Program Review, the faculty expect to be funded at an appropriate level for the acquisition of appropriate equipment and technology. In addition they expect that if faculty are to be evaluated relative to Professional Development, that the university will show more of a financial commitment to those activities. A curriculum change will also require professional development funding.

Faculty understand the commitment necessary for recruiting and retention activities, and hope that the administration is sensitive to the need for released time, when full teaching loads are achieved, in order to develop recruiting and retention materials, and to leave campus to recruit at high schools and community colleges across Michigan. Class coverage while off campus recruitment commitments are being conducted are also a concern especially when sabbatical leaves are concerned. In addition, class coverage for areas in which faculty have specialized are also a concern, when faculty leave the campus for recruitment activities..

Faculty expect to see an increase in appropriate technical resources available in the library and appropriate computer laboratories.

Finally, the faculty expect that the College of Allied Health and Ferris State University will develop a written funding plan which will enable the acquisition of new equipment in order to implement the planned curriculum modification.

## **Plans for Improvement**

Program faculty have been working on a curriculum revision for two years. It is anticipated that this will result in a recommendation for a curriculum change progressing through the College of Allied Health Sciences, through the Academic Senate's University Curriculum Committee and to the Board of Trustees for approval in Spring, 1998, for implementation in fall, 1998.

Orders are in process for new computers for each of the faculty.

Faculty are committed to educating the Advisory Committee

The faculty plan to continue to refine, develop and implement a recruiting and retention plan supported by the entire program faculty

The faculty plan to investigate the possibility of resurrecting the external degree curriculum, and to seek subject material and audiences for continuing education. In addition, the faculty plan to investigate non-traditional course formatting and delivery and to implement these to audiences currently not being served. To do so will spread the good word, and improve the image and stature of the IEHM curriculum and Ferris State University.

## **Section Two: Alumni Survey**

Below is a summary of the Industrial and Environmental Health Management (IEHM) Graduate Survey. The IEHM Program surveyed the 1984 - 1996 program graduates. A total of 264 surveys were sent with a 33% response rate (85 completed surveys, 8 returned undeliverable).

According to the survey, 86% of the 1984-1996 graduates are employed in the IEHM field. The graduates reported over fifty different job titles within the field from entry-level to leadership roles.

Eighty-five percent of the graduates entered the IEHM program as a transfer student either from another Ferris program (35%) or another university (22%) or community college (28%).

The survey showed that 96% percent of the graduates felt that their degree from Ferris State University prepared them for their career.

Over fifty percent of the respondents report using computer skills in their jobs while less than 20% said Ferris provided adequate to excellent computer skills.

The graduates reported that having skills in written communication, speech communication, mathematics, computers, decision making, analytical reasoning, and human relations were important in their current jobs (78-100% good to excellent). The graduates rated their preparation by Ferris in these areas as good or better from 27-92%. mathematics (63%) and computer preparation (27%) ranked lowest.

Graduates reported that the majority of the course material was current in the IEHM courses when they were enrolled (52-94%). Common technical core courses had a good to excellent rating of 42 to 89%. The highest rating was associated with internship (89%) and the lowest with Public Health Administration (PHA)(42%). Written comments by the respondents indicated that PHA only applied to the General Environmental Health Option. Under semester transition, the Faculty made Public Health Administration a requirement for only those students in the General Environmental Health Option.

The survey asked for information on each of the four options within IEHM. Alumni reported that hands-on activities, laboratories, and field trips were valuable and should be expanded.

Survey results indicate that the summer block environmental studies requirement for General Environmental Health and Hazardous Waste Management students was valuable. However, written comments suggest that hazardous waste management projects should be incorporated into the block experience to make sure students in this option obtain some hands-on field experience in their discipline.

Overall the IEHM program alumni are pleased with the program. Ninety-two percent of the respondents said the IEHM program prepared them well for their career choice.

The IEHM faculty believe it is necessary to maintain closer contact with program alumni. This will benefit several areas. First it will allow for additional feedback regarding the program. Better contact will also expand the network for currently enrolled students to communicate with recent graduates for job shadowing, internships, and job opportunities. Alumni contact could include such activities as



newsletters, additional surveys, and alumni gatherings. Input from the program graduates is essential to making sure the academic program is meeting the needs of the IEHM-related professions.

Having computer skills are essential to today's IEHM professional. At the time of this survey, the College of Allied Health Sciences Student Computer Lab had only been open two years and may account for the low (20%) ratings on computer preparation for the alumni surveyed. The IEHM Faculty have been incorporating more computer-related assignments in IEHM courses, however there is a need for continued improvement in this area. In fact the IEHM faculty feel a dedicated computer area is necessary to allow students an opportunity to use computer-related tools that are part of today's profession.

INDUSTRIAL AND ENVIRONMENTAL HEALTH MANAGEMENT  
COLLEGE OF ALLIED HEALTH SCIENCES  
FERRIS STATE UNIVERSITY

ALUMNI SURVEY RESULTS

*All numerical values are expressed in percent. Percentages add to 100 or 101% due to rounding.*

1. What year did you graduate? 1984 through 1996
2. Are you currently working in the IEHM profession?  
86% Yes  
14% No
3. What is your present job title?  
*See attached list.*
4. What other positions, by title, have you held?  
*See attached list.*
5. Which option did you complete?  
29% General Environmental Health  
40% Hazardous Waste  
20% Industrial Hygiene  
11% Industrial Safety
6. What is your present salary?  
16% Less than \$25,000  
35% \$25,000 - \$34,999  
37% \$35,000 - \$50,000  
12% More than \$50,000
7. Which certifications/registrations do you hold? (Check all that apply.)  
5% CIH            3% CSP            5% CHCM  
23% RS/REHS    20% CHMM        45% Other (please specify)
8. How many positions have you held since graduation?  
5% None  
33% One  
43% Two  
19% Three or more

9. Entered IEHM Program as a :
- 12% Freshman
  - 35% Transfer from another Ferris Program
  - 22% Transfer from another University
  - 28% Transfer from another Community College
  - 4% Other (please explain): External degree program
10. Has your FSU degree prepared you for your career?
- 13% Exceptionally well
  - 45% Well
  - 38% Adequately
  - 4% Less than adequately
  - 0% Poorly
11. Can you move from your present position to a higher level position with your current degree?
- 60% Yes
  - 28% Uncertain
  - 12% No
12. For your next career move, will you need any of the following?
- 28% Continuing education (seminar, workshop)
  - 21% Degree
  - 13% Additional course work
  - 39% Certifications
13. Do you have an advanced degree?
- 8% Yes
  - 92% No ( If no, skip to question 15.)
14. If Yes, what degree do you have?
- 67% Master's Degree
  - 0% Doctorate
  - 33% Other: EPA Certification, Graduate certificate
15. If No, do you plan to obtain one?
- 33% Yes
  - 47% Uncertain
  - 11% No
  - 9% Currently working on a degree

16. How well did your FSU studies prepare you for your advanced degree or planned graduate studies?

- 11% Exceptionally well
- 36% Well
- 41% Adequately
- 9% Less than adequately
- 3% Poorly

17. Please rate the computer skills you received in IEHM program courses.

- 2% Excellent
- 6% Very good
- 14% Good
- 31% Fair
- 35% Poor
- 11% Not applicable

18. Which of the following computer skills do you use in your position? (Check all that apply.)

- 13% Network
- 3% Programming
- 18% Spreadsheets
- 23% Word Processing
- 4% National Database
- 13% Database Software
- 8% Communications
- 12% Systems Analysis
- 12% Internet
- 5% CAD/Modeling (Please specify.)

- Air dispersion modeling
- Construction CAD
- EPA emission model
- Autocad Version 13
- Pressure mound design for outside sewage
- CAD zone program
- Corel Draw/PageMaker
- Automap, Turbo cad
- Harvard Graphics

19. Please rate the importance of the following for your current job, based on the rating scale below:

- 1. Excellent
- 2. Very good
- 3. Good

- 4. Fair
- 5. Poor
- 6. Not applicable

Skill	1	2	3	4	5	6
Written communication	63%	29%	5%	2%	—	—
Speech communication	67%	26%	5%	1%	—	—
Mathematics	8%	20%	50%	18%	5%	1%
Computers	34%	33%	28%	4%	—	1%
Decision making	66%	27%	6%	1%	—	—
Analytical reasoning	47%	33%	16%	1%	—	—
Human relations	74%	23%	4%	—	—	—
Technical courses	35%	38%	16%	5%	—	6%

20. Please rate your preparation by Ferris in the following, based on the rating scale below:

- 1. Excellent
- 2. Very good
- 3. Good

- 4. Fair
- 5. Poor
- 6. Not applicable

Skill	1	2	3	4	5	6
Written communication	18%	34%	34%	11%	4%	—
Speech communication	5%	27%	39%	21%	7%	1%
Mathematics	1%	22%	38%	22%	4%	11%
Computers	5%	10%	12%	35%	27%	11%
Decision making	11%	35%	37%	8%	7%	—
Analytical reasoning	8%	42%	27%	17%	1%	3%
Human relations	9%	20%	38%	27%	4%	3%
Technical courses	24%	34%	33%	6%	1%	1%

21. Please rate the following courses that you took at Ferris:

Part One

1. Excellent
2. Very good
3. Good
4. Fair
5. Poor
6. Not applicable

Part Two

1. Current material presented
2. Outdated material presented

CORE COURSES	PART ONE						PART TWO	
	1	2	3	4	5	6	1	2
Public Health Administration	3%	16%	23%	32%	16%	10%	52%	48%
Epidemiology & Statistics	5%	15%	30%	27%	6%	9%	83%	17%
Introduction to IEHM	11%	31%	32%	13%	7%	6%	84%	16%
Environmental Radiation	14%	33%	27%	9%	4%	13%	88%	12%
Orientation to Internship	17%	24%	22%	13%	17%	7%	85%	15%
Hazardous Waste Management	28%	41%	15%	9%	3%	3%	85%	15%
Industrial Ventilation	17%	38%	22%	9%	4%	10%	92%	8%
IEHM Internships (All Options)	54%	27%	8%	3%	5%	4%	94%	6%

**Comments:** (as actually written by the respondent)

Drop PHA for Haz Waste.

Toxicology is a very good class.

The internship I did was more valuable to my career than most of the courses I took. I can't remember if the material presented was out dated at the time I took the class. Only two of these classes actually applied to my career.

What's excellent about the Ferris Program is not any individual course but the broad background a student gains throughout the program.

Overall, I thought the IEHM's courses were very good and they helped me for my current job.

I don't believe it is necessary to conduct a orientation to internship course. Maybe a short seminar could be conducted then it could be fully the responsibility of the student and/or counselor to arrange the internship site.

Need to include business related core material: budgeting, cost containment, etc.

Courses evaluated from a county health department sanitarian point of view.

Due to the rapidly changing field, it is extremely difficult for instructors, or anyone else for that matter, to stay abreast of all the Environmental. rules changes. The information portrayed in the above classes may have been up-to-date when presented, but upon entering the field, the information was obsolete.

Internships highly important and to pick the right on for yourself.

Should of had fairness to all students job skills prep. as well as resume.

Too much squeezed into a little time. Could have done more "real life" application.

It is difficult to think back & recall current material vs. non-current. Internships at local health dept. rather than (paid) industrial should be emphasized.

There is no substitute for O.J.T. There are parts of the job you can't learn in school. It's hard to prepare for a real life job in an academic setting. You won't be prepared to be a professional right out of school, you have to learn that on the job. That's what a job is, constant learning. That's what school is for, you have to learn to learn!

A lot of courses will seem outdated in hind-sight because of advances since 1992 when I graduated. They may be current.

Radiation- needs hands on monitoring with the equipment and state requirements-should have students purchase the state radiation book.

More radioactive waste management should be included with the hazardous wastes management class.

Haz-waste should have included more than just regulators ( case histories, current issues, PPE, decon, etc.)

Part One

- 1. Excellent
- 2. Very good
- 3. Good

- 4. Fair
- 5. Poor
- 6. Not applicable

Part Two

- 1. Current material presented
- 2. Outdated material presented

General Environmental Health Option	PART ONE						PART TWO	
	1	2	3	4	5	6	1	2
Communicable Disease Control	12	41	12	6	4	14	85	15
Solid Waste Management	10	18	25	20	8	20	56	44
Water Supply/Pollution Control	20	33	20	8	3	18	89	11
Shelter Environment	10	23	19	19		37	57	43
Integrated Pest Management	11	29	20	3		37	95	5
Environmental Health Laboratory	28	22	14	6		31	90	10
Food Technology	13	20	18	5		39	86	14
Vector Control	15	29	18	3	3	35	83	17
Laboratories, Hands-on Activities, or Field Trips	26	5	26	3	9	29	77	23
Summer Block	32	24	10	7	5	22	83	17

**Comments:** (as actually written by the respondent)

Summer block, although very challenging & a real pain in the butt without a doubt the greatest learning experience I had at Ferris. some type of summer block should be required for all options. How is the Hersey River these days anyway?

Vector control and Integrated rest management needs to look alternative ways to control insects and rodents.

More field trips should have been taken - inspecting restaurants.

Some summer block material unrelated to career choice. Some lab equipment/techniques outdated.

Summer block was great because it brought the students and faculty together as some sort of team.



Hazardous Waste Management Option	PART ONE						PART TWO	
	1	2	3	4	5	6	1	2
Solid Waste Management	10	31	12	13	6	10	58	42
Water Supply/Pollution Control	18	28	13	13	3	28	81	19
Industrial Hygiene & Ergonomics	27	36	24	2		11	86	14
Toxicology	22	49	22	4		12	90	10
Hazardous Waste Law	31	36	18			16	93	7
Physical Geology	24	20	13	7		37	100	
Hydrogeology	15	12	12			62	94	6
Laboratories, Hands-on Activities, or Field Trips	21	21	21	12	10	14	86	14
Summer Block	18	25	13	8	13	25	80	20

**Comments:** (as actually written by the respondent)

Keep summer block but specialize them more toward the option that students are taking.

More needed on ergonomics and hands on air monitoring. More work on how to fill out TIER I / TIER II reports, biannual Haz Waste reports, title V air Quality (new students really need this) air permitting for small sources. Small QTY generator status/LQG status, waste reduction. Recycling-new laws/regs. MORE, MORE, MORE: seminars, workshops, community involvement, networking-public speaking and writing skills needed.

Not enough current equipment and usage presented.

Many classes in HWM now available were either not available or emphasis was charged.

Summer block- first few weeks too intense/stressful. Hard to learn and comprehend all the materials presented with such long lectures, especially on difficult and new information (i.e. surveying).

The summer block is a waste of time for everyone not in the general environmental health option.

Summer block - Great growing experience, not applicable to today's competitive industry!!!

Not much learned from this option. No real world knowledge. Doubtful if jobs exist here for the newly graduated students.

More labs hands-on very important. Pats of block very good some useless.

A lot more exposure to different types of air mentioning equipment & their application would've been valuable. We had access to them, but weren't really exposed to their theories of operation, applications, limitations, trouble-shooting, etc.

Ergonomics-needs to focus on job safety analysis and the NIOSH lifting guide.



Part One

1. Excellent
2. Very good
3. Good

4. Fair

5. Poor

6. Not applicable

Part Two

1. Current material presented
2. Outdated material presented

Industrial Hygiene Option	PART ONE						PART TWO	
	1	2	3	4	5	6	1	2
OSHA Law	35	32	13	10		10	95	5
Industrial Hygiene & Ergonomics	30	37	20	3		10	85	15
Toxicology	31	31	11			19	86	14
Air Sampling & Analysis	25	36	21			18	95	5
Noise & Vibration	37	33	11			19	94	6
Laboratories, Hands-on Activities, or Field Trips	32	32	19	4	4	11	100	

**Comments:** (as actually written by the respondent)

School needs to purchase better training equipment-Everything was outdated in 1991-92-93

Hands-on activities are very important. Many of my colleagues hesitate using new equipment they are not familiar with. The hands-on activities gives me the confidence to learn the new equipment.

Would be better if more field trips were included.

I enjoyed the field trips, but I wished that there were more of them.

The classes offered very little technical information. I graduated with the safety option without ever seeing the state safety standards. A lot more time should be spent on book knowledge and theory.

These classes helped me to be a competent problem solver in my first Health & safety job right out of college.

Industrial Safety Option	PART ONE						PART TWO	
	1	2	3	4	5	6	1	2
Accident Investigation & Reporting	10	30	20	15	5	20	100	
OSHA Law	22	39	6		11	22	70	30
Industrial Hygiene & Ergonomics	6	44	22		6	22	83	17
Fire Prevention	12	35	12	6	6	29	83	17
Mechanical Safety	11	39	17		6	28	85	15
Noise & Vibration	28	20	11		6	33	91	9
Safety Management	12	41	24			24	100	
Laboratories, Hands-on Activities, or Field Trips	32	19	13		13	25	91	9

Comments: (as actually written by the respondent)

Ergo was not a part of my class but still was not heavily a part of the industry yet. I recommend more field trips to manufacturing plants including mechanical power presses, lathes, mills, iron worker. Plant safety is heavily mechanical safety related and plant visits to back up machine guardians is essential.

Fire prevention-needs more focus on how to inspect fire extinguishers, how often, how to hang them properly-need safe standards. Mechanical safety-more focus on specific lockout/tagout procedures-how to identify and perform.

22. The IEHM Program faculty are currently reviewing the Environmental Management Studies Block (Summer Block) for students in the General Environmental Health and Hazardous Waste Management options. In view of this, the program would appreciate your views on the "value" of your summer block experience. Specifically, we desire a "retrospective analysis" of the value of the summer block with respect to your current and prospective employment.

A. Did you complete the Environmental Management Studies Block of courses (i.e., Summer Block)?

66 %Yes, Go to B.

34% No, Skip to question 23.

B. Please indicate which option you completed.

44%- General Environmental Health  
52%- Hazardous Waste Management

2%-Industrial Hygiene  
2%-Industrial Safety

Please circle one number on the line below each of the following questions, indicating your choice:

1 = Strongly Disagree, 5 = Neutral, 10 = Strongly Agree

C. The Environmental Management Studies Summer Block experience should be retained in its present format for the General Environmental Health Option:

1	-	2	-	3	-	4	-	5	-	6	-	7	-	8	-	9	-	10
11%		0%		7%		5%		11%		4%		11%		11%		11%		28%

D. The Environmental Management Studies Summer Block experience should be retained in its present format for the Hazardous Waste Management Option:

1	-	2	-	3	-	4	-	5	-	6	-	7	-	8	-	9	-	10
20%		7%		16%		11%		13%		2%		2%		11%		9%		9%

E. The Summer Block should emphasize CONTENT (the teaching of specific skills, knowledge, methods):

1	-	2	-	3	-	4	-	5	-	6	-	7	-	8	-	9	-	10
5%		5%		0%		5%		10%		2%		5%		27%		15%		27%

F. The Summer Block should emphasize PROCESS (interpretation, assessment, management, team building, critical thinking):

1	-	2	-	3	-	4	-	5	-	6	-	7	-	8	-	9	-	10
4%		2%		2%		0%		4%		0%		2%		14%		22%		51%

G. Hazardous Waste Management Option students should be offered a SEPARATE TRACK within the current Summer Block:

1	-	2	-	3	-	4	-	5	-	6	-	7	-	8	-	9	-	10
4%		4%		4%		6%		15%		2%		4%		10%		17%		35%

H. Hazardous Waste Management Option students should be offered an ENTIRELY SEPARATE Summer Block experience:

1	-	2	-	3	-	4	-	5	-	6	-	7	-	8	-	9	-	10
14%		2%		2%		0%		20%		41%		10%		12%		6%		20%

I. The Summer Block should retain a BROAD (environmental) rather than a NARROW (option) perspective:

1	-	2	-	3	-	4	-	5	-	6	-	7	-	8	-	9	-	10
8%		4%		6%		8%		17%		6%		11%		9%		6%		26%

Comments about Question 22: (as actually written by the respondent)

Haz Waste students could learn a lot more about their field by going to TSDF facilities, going o walk through the chemical plants, etc. They need to have a separate block.

I thought the summer block was valuable to all IEH program options. However, all things can be improved and if individualizing the summer block per program option is in best interest, then do it, but not at an increased educational cost to the student.

Their needs to be a twist/involvement more with specific curriculum. If in H.W. have segment that deals specific with that.

The format of the summer block needs updating. I have never dealt with the public (door-to-door) in my job, and don't know why I did on summer block. I think all students should have summer block. I think all students should have summer block, but with different emphasis for different options. Try involving businesses in the general area for projects/research. It might take some effort, but the rewards would out weigh the effort.

As state earlier, I think the summer block should be mandatory for all IEHM students. Whether or not the block be integrated w/students from all options is less important than making the first decision.

The skill set should remain the same, but content could be more "option" oriented.

Make sure all bases are covered: surveys, map making, surveying, analysis, writing, community, involvement, team work.

Summer block definitely was tough. Made you think fast since there was no time to waste a "put-off" a project. Very competitive. I thought it was a good experience.

Summer block should be considered a required experience for all options of the IEHM programs.

Several tracks should be implemented with regard to real world job market. Work groups should be offered according to career direction - not simply assigned.

I feel the HW option should have more activities pertaining to that field, I do also feel that the broad (env.) perspective is also important.

Summer block is an excellent opportunity to convey the importance of teamwork and communication between co-workers.

The summer block prepared me for field activities when attending graduate school. It gives the students an opportunity to apply technical skills in a practical manner. I feel it is very beneficial to retain the summer block.

I think having all the students together in one group has definite benefits. Learning to work together in such a large group in very important. However, more specific training would also be beneficial.

I felt the summer block was mostly a waste of time. When I transferred to FSU from a different University, I already completed similar courses. Unfortunately I still had to participate in the summer block.

I think it is important to keep the summer block general since I went from environmental to safety. I think the summer block should operate as it did in the past but either the added parameter of field testing, remediation options etc...

The summer block in no way, helps me currently in my job & I can't see that it ever will. I feel that it was a waste of time & money. If it is going to be a part of IEHM it should be different for each option.

Some aspects of the summer block so not provide hazardous waste management students enough "hands-on" experience, but it does provide the chance to use your analytical reasoning abilities and reports of your findings that all options could benefit from.

For those students in the hazardous waste management option, the summer block was anorexic when it came down to content matter. However, I believe that the experience was very beneficial in teaching the individual how to function with in a group or departmental structure. I feel this was as important as having a strong content emphasis. I would suggest incorporating more haz-waste information & technical experience into the "existing" framework of the block. After all, what good is technical knowledge if we can't work in a group with others to achieve a shared goals!

I can't recall any H.W. in the summer block. Soils training, food service establishments, well, septic systems need to be hands-on; field experience. What does a person do in H.W.? I never found out in the real world.

I strongly agree that should be offered a separate track during Summer block. A special project and/or a extremely hands-on reactive high impact episode to bring students into reality regarding the potential of a haz-waste.

Job positions are rarely for "generalists" in E.H. Most health depts. now specialize through the background gained at FSU reigns superior to that of colleagues with biology, geology, etc. degrees.

Summer block was indeed an invaluable experience for me. I learned what Environmental Health means, and how to spell Environmental Health. Who would figure?

The summer block is a valuable experience because it emphasized the importance of process, teamwork, organization, report writing, communication, and most of all versatility. In our field you need to be able to roll w/the change and feel comfortable filling a lot of shoes.

My experience with summer block was the team way of working within groups should stay the same but the content of summer block needs to be updated for H.W. students. H.W. Students need more material that pertains to them & it should be separate! Monitor wells, sampling protocols, free product, remediation systems/techniques design, UST removal, permitting, SOPs, surveying-Keep this it is valuable, more "hands-on training", more regulations/laws, safety, engineering courses. Summer block has real life application except work relationships things that did not pertain to or were useless. Info on turkeys-who cares!, fish identification, assessments are more gov't work phase I & II are more applicable to the real world, photo development. I thing that certain faculty are putting their own interests first and not letting our IEHM program progress. These people are hurting the program and are preventing students form getting a better education. I have compared myself to a U of M civil graduate that I replaced. I had more knowledge & experience in the Environmental field. If we can incorporate engineering classes it will make ore program & students more valuable.

Environmental-MI students need to learn how to fill out clean air act title IV, air permits and DNR storm water pollution prevention plans as well as city requirements for water testing.



Haz-waste students need to rules on form R requirements, and how to eliminate or reduce hazardous waste streams. Recycle ideas. What can be recycled? What can be used instead of ? Hazardous waste manifests.

The summer block should prepare a student for events faced in the working world (i.e., report writing, surveying, monitoring well installation, soil and ground water sampling, hands on experience with equipment). Students should learn how to use public sources through FOIA requests and how to collect and interpret analytical data. This not only is useful towards gaining employment, but also makes the student useful during internships.

I believe that all IEHM students no matter what option should take Block! It was a very good experience but everyone should participate. Also it should be more individualized according to option. Although I liked block, I didn't feel that it was teaching me a lot about HW it seemed more toward general. The computer skills, writing skills, and group participation skills gained have helped me a GREAT deal!!

I have found summer block interesting, but I have yet to use any skills learned in summer block for my current job.

Its really hard to answer those as I graduated 12 years ago & so much has changed in technology and I'm certain the curriculum.

I believe that the summer block program should be both broad and specialized. Depending on what option one is in. Why not have a common core assessment i.e.(chipper lake etc.) and also have specialized courses depending on option. I didn't think it should be totally specialized. But parts of it need to be.

Let the students choose an option it they want to, but only of it's "no sweat" to you.

23. How well did the IEHM program prepare you for your career choice? Please circle one number below. (1 = poor to 10 = excellent)

1	-	2	-	3	-	4	-	5	-	6	-	7	-	8	-	9	-	10
(Poor)																		(Excellent)
1%		1%		1%		0%		15%		3%		19%		36%		15%		9%

24. Other comments: (as actually written by the respondent)

Business MGMT classes would have a good curriculum addition. Economics, accounting, really didn't help. Need more info on consulting for students, because that is where most grad's start off after graduation. Most jobs are also a combination of health & safety & environmental in general industry.

Need more intern time, 2 segments (blocks) 10 weeks. More communication courses, a more active recruitment by companies, firms to bring on students. Interviews held on campus for positions intern and professional. Bring companies, PH dept., consulting firms in to hire.

The program needs more of an engineering background for jobs that are out there, and students should be told that to be an industrial hygienist you need to have a masters degree.

The safety and industrial hygiene program was weakened due to the loss of a professor when I went to Ferris. I hope it receives as much attention as the Environment Health options.

I have been told many times that it is very important how much I knew right after I graduated from FSU. What I learned at FSU has helped me to learn many new things, because I had a good background. All the IH classes were great.

Some core courses are of almost no value to someone in my position i.e.-radiation-anything I need to know I learned in chemistry or physics (or high school) & anyone going on to work with radiation will need to know much more than that course offers. the number of core courses should be reduced and replaced by option courses.

Most everything I do at work, I learned at work. That could change with business involvement (consultants) more than just at FIEHA meetings.

Additional classes in environmental engineering would benefit the program. Also classes in human relations/office politics would also help. Possible debate class or some kind of class where one has to defend one side of an issue. I found that sometimes you have to present a good case for actions to be taken even if you are explaining an OSHA law.

I feel that my education from Ferris has more than adequately prepared me for my work environment. I do see a need for some classes involving computer use. Specifically for the Safety, IEHM professionals. Also, a masters program would be beneficial. Or, barring that a course on, or to prepare for, taking certification exams.

Surveying is important for shooting grade on a drain field. Need more hands on with soils.

Personal communications, public speaking, and additional non-technical writing courses should be required, since they are what determines your success with the technical knowledge.

Although I am now assigned in a human relations job, my education in EH was and still is extremely usable to me. I plan on getting back into EH soon, possibly in a management capacity.

More training in machine guardian & ergonomics would greatly improve the preparedness- all in all I feel Ferris IEHM is an outstanding job. Keep up the good work. The weakness in the program is related to the other departments. The chemistry, physics, mathematics and english departments were very weak. These caliber of instruction was fractional as compared with my community course instruction. the computer class was only a basic class-Fairly word processing, spreadsheets & data base. I self thought myself in all these areas.

I should have more geology, hydrogeology and problem solving courses work. The ventilation class was somewhat (not totally) inappropriate at the time I was taught it.

Need more involvement (in school) with computers and oral communication.

I think you'll find, as with many other degrees, is that college courses is only a small part of the learning experience. The "working world" is where the learning & molding actually takes place. Overall, I believe the IEHM program gave me a good start with my career path & I am finally finding out exactly what and where I want to go with it. I have learned & grown professionally 100% since graduation. This has come to me via hard work, on going education (seminars, workshops), supportive boss, & rapidly growing & diversified company.

Have more discussion in OSHA law class regarding construction. Slash production & operations MGMT from the curriculum and tell Mr. Ells to eat your heart out! Call me if you need help regarding training in the construction field. Also discuss in your class the importance of lowering your insurance premiums as opposes to scaring people into safety with "possible" OSHA fines.

Overall, it did not prepare me for present employment position. I am responsible for serving 3 different tribes with a total population of approximately 2,500 with many different areas of Environmental Health.

My career choice is geared toward environmental consulting. No specific direction was offered in this regard. Internship sites consisted primarily of Health Depts. More emphasis should be placed on private industry. There are many good internship site candidates out there, but Ferris seemed to be stuck in the H.D. mode. Environmental consulting is a prosperous industry, even without MUSTFA. Perhaps hire an environmental property assessor to teach a course on ph1, ph2, BEA, CAD, report writing, etc.

For private sector certification is needed. For government work an advanced degree without certification is preferred. It should be noted almost all advanced degree be individuals in government service is through correspondence courses.

I feel that the program needs to apply more hands on training to supplement the courses. This would assist in making the course work more retainable, as well as a fun learning experience.

I think that the program should contain more work with soils. Collecting soil samples, spending more time training the students in soil classification, and increased geology training would definitely benefit many of the students.

More emphasis on decision making. I was provided with a strong technical background from the IEHM program, but my practical on-hands knowledge was limited.

Right now I'm pursuing a career in retail IEHM isn't applicable. I found it very hard to find employment in the "environmental field." It may be due to my location, I'm not sure.

If possible, add an environmental remediation project to the summer block final project. In other words, in you doing an environmental study in Lake Ferris and its surrounding community, add to the summer block report a section on results of a phase 1 and/or 11 or BEA of a specific portion of property and make recommendation/comments on the findings. Possible remediation options for the property owner. I know this is not likely to happen for every study area because no property owner is going to want FSU students reporting to the would its contamination but if a bank could recommend properties or a fictitious site could be created, it would be helpful to the Hazwaste students to use their geological background to track wastes and their hazwaste MGMT skills to come up with remediation options. However, a good internship will offer this to the students as well.

The hazardous waste option should have a stronger background in organic chem. There also needs to be more hands on, I feel I would have learned more of I could have actually had more hands on training. There also needs to be a stronger computer background.

Completed IH courses. Competition for IH positions depends on certification and/or a masters degree. The safety arena is more open for students completing a BS form Ferris. My perspective based on holding a position as an IH, and now as a safety specialist. The IH hazards are not receiving as much attention, focus or recognition as a true concerns in the work place. In addition, industrial hygienists do not get the respect they deserve. More emphasis in placed on safety rather than health. Experienced safety specialists without a degree earn the respect when it doesn't seem to fit.

I would highly recommend the IEHM program at FSU to any high school sr. or college freshmen. The knowledge/experience gained through my IEHM classes has provided me with all my success with ford motor co.

I worked in environmental health at a local HD for 6 years. I changed professions because I found it difficult to find a job in an area other than a Health Dept. with my background. I would have had more guidance in my decision to choose the general option. As I look back, IH or Ind. Safety would have been a more appropriate choice but I was unaware of what these consisted of. Since I have made a career change, I am much more satisfied in my professional life. I enjoyed environmental health, but was unable to grow and feel a sense of achievement or accomplishment.

More emphasis on management skills including: writing & oral communication, technical course work was excellent! Highly recommend dual major- Ex: Industrial Hygiene & Haz-Waste MGMT or Safety & Haz-Waste. Companies need individuals with knowledge in both safety/IH & environmental!

This score probably lower than most of you would like to see. This is mainly due to the lack of hands-on, real-world exposure to the field. Maybe the program should evaluate a co-op work program with "local" industry. This would better prepare the graduate for the trials & tribulations to come.

Excellent program. Good instructors. I wish a masters degree was available when I was at Ferris, I recommend this program to other personnel interested in this field of study.

I am currently working as a sanitarian. I really "thought" I would work for a private entity in the H.W. field. Either no experience, or connections, I was really let down. It took me seven months to land a job. I work in an undesirable field and location. Very few EH jobs are in the want ads, employment agencies, etc...

My degree gave me an excellent overview of my current job. I feel that it is my fault that I didn't get more out of it. I did not take college very seriously. I am lucky that I have been successful now. I probably won't have had to work so hard if I would have just participated when I was supposed to.

Due to state government consulting, state and county employment are not places to be. Jobs are limited, generally shaky ground. All IEHM options have a place, a permanent place, in industry. I recommend focusing on industrial applications.

Please update curriculum to meet current trends & needs as well as new community based health management. Increase the intensity & difficulty in course work. Add courses on a risk assessment, toxicology, understanding of legal terminology, enforcement & interpretation, pollution prevention strategies.

The I.E.H.M. prepared me to pass the RS exam, without which I would be just another san.I. You should design a course aimed at preparing students for the RS exam, it's a killer.

My experience in the IEHM program was that I had been exposed to enough different things that I could do a lot of different things when I graduated. One thing I would want to stress to future graduates is that they will probably have to do a lot of things in the same position. They may need to be trained, samplers, geologists, inspectors, technical writers, compliance officers, reg. interpreters, field team leaders, etc., all in the same day. I have found this to be the case in both the consulting & academic settings. More exposure to many different professions (i.e. speakers, field trips, etc.) would help students know what they'll need to know when they graduate. The ability to adapt to many different tasks is critical to survival in this field. I think that most workplaces expect to hire people who can do a lot for them and fulfill the duties of Haz-waste MGMT., IH, Safety officer, & Environmental Health specialist. All four of the

program options are dealt W/ in my work place everyday, so maybe more of a core curriculum approach to the degree would better prepare students.

The IEHM course prepared me fairly well in the sense of course/book material. The internship was what make me attractive after graduation. I had technical skills that other applications did not possess.. However, technical writing and other aspects of what is going on in toady's world needs to be taught or emphasized more. I know that the majority of the staff is in the field with their own businesses. That type of information is what should be taught in addition to book knowledge. Employers today want experience & not a person who knows what the regulations say.

The program provided an adequate base, but 90% of what you need to know is learned no the job (obviously)- I think the program needs more Math & technical writing. The physics class offered in 90-92 should be more advanced class with a lab.

I am the Environmental Health/Industrial Hygiene expert for an anti-terrorist group responding to scenes of biological/chemical releases of a criminal nature as well as sites of potential release such as the Olympics and political conventions. My broad background enables me to do this job and Ferris is part of that mix.

Although I an not currently working in the field, I hope to in the future. I really enjoy the program! I feel it helped a lot it and would prepare anyone for a career in IEHM!!

For the Hazardous waste management option I would recommend a course in chemistry of hazardous materials and a full year of organic chemistry. A separate course on D.O.T. regulations would be good idea also.

Most of my experience has been in Haz-waste & Industrial Hygiene & Safety . In retrospect any of the other options, other than Gen.Env. Health, would have prepared me much better. I have done a lot of learning on the job but got my foundation at Ferris. I have also done a lot of self study although I do not have a masters.

Human relations, written & verbal communication are very important in this field. These topics should be stressed in every class offered in IEHM. Many colleagues have told me that students lack those skills.

All in all, I feel that FSU has a very strong IEHM program. But I do think summer block needs to have some specialized (course) field work for the Haz Waste option, and I think some of the classes in the core of options should be forced more on what the actual (laws-regs) are. NPDES-permits, sans. title III respects, spill plains, Title V are permits etc. I also believe that a course on Michigan environmental regulations would be very helpful., as we did not have much exposure to it. During college, but must abide by it in industry (Mich.). I was also believe an air pollution (permits) course should be required as a core class.

**CORE COURSES** *comments:* (as actually written by the respondent)

- Drop PHA for Haz Waste.
- Toxicology is a very good class.
- The internship I did was more valuable to my career than most of the courses I took. I can't remember if the material presented was out dated at the time I took the class. Only two of these classes actually applied to my career.
- What's excellent about the Ferris Program is not any individual course but the broad background a student gains throughout the program.
- Overall, I thought the IEHM's courses were very good and they helped me for my current job.

- Dr. Rouman's texts were all ancient and his instruction was most typified by his reading the text. I called him "the reader". Mr. Ells & Dr. Rodabaugh were both current and outstanding in their presentation and materials.
- I don't believe it is necessary to conduct an orientation to internship course. Maybe a short seminar could be conducted then it could be fully the responsibility of the student and/or counselor to arrange the internship site.
- It's not that I felt Mr. Roman did a poor job teaching Public Health Administration. He knew the subject well, I just didn't find the class beneficial.
- Need to include business related core material: budgeting, cost containment, etc.
- Courses evaluated from a country health department sanitarian point of view.
- Due to the rapidly changing field, it is extremely difficult for instructors, or anyone else for that matter, to stay abreast of all the Environmental. rules changes. The information portrayed in the above classes may have been up-to-date when presented, but upon entering the field, the information was obsolete.
- Internships highly important and to pick the right one for yourself.
- Should have had fairness to all students job skills prep. as well as resume.
- Too much squeezed into a little time. Could have done more "real life" application.
- It is difficult to think back & recall current material vs. non-current. Internships at local health dept. rather than (paid) industrial should be emphasized.
- There is no substitute for O.J.T. There are parts of the job you can't learn in school. It's hard to prepare for a real life job in an academic setting. You won't be prepared to be a professional right out of school, you have to learn that on the job. That's what a job is, constant learning. That's what school is for, you have to learn to learn!
- A lot of courses will seem outdated in hind-sight because of advances since 1992 when I graduated. They may be current.
- The classes that Rodabaugh thought were all "stories" of his great past and offered very little technical information.
- Radiation- needs hands on monitoring with the equipment and state requirements-should have students purchase the state radiation book.
- More radioactive waste management should be included with the hazardous wastes management class.
- Haz-waste should have included more than just regulators ( case histories, current issues, PPE, decon, etc.)

## **GENERAL ENVIRONMENTAL HEALTH OPTION**

*comments:* (as actually written by the respondent)

- Summer block, although very challenging & a real pain in the butt without a doubt the greatest learning experience I had at Ferris. some type of summer block should be required for all options. How is the Hersey River these days anyway?
- Vector control and Integrated pest management needs to look alternative ways to control insects and rodents.
- More field trips should have been taken - inspecting restaurants.
- Some summer block material unrelated to career choice. Some lab equipment/techniques outdated.
- Summer block was great because it brought the students and faculty together as some sort of team.
- Mr. McMullen, Mr. Ells, and Mr. Hunter were all excellent. Gary Rodabaugh was an excellent and appropriate addition.

## **HAZARDOUS WASTE MANAGEMENT OPTION**

*comments:* (as actually written by the respondent)

- Keep summer block but specialize them more toward the option that students are taking.
- More needed on ergonomics and hands on air monitoring. More work on how to fill out TIER I / TIER II reports, biannual Haz Waste reports, title V air Quality (new students really need this) air permitting for small sources. Small QTY generator status/LQG status, waste reduction. Recycling-new laws/regs. MORE, MORE, MORE: seminars, workshops, community involvement, networking-public speaking and writing skills needed.
- Not enough current equipment and usage presented.
- Many classes in HWM now available were either not available or emphasis was charged.
- Summer block- first few weeks too intense/stressful. Hard to learn and comprehend all the materials presented with such long lectures, especially on difficult and new information (i.e. surveying).
- The summer block is a waste of time for everyone not in the general environmental health option.
- Summer block - Great growing experience, not applicable to today's competitive industry!!!
- Not much learned from this option. No real world knowledge. Doubtful if jobs exist here for the newly graduated students.
- More labs hands-on very important. Pats of block very good some useless.
- A lot more exposure to different types of air mentioning equipment & their application would've been valuable. We had access to them, but weren't really exposed to their theories of operation, applications, limitations, trouble-shooting, etc.
- Ergonomics-needs to focus on job safety analysis and the NIOSH lifting guide.
- This was not an option for me, but should have been.

## **INDUSTRIAL HYGIENE OPTION**

*comments:* (as actually written by the respondent)

- School needs to purchase better training equipment-Everything was outdated in 1991-92-93
- Hands-on activities are very important. Many of my colleagues hesitate using new equipment they are not familiar with. The hands-on activities gives me the confidence to learn the new equipment.
- Would be better if more field trips were included.
- I enjoyed the field trips, but I wished that there were more of them.
- The classes offered very little technical information. I graduated with the safety option without ever seeing the state safety standards. A lot more time should be spent on book knowledge and theory.
- These classes helped me to be a competent problem solver in my first Health & safety job right out of college.

## **INDUSTRIAL SAFETY OPTION**

*comments:* (as actually written by the respondent)

- Ergo was not a part of my class but still was not heavily a part of the industry yet. I recommend more field trips to manufacturing plants including mechanical power presses, lathes, mills, iron worker. Plant safety is heavily mechanical safety related and plant visits to back up machine guardians is essential.
- Fire prevention-needs more focus on how to inspect fire extinguishers, how often, how to hang them properly-need sate standards. Mechanical safety-more focus on specific lockout/tagout procedures-hoe to identify and perform.

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**24. comments:** (as actually written by the respondent)

- Although we had some differences Mr. Ells, I respect you and learned a great deal from your teachings. Best wishes! Dr. Rodabaugh, you were a great instructor. Learned a great deal from you too. I'm sorry Mr. Rouman, although you were a nice person, your classes were BORING! Mr. Monotone at best. If you ever need someone to explain to students how the Environmental Health program prepared me for my job, and current job responsibilities on the Indian Reservation.
- Business MGMT classes would have a good curriculum addition. Economics, accounting, really didn't help. Need more info on consulting for students, because that is where most grad's start off after graduation. Most jobs are also a combination of health & safety & environmental in general industry.
- Need more intern time, 2 segments (blocks) 10 weeks. More communication courses, a more active recruitment by companies, firms to bring on students. Interviews held on campus for positions intern and professional. Bring companies, PH dept., consulting firms in to hire.
- The program needs more of an engineering background for jobs that are out there, and students should be told that to be an industrial hygienist you need to have a masters degree.
- The safety and industrial hygiene program was weakened due to the loss of a professor when I went to Ferris. I hope it receives as much attention as the Environment Health options.
- I have been told many times that it is very important how much I knew right after I graduated from FSU. What I learned at FSU has helped me to learn many new things, because I had a good background. All the IH classes were great.
- Some core courses are of almost no value to someone in my position i.e.-radiation-anything I need to know I learned in chemistry or physics (or high school) & anyone going on to work with radiation will need to know much more than that course offers. the number of core courses should be reduced and replaced by option courses.
- Most everything I do at work, I learned at work. That could change with business involvement (consultants) more than just at FIEHA meetings.
- Additional classes in environmental engineering would benefit the program. Also classes in human relations/office politics would also help. Possible debate class or some kind of class where one has to defend one side of an issue. I found that sometimes you have to present a good case for actions to be taken even if you are explaining an OSHA law.
- I feel that my education from Ferris has more than adequately prepared me for my work environment. I do see a need for some classes involving computer use. Specifically for the Safety, IEHM professionals. Also, a masters program would be beneficial. Or, boring that a course on, or to prepare for, taking certification exams.
- Surveying is important for shooting grade on a drain field. Need more hands on with soils.
- Personal communications, public speaking, and additional non-technical writing courses should be required, since they are what determines your success with the technical knowledge.
- I found a job that will give me a lot of exposure in my field. Lori Seiler helped me on finding a job. Thanks Lori!
- Although I am now assigned in a hands relations job, my education in EH was and still is extremely usable to me. I plan on getting back into EH soon, possibly in a management capacity.
- More training in machine guardian & ergonomics would greatly improve the preparedness- all in all I feel Ferris IEHM is an outstanding job. Keep up the good work. The weakness in the program is related to the other departments. The chemistry, physics, mathematics and english departments were very weak. These caliber of instruction was fractional as compared with my community course instruction. the computer class was only a basic class-Fairly word processing, spreadsheets & data base. I self thought myself in all these areas.



- I should have more geology, hydrogeology and problem solving courses work. The ventilation class was somewhat (not totally) inappropriate at the time I was taught it.
- Need more involvement (in school) with computers and oral communication.
- I think you'll find, as with many other degrees, is that college courses is only a small part of the learning experience. The "working world" is where the learning & molding actually takes place. Overall, I believe the IEHM program gave me a good start with my career path & I am finally finding out exactly what and where I want to go with it. I have learned & grown professionally 100% since graduation. This has come to me via hard work, on going education (seminars, workshops), supportive boss, & rapidly growing & diversified company.
- Have more discussion in OSHA law class regarding construction. Slash production & operations MGMT from the curriculum and tell Mr. Ells to eat your heart out! Call me if you need help regarding training in the construction field. Also discuss in your class the importance of lowering your insurance premiums as opposes to scaring people into safety with "possible" OSHA fines.
- Overall, it did not prepare me for present employment position. I am responsible for serving 3 different tribes with a total population of approximately 2,500 with many different areas of Environmental Health.
- My career choice is geared toward environmental consulting. No specific direction was offered in this regard. Internship sites consisted primarily of Health Depts. More emphasis should be placed on private industry. There are many good internship site candidates out there, but Ferris seemed to be stuck in the H.D. mode. Environmental consulting is a prosperous industry, even without MUSTFA. Mike Ells and Gary Rodabaugh should be given full authority over summer block curriculum. I feel they are in touch with the real world job market and could easily put together a program that would match career goals with specific training and work groups. I was placed in groups that were completely unrelated to me career direction. Perhaps hire an environmental property assessor to teach a course on ph1, ph2, BEA, CAD, report writing, etc.
- For private sector certification is needed. For government work an advanced degree without certification in preferred. It should be noted almost all advanced degree be individuals in government service is though correspondence courses.
- I feel that the program needs to apply more hands on training to supplement the courses. This would assist in making the course work more retainable, as well as a fun learning experience.
- I think that the program should contain more work with soils. Collecting soil samples, spending more time training the students in soil classification, and increased geology training would definitely benefit many of the students.
- More emphasis on decision making. I was provided with a strong technical background from the IEHM program, but my practical on-hands knowledge was limited.
- Right now I'm pursuing a career in retail IEHM isn't applicable. I found it very hard to find employment in the "environmental field." It may be due to my location, I'm not sure.
- If possible, add an environmental remediation project to the summer block final project. In other words, in you doing an environmental study in Lake Ferris and its surrounding community, add to the summer block report a section on results of a phase 1 and/or 11 or BEA of a specific portion of property and make recommendation/comments on the findings. Possible remediation options for the property owner. I know this is not likely to happen for every study area because no property owner is going to want FSU students reporting to the would its contamination but if a bank could recommend properties or a fictitious site could be created, it would be helpful to the Hazwaste students to use their geological background to track wastes and their hazwaste MGMT skills to come up with remediation options. However, a good internship will offer this to the students as well.

- The hazardous waste option should have a stronger background in organic chem. There also needs to be more hands on, I feel I would have learned more of I could have actually had more hands on training. There also needs to be a stronger computer background.
- Completed IH courses. Competition for IH positions depends on certification and/or a masters degree. The safety arena is more open for students completing a BS from Ferris. My perspective based on holding a position as an IH, and now as a safety specialist. The IH hazards are not receiving as much attention, focus or recognition as a true concerns in the work place. In addition, industrial hygienists do not get the respect they deserve. More emphasis is placed on safety rather than health. Experienced safety specialists without a degree earn the respect when it doesn't seem to fit.
- I would highly recommend the IEHM program at FSU to any high school sr. or college freshmen. The knowledge/experience gained through my IEHM classes has provided me with all my success with ford motor co.
- I worked in environment health at local HD for 6 years. I changed professions because I found I difficult to find a job in an area other than a Health Dept. with my background. I would of had more guidance in my decision to choose the general option. As I look back, IH or Ind. Safety would have been a more appropriate choice but I was unaware of what these consisted of. Since I have made a career change, I am much more satisfied in my professional life. I enjoyed environmental health, but was unable to grow and feel a sense of achievement or accomplishment.
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- I believe Ferris is giving students a unrealistic view of the real world. I expected to have the 10 job offers available when I graduated. I had trouble finding one. I received very little support from the Faculty at Ferris. I believe Ferris students expect to come out of school and move directly in management positions and are unrealistic in what they expect as a starting salary. This is evident from the interviews that I have been part of. The students seem to have a false sense of confidence during interviews. Two years ago at the Michigan Safety conference I was appalled by the students unprofessional conduct. When they attend a conference they should view themselves as representatives of Ferris State and of IEHM program. I am also surprised how little the Faculty supports the students. Have they ever considered a internship job fair? Where potential internship employers could interview students in campus. This would be a opportunity for potential internship employers to meet the student and a chance for alumni to return to Ferris. I also believe your survey is a little swayed. I think you would like to know little more specific information about salaries. \$35-50k is a broad range where most people with a few years experience will be. Or is that the purpose, promise students \$35050k in three years. I know when I was a student that meant I would make 49k not 36k in three years. I think Dr. Rodabaugh needs to spend more time teaching students about pertinent laws and regulations and a lot less time bragging about his conquests at General Motors. His stories did very little to prepare me for the job market.
- The IEHM course prepared me fairly well in the sense of course/book material. The internship was what make me attractive after graduation. I had technical skills that other applications did not possess.. However, technical writing and other aspects of what is going on in toady's world needs to be taught or emphasized more. I know that the majority of the staff is in the field with their own businesses. That type of information is what should be taught in addition to book knowledge. Employers today want experience & not a person who knows what the regulations say.
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- Although I an not currently working in the field, I hope to in the future. I really enjoy the program! I feel it helped a lot and would prepare anyone for a career in IEHM!!
- For the Hazardous waste management option I would recommend a course in chemistry of hazardous materials and a full year of organic chemistry. A seperate course on D.O.T. regulations would be good idea also.
- Most of my experience has been in Haz-waste & Industrial Hygiene & Safety . In retrospect any of the other options, other than Gen.Env. Health, would have prepared me much better. I have done a lot of learning on the job but got my foundation at Ferris. I have also done a lot of self study although I do not have a masters.

- My intent in attending Ferris was more Haz-waste than E-H, but the options weren't there at that time. Mr. Rouman did not let us break out of the "old school" of Health Dept work. We knew at the time that Haz-waste was the future, he blocked our way.
- Human relations, written & verbal communication are very important in this field. These topics should be stressed in every class offered in IEHM. Many colleagues have told me that students lack those skills.
- All in all, I feel that FSU has a very strong IEHM program. But I do think summer block needs to have some specialized (course) field work for the Haz Waste option, and I think some of the classes in the core of options should be forced more on what the actual (laws-regs) are. NPDES-permits, sans. title III respects, spill plains, Title V are permits ect... I also believe that a course on Michigan environmental regulations would be very helpful., as we did not have much exposure to it. During college, but must abide by it in industry (Mich.). I was also believe an air pollution (permits) course should be required as a core class.

#### **4. Other Positions held:**

Environmental Consultant  
 Campus Sanitation, Environmental Coordinator,  
 Hazardous  
 Chemical Hygiene Technician  
 Corporate H&S Manager, Regional Safety Officer,  
 Environmental Scientist  
 EEO Officer  
 EHS Compliance Technician 2yrs. Bioenvironmental  
 EHS Environmental Tech.  
 Engineer Tech. 4yrs., I.H. Tech. 2yrs.  
 Environmental Engineer  
 Environmental Health Specialist  
 Environmental Coordinator  
 Environmental Field Tech. Safety Officer/Manager  
 Environmental Health & Safety Specialist, Safety/  
 Security Supervisor  
 Environmental Property Assessor  
 Environmental Safety Assistant  
 Environmental/Safety Coordinator  
 Environmental Scientist, (consultant)  
 Hazardous Material Technician  
 Health & Safety Associate  
 Health & Safety Coordinator  
 Health & Safety Officer/Inorganic Laboratory Tech.  
 Industrial Hygienist  
 Loss Control Manager  
 Materials Coordinator  
 Noise Technician, Hygiene Technician  
 Nurse Manager  
 Operation Specialist  
 Production Supervisor  
 Project Manager  
 Quality Control Tech.

Radiation Safety Officer  
Regional IH, Supervisory IH  
Registered Sanitarian  
Remedial Installation & Design Sr. Field Tech., Env.  
Property Assessor  
Safety Coordinator  
Safety Environmental Coordinator  
Safety Facilitator  
Sanitarian II  
Sanitarian I  
Director Of Environmental Health (Civilian)  
Sanitation Supervisor  
Service Representative  
Staff Scientist  
Surface Water Analysis Technician

### **Section Three: Survey of Employers of Program Graduates**

The Industrial and Environmental Health Management (IEHM) Program surveyed employers of IEHM graduates regarding the overall quality and performance of the IEHM students they had employed. A copy of the complete survey results follows.

A total of 181 surveys were mailed during Winter semester 1997. The response rate was 34% (58 completed surveys returned, 11 returned undeliverable).

Overall, the employers expressed satisfaction with the performance and quality of the IEHM graduates they have encountered. Employers rated the IEHM graduates as good to excellent 89 - 98% for all of the areas on the survey.

Ninety-six percent of the employers would seek out another IEHM graduate for their organization. Employers reported that the graduates were technically competent and well prepared to adapt to the professional arena.

According to the written comments, areas that need continued emphasis are communication skills (written and verbal), ability to deal well with people, critical thinking and critical problem solving skills. The concept of risk communication is common to all of the IEHM disciplines and employers expressed the need for improvements in the students' ability to express technical environmental, industrial hygiene, and safety information in an understandable manner to all types of audiences.

In general, employers stated that the IEHM program at Ferris continues to offer a variety of programs and consistently produce highly qualified graduates. As also indicated in the alumni survey, students need to develop their computer skills. They also need to demonstrate an understanding of how environmental, industrial hygiene, and safety issues fit into an organization and how to creatively work to protect human health and the environment.

The IEHM program faculty recognize the need to continue helping students develop into career professionals not technicians. Areas for continued improvement are communication skills (written and verbal), ability to deal well with people, critical thinking, critical problem solving skills, and risk communication.

Another area for continued improvement is to encourage employers of IEHM graduates to interact with the currently enrolled students through activities such as field trips, guest speakers, or job fairs. These activities would allow employers to see first hand what the IEHM students are doing and would provide students with a chance further research their career options.

# INDUSTRIAL AND ENVIRONMENTAL HEALTH MANAGEMENT PROGRAM

## COLLEGE OF ALLIED HEALTH SCIENCES FERRIS STATE UNIVERSITY

### GRADUATE EMPLOYER SURVEY RESULTS

Please evaluate the overall quality and performance of all the Ferris State University Industrial and Environmental Health Management students you have employed for the areas listed below.

Please use the rating scale of 1 (poor) to 5 (excellent) and 6 being not applicable.

*All values are expressed in percent. Percentages may exceed 100% due to rounding.*

	1	2	3	4	5	6
1. Theoretical knowledge	2	0	19	53	19	7
2. Technical skills	2	2	19	51	21	5
3. Ability to apply knowledge in practical situations	2	2	21	47	28	2
4. Prepared to assume entry level duties	2	9	27	20	36	7
5. Exhibited capacity to learn and apply new experiences	2	2	2	43	48	4
6. Competency in problem solving	2	0	23	39	37	0
7. Growth and development since hired	0	2	2	42	51	4
8. Promptness in arriving for appointments	0	2	4	40	46	9
9. Promptness in completing assignments	2	2	12	40	39	5
10. Level of professionalism	2	3	7	43	40	5
11. Level of enthusiasm for the assigned tasks	0	4	14	44	35	4
12. Ability of effectively communicate orally with others	2	2	19	40	37	0
13. Ability to use written communication effectively	2	5	35	26	32	0
14. Computer competency	2	5	21	38	29	5

15. If the opportunity arose, please indicate your willingness to seek out another Ferris graduate to work in your organization. Please explain your answer.

YES 96%

NO 4%

*See attachment.*

16. Are there competencies in any specialty areas you feel a Ferris graduate should possess?

*See attachment.*

17. Based on today's industrial and environmental health job demands, are there any particular areas you feel Ferris should emphasize in the curriculum?

*See attachment.*

18. What do you see as the emerging issues in the field of environmental, health, and safety?

*See attachment.*

19. General comments.

*See attachment.*



**15. If the opportunity arose, please indicate your willingness to seek out another Ferris graduate to work in your organization. Please explain your answer. (as actually written by the respondent)**

- If they get the basics of environmental health
- The majority of our Environmental Health Staff are Ferris graduates and following several years of other job experience have developed into outstanding , professional sanitarians.
- We are very pleased with caliber of the employee working for us.
- We are employing a Ferris HVAC student for our 1997 spring/summer semester.
- Ferris prepares students for entry level positions better then other experiences we have had.
- We had a very positive experiences with out intern.
- Had technical knowledge but this individual had difficulty completing tasks and working with others.
- The DMDHD is always willing to look at prospective interns.
- They come with an understanding of public/environmental health more than and there school.
- But this would be dependent on their course work. If they have specialized in hazardous waste, this field does not have the job market it did in the 80's.
- Student have knowledge of "real world" practices.
- Very satisfied with past experiences
- Proven ability to do an outstanding job. Seven of our eight staff are Ferris graduates.
- Depending on our needs and the skills, capabilities and method of the candidate we would certainly look favorably on one of your people.
- Well versed in the field both a position approach t problem solving.
- Always willing to continue with internships.
- I am a Ferris Grad. Of course I want to hire other Ferris Grads.
- I would evaluate the person not necessarily form where they graduated.
- Our organization was very pleased with the performance for our 2 FSU interns.
- Over the years graduates/interns from Ferris have been excellent. Four of our nine sanitarians are Ferris graduates and all are doing well.
- Ferris graduates have a good understanding of public health.
- Ferris has always had, & maintains excellent record for graduating EH students.
- Our last experience was great. Individual was well prepared to adapt in the professional arena.
- As projects arise the knowledge of these students would be an advantage.
- The young people that I have had contact with were very good in their field. They were always looking for other new avenues of learning.
- Ferris grads appear to be very technically competent.
- Very poor orientation to practice of environmental health at a local health dept. Outdated knowledge, no exposure to the current technologies, methodologies, needs assessments or relationships worth communities as stockholders.
- FSU has the best technically qualified IH candidates in existence. Bar none. Most of the there schools that I've had experience with emphasize theory to the extent that "how to" skills are last.
- Terry has adapted quickly to his job duties and has shown creative thinking in his approach to completing tasks in an efficient and professional manner. This tells me he has a solid background to build on and draw knowledge from.
- The graduates form Ferris IEHM program require less field training as professional because of their academic and internship experience.
- We don't have an opening at the present time, however if/when an opening is available this is an option we would consider.

**16. Are there competencies in any specialty areas you feel a Ferris graduate should possess? (as actually written by the respondent)**

- Special emphasis should be placed on letter/report writing skills and oral presentations.
- Computer software knowledge & competence, Report writing abilities, Meeting & communicating with varied groups
- Oral and writing skills need to be addressed.
- No. I feel a broad perspective of knowledge is important.
- Risk assessment
- Physiology, pathology, chemical toxicity, dermatitis, heat stress, recognition - evaluation - control, air sampling instruments, Threshold limit values, mathematics, statistics, noise monitoring instruments, carcinogenicity, teratogenicity, workers compensation, cold stress, mechanical ventilation, OSHA/MSHA/EPA
- Effective oral communication skills. The EH Field is dependent of effective communication.
- More computer training using data bases. Dealing w/people. Written and oral communications.
- Stress fundamentals & good understanding of theories behind practices of environmental health. This aspect combined w/practical field portion of curriculum have been the key to what sets Ferris apart from other Env. studies programs.
- written & oral communication, computer skills
- For students considering work at the local health department level more extensive training is needed in the following areas: Food service, public water supply & knowledge of ACT 399, private water supply - well construction standards, other knowledge word processing/ database/ spreadsheet/ cad system.
- Water quality and the rapid changing field of on-site sewage disposal.
- Overall knowledge of environmental roles and regulations.
- no - Depends on the job. We have sanitarians with specialty areas that have obtained additional training after graduation; based upon job needs.
- Communication - regardless of the technical expertise everyone of your graduates would benefit and be more attractive with public speaking, conversation & written communication skills.
- SELF - MOTIVATION is always #1
- The broader > the better. Well rounded.
- Adaptability, computer skills
- More advanced computer & technical writing skills.
- Solid ability to write reports solid math skills.
- Ability to deal effectively with people.
- More of a risk management emphasis - broader
- Better oral & written communication skills
- The ability to communicate effectively.
- In sure that report writings skills and communication skills are emphasized.
- Food sewage and water! Those "old" programs must not be ignored!
- In dealing with local health Depts. most sanitarian responsibilities are in sewage disposal and ground water well construction.
- Shelter Environment
- Future programs should include a greater emphasis and greater proficiency in food service sanitation.
- communication is always a critical area verbal & in writing/computers
- Document anything, Document everything, & Document always
- Fiscal accounting & project management.
- Yes, the field of inspection by outside organizations
- Technical writing & spelling skills need to be tune-up! Include more spot welding in the welding curriculum.

- Food- Service safe management certification, soils- successfully passed soils science course work, water- ground water course work, public swimming pool course work.
- How to integrate the EHS functions into the business organization. The need for public relations skills for EHS professionals is increasing.
- EPA, DOT, and OSHA regulations.
- Ability to develop & work with programs in relational database software access, excel strong industrial hygiene skills.

**17. Based on today's industrial and environmental health job demands, are there any particular areas you feel Ferris should emphasize in the curriculum? (as actually written by the respondent)**

- Environmental law
- Computer skills, land use planning
- Basic public health concepts and practice. More emphasis on public health than industrial related EH.
- Air quality
- Consider establishing a master's degree program in industrial hygiene. Consider offering industrial hygiene monitoring classes earlier in the curriculum. Consider adding a statistical analysis course.
- Communication, On-site water and wastewater, HACCP based food inspections.
- Food service sanitation, Water wells, outside sewage disposal.
- Food safety & sanitation are increasing in importance due to dramatic increase in population dining out. This should be stressed from a microbial testing approach again, so students have the background knowledge to do problem solving. Also, epidemiological investigations.
- technical writing & training on soils
- Computers, GPS, GIS, new on-site sewage technology
- Environmental rules & regulations
- Ability to lead a training session
- no
- Brownfields appears to be the growth area of the environmental field. Roles of consultants, develops, public health representatives, administrative and attorneys are now being sorted out.
- Teach students how to work effectively with those who do not have a good "safety attitude".
- Research skills, people skills
- Environmental Law, negotiations, risk assessment
- Risk communication & assessment
- Dealing with government agencies
- Ability #16 to this answer also.
- Selling what needs to be done to upper management & workers.
- For L.h.d. employment - need more solid, on-site sewage & water supply
- problem solving
- More emphasis on the regulations.
- Remediation techniques - ground water, soils, etc., and associated industrial hygiene issues involved.
- Risk communication skills and "altruism". Too many students are out for the bid perks in industry.
- Soils works - defining texture and molting well construction.
- budgeting & MGMT
- Food service sanitation, onsite sewage disposal including soil identification, onsite water supply.
- Understand contract law because of consolidation and outsourcing directly.

- Not to suggest you aren't, but I feel it's important for grads to understand the real life quandary businesses (especially small) find themselves in with respect to the cost of compliance. "Can one afford not to?"
- Cost avoidance & prioritization of compliance issues.
- I would have to look to see what you had to offer before make this type of call.
- None other than its a much broader field than many graduated think after graduation.
- The engineer of today is expected to spend a great deal of time on the floor interaction with work teams & individual members, sometimes at odd hours. Some HR skills may help here!
- Risk assessment, community health statues assessment, team building/ group dynamics
- Need to start address how to integrate EH into the business end of any organization. Our lack of understanding this as a profession has led to staff cuts and outsourcing.
- Food- HACCP principles, basic food sanitation, Sewage- conventional sewage systems, alternative systems (9B2, sand filter technology), Indoor air Quality- residential.
- The change in Industrial waste demands changing from land filling to more efficient disposal methods, possibly look at alternative methods.

**18. What do you see as the emerging issues in the field of environmental, health, and safety? (as actually written by the respondent)**

- Environmental law
- Indoor air quality, pollution prevention, & both solid and agricultural waste disposal.
- Risk management
- Survival of the environmental health profession
- Air quality
- Workplace violence, cost/benefit of regulations/legislation, ergonomics, motor vehicles safety, occupational safety and health remediation of hazardous waste sites, motor vehicle pollution, indoor air quality, outdoor air quality, off-the-job injuries, absenteeism, statistical analysis, epidemiology, public/occupational tuberculosis, metal - working fluids, employee training including computer - based training, biological hazards, ionized and non - ionized radiation, reproductive risks, industrial ventilation, de contamination.
- Radon, indoor air
- Food sanitation, Toxic & hazardous wastes, The conduct of public health with emphasis is on basis public health issues, Housing, water septic & food.
- As I pointed out in #17 & continued in # 19, but also activities associated w/pollution prevention & finding safety alternatives to currently used hazardous substances. In general, prevention is where it's at.
- risk based decision making
- problem solving with current technology
- A good basis knowledge of all regulations, law, and enforcement proceedings.
- Urban redevelopment - (Brownfields)
- Indoor air quality - Environmental problems associated with growth.
- Rolled back environmental clean up standards. "What ever it states approach" to success in business might compromise worker safety and compromise community health impacts if progress moves quicker then protection.
- Site safety planning, regulatory compliance, public relations strategies.
- IAQ litigation, Real vs. Perceived risk, cost benefit analysis.
- Brownfields are hot right now.
- Efficient time management
- Indoor air quality, environmental air quality.
- Being able to expand beyond current level - keeping ahead of politicians-

- Cost effectiveness & prevention
- Ground water contamination, monitoring of some.
- Pollution prevention, recycling, reuse, safety emphasis - all accident are preventable.
- Getting good students into relatively low paying L.H.D. job!
- Regulatory reform, consultation for business & industry to meet new - old, changed & changing regulations or air, water, soil.
- Indoor air quality, tattoo parlors
- Contracting and outsourcing
- Self discovery and disclosure of non compliance's.
- As always, regulatory compliance but more importantly, how comply without financially hampering the organization.
- Areas in the environmental, health, and safety more regs. dumped on them. As well as the present ones getting tighter.
- The diverse back grounds required to advance to upper level positions. However, the various technical areas needed are not something that can be provided to graduates.
- Non environmental compliance & the lack of safety is expensive. Engineers of today need to know how to deal with finance people in order to "sell" their projects & move forward.
- Profiting community health status, identifying environmental contributions to that status and community participation/support for development of methodologies to address some.
- Downsizing and outsourcing, indicating that many future career opportunities will be in consulting. Also, many "pretenders" are putting themselves forth as EHS experts when they are not. This deludes and negatively impacts the EHS professions.
- Food- HACCP programs as related to inspections, Indoor air quality- residential testing, Water quality & quantity concerns, solid waste concerns, hazardous waste concerns.
- Other alternatives to waste disposal than land filling. Recycling is becoming more evident, but the cost to recycle is expensive. Small companies cannot afford to recycle certain wastes. Possibly look at alternative disposal options.
- Confided space (permit), Ergonomics, behavior based accident prevention.

**19. General comments. (as actually written by the respondent)**

- Excellent worker with good technical knowledge
- Ferris is to be commended for continuing to offer a variety of environmental programs which consistently produced highly qualified graduates.
- Students need to know that pay rates in the public sector are not the best. Motivation and professionalism/prediction need to be stressed.
- The FSU grads I employ expressed a need for more field, hand-on training in college. i.e.: site visits to well drilling sites & drainfield installations, also restaurants.
- I participated in the job fair one year ago - just to help out - & few students were there. The students have high expectations of lots of jobs at high salaries. I guess the program is doing well. I mean, as long as the students are all getting high paid, great jobs; the academic program should be fine.
- Curriculum in Allied Health Services needs to stay current with environmental conditions and change when required.
- Water Quality study - both ground water & surface H<sub>2</sub>O - w/emphasis on computer programs for happening contamination & graphically displaying data to build cases for improving community water & wastewater systems. GIS - Is important to all professions, but has particular applications for environmental professionals.
- Bring a Ferris grad with EH major is a plus on an employment application.
- We have enjoyed the three interns Ferris has sent us. As far as we know they are all on the tax rolls now. We also appreciated the support we received from Ferris evident in the visits by faculty.

- Keep them coming!
- Quality of Ferris students has been excellent.
- The internship is excellent exposure for students to gain understanding of the types of jobs and work available in industries.
- Overall Ferris has a good program - If the above areas are addressed. The future graduates would be better equipped to move in to the employment arena.
- Ferris is O.K. - Keep it up, class of "59".
- All my experience with Ferris students has been great. Working on the scholarship committee with the Michigan safety conference I have the opportunity to see and speak to your young people. Keep up the good work.
- With no income, these students seem to have little incentive to actively participate & learn form a project.
- All in all my experience with Ferris State has been great. Working on the scholarship committee with The Michigan Safety conference I have The opportunity to see and speak to your young people. Keep up the good work.
- Over the years, we've hired several FSU grads. Common to us were the inflated salary expectations, over confidence in their ability and disappointment in rate of advancement. Once they've gotten over these hurdles, they've made very good employees. We still have 2 alumni!
- I have forward the Ferris program to be based upon a 60's model, failing to amend the program for today's needs.

## **Section Four: IEHM Student Satisfaction Survey**

The IEHM program surveyed currently enrolled students during the Fall and Winter Semesters of 1996. A total of 100 surveys were distributed with a response rate of 54%. Based on the number of not applicable responses received in the survey, it is believed that many of the respondents were early on in their IEHM program completion.

According to the student survey, the majority of students have chosen the hazardous waste management option (41%) with General Environmental Health (28%), Industrial Safety (21%) and Industrial Hygiene (9%) following in order.

Seventy-four percent of students were transfers from either another Ferris program (37%) or from another educational institution (37%). Only 21% started the program as a Freshman. Over ninety percent of the students reported interest in obtaining an advanced degree (primarily a Master's Degree). The IEHM faculty believe that this information should impact recruitment efforts by focusing on transfer opportunities and by increasing the awareness about IEHM at the high school level.

Sixty-six percent of students rated the computer skills they received in their IEHM classes as good to excellent. Twenty seven percent reported the skills as fair to poor.

The students reported that their preparation by Ferris in written communication, speech communication, mathematics, computers, decision making, analytical reasoning, human relations, and technical information was good to excellent from 75 to 86%. They rated the adequacy of their preparation in biology lowest at 59%.

When asked to rate the IEHM, Chemistry, Biology, Physics, and Geology courses required in the program, there was a large percentage of not applicable responses. This indicates that the students are early in completing their program and have not had the opportunity to take the courses as of the Winter semester 1996. For the students who did rate the course work, they selected from good to poor for the majority of the responses. The notable exceptions to this were Epidemiology and Statistics (34% fair to poor), and General Chemistry I and II (34 and 47% fair to poor respectively). The IEHM courses had the highest approval ratings overall. The IEHM faculty have observed that students do not have an understanding of how the basic science and math courses in their options serve as the foundation upon which the technical IEHM course material is built. The faculty see the need for reinforcing the concepts that the IEHM degree is a professional degree not a technician level program. Better integration between the foundation science courses and the technical IEHM courses should be investigated.

When asked to rate Ferris overall students were generally satisfied with the system with the following exceptions: quality of the library holdings and library service hours, quality of computer laboratory support, and availability of computer facilities.

Student comments were generally supportive of the IEHM program and reported a comfortable learning environment with the faculty accessible and willing to help as needed. The students indicated a desire to continue to receive information in the classroom that is relevant to their future careers. The IEHM faculty work diligently at keeping up with current developments in each of their disciplines.

In conclusion, the IEHM students seem satisfied with the overall academic program. According to the students, areas that need improvement include the quality of the library holdings and library service hours, quality of computer laboratory support, and availability of computer facilities.

According to the IEHM faculty interpretation of the student survey, an area that needs improvement is helping students understand that an IEHM degree is a professional degree and not a technician level program. IEHM advisors must emphasize the importance of the basic general education, arts and science foundation courses to the complete understanding of technical IEHM courses in their degree program. Faculty need to better integrate the basic science and math courses with IEHM courses. The faculty also see a need for the students to gain a better understanding of what their career options can be in this field. Currently the faculty encourage students to participate in such things as professional societies, student organizations, and classroom field trips. Additional activities could include such things as additional guest speakers, contact with alumni, and job shadowing programs.



INDUSTRIAL AND ENVIRONMENTAL HEALTH MANAGEMENT  
COLLEGE OF ALLIED HEALTH SCIENCES  
FERRIS STATE UNIVERSITY

STUDENT SURVEY RESULTS

*All numerical values are expressed in percent. Percent may exceed 100 due to rounding.*

1. Which option are you completing?

- 28%  General Environmental Health
- 41%  Hazardous Waste
- 9%  Industrial Hygiene
- 21%  Industrial Safety

2. Did you enter the IEHM Program as a :

- 21%  Freshman
- 37%  Transfer from another Ferris Program
- 9%  Transfer from another University (no degree)
- 7%  Transfer from another University with an Associate's Degree
- 2%  Transfer from another University with a Bachelor's Degree
- 9%  Transfer from a Community College (no degree)
- 11%  Transfer from a Community College with an Associate's Degree
- 5%  Other (please explain): \_\_\_\_\_

3. Do you plan to get an advanced degree?

- 92%  Yes
- 8%  No ( If no, skip to question 5.)

4. If Yes, what degree?

- 74%  Master's Degree
- 26%  Doctorate
- 0%  Other \_\_\_\_\_

5. Please rate the computer skills you received in IEHM program courses?

- 4%  Excellent
- 15%  Very Good
- 47%  Good
- 20%  Fair
- 7%  Poor
- 11%  Not Applicable

6. Which of the following computer skills do you use? (Check all that apply.)

- 11%  Network
- 4%  Programming
- 16%  Spreadsheets
- 31%  Word Processing
- 7%  National Database
- 8%  Database Software
- 4%  Communications
- 1%  Systems Analysis
- 15%  Internet
- 3%  CAD/Modeling (Please specify).

7. Please rate your preparation by Ferris in the following, based on the rating scale below:

- |              |                   |
|--------------|-------------------|
| 1. Excellent | 4. Fair           |
| 2. Very good | 5. Poor           |
| 3. Good      | 6. Not applicable |

Areas	1	2	3	4	5	6
Speech communication	1	3	3	1	0	4
Mathematics	1	2	4	1	2	6
Computers	7	3	3	9	4	6
Decision making	4	2	3	2	4	5
Analytical reasoning	1	3	3	9	6	0
Human relations	2	3	2	1	4	4
Technical courses	1	4	2	1	0	2
Chemistry	2	4	2	7	2	2
Biology	2	3	2	2	1	8
Physics	9	4	2	1	0	6

8. Please rate the following courses that you took at Ferris:

Part One

1. Excellent
2. Very good
3. Good

4. Fair
5. Poor
6. Not applicable

<b>COURSES</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
BIOL 109 Anatomy & Physiology	21	8	8	6	0	36
BIOL 121 General Biology I	10	32	32	7	2	17
BIOL 205 Human Anatomy and Physiology	7	11	4	4	4	71
BIOL 218 Microbial Ecology	17	31	8	11	0	33
BIOL 314 The Biological Environment	13	10	13	10	0	55
CAHS 317 Public Health Administration	5	18	18	5	0	53
CAHS 410 Intro. To Epid. And Pub. Hlth. Stats.	11	0	23	17	17	31
CHEM 114 Intro. To General Chemistry	8	2	14	10	8	41
CHEM 121 General Chemistry I	9	15	26	17	17	17
CHEM 122 General Chemistry II	5	10	8	21	26	31
CHEM 124 Intro. To Organic and Biochemistry	6	3	16	10	13	52
CHEM 214 Fundamentals of Organic Chemistry	10	3	7	7	7	66
CHEM 221 Organic Chemistry I	7	0	3	13	10	67
CHEM 222 Organic Chemistry II	4	4	11	4	4	71
GEOL 121 Physical Geology	31	16	0	0	3	50
GEOL 321 Hydrogeology	39	15	3	3	0	39
IEHM 101 Intro. To Ind. And E.H. Mgmt.	22	39	14	10	2	12
IEHM 211 Water and Wastewater	17	36	14	0	0	33
IEHM 212 Shelter Environment	14	0	10	5	0	71
IEHM 214 Vector Control	11	18	4	0	0	68
IEHM 222 Fire Prevention and Control	15	0	4	0	4	78
IEHM 231 Mechanical Safety	14	0	10	7	3	67
IEHM 250 Integrated Pest Management	12	12	4	0	0	73
IEHM 302 Comm. Disease Control	18	14	4	0	0	64
<b>COURSES</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
IEHM 308 Solid Waste Management	30	27	8	0	3	32

IEHM 310 Environmental Radiation	21	23	26	8	8	15
IEHM 311 E.H. Laboratory	10	10	7	10	0	63
IEHM 319 Orientation to Internship	16	3	13	16	3	48
IEHM 320 Insti. Health and Safety	16	13	16	9	3	44
IEHM 322 Acc. Prevent, Invest. & Reporting	20	0	17	3	3	57
IEHM 330 OSHA Laws	21	12	15	3	3	47
IEHM 332 Industrial Hygiene & Ergonomics	23	23	23	6	3	23
IEHM 335 Air Sampling and Analysis	11	0	7	0	0	82
IEHM 345 Hazardous Waste Management	26	35	12	0	0	28
IEHM 350 Food Technology	14	14	3	0	3	66
IEHM 375 Toxicology	15	22	7	4	4	48
IEHM 403 Air Pollution	12	0	4	0	0	84
IEHM 405 Environmental Engineering	10	7	13	3	0	67
IEHM 408 Environmental Chemistry	11	7	11	0	4	67
IEHM 409 Environmental Management	10	3	17	3	0	66
IEHM 410 Env. Assess. And Impact Analysis	0	14	18	4	4	61
IEHM 412 Industrial Ventilation	28	15	18	13	0	26
IEHM 416 Noise and Vibration	4	8	0	4	0	83
IEHM 422 Environmental Systems Mgmt	.9	0	6	0	3	60
IEHM 440 Hazardous Waste Law	22	11	0	7	0	59
IEHM 490 Safety Management	17	13	7	0	3	60
IEHM 491 HW, IH, IS, Internship	8	4	4	0	4	80
IEHM 492 GE Internship	8	4	0	0	0	88
IEHM 497 Special Problems	4	0	0	0	0	96
PHYS 130 Concepts in Physics	20	17	6	3	0	51

Industrial + Environmental  
Health Management

APRC 1997-1998

Section 2 of 3

9. Please rate Ferris in the following, based on the rating scale below:

Part One

- 1. Excellent
- 2. Very good
- 3. Good

- 4. Fair
- 5. Poor
- 6. Not applicable

AREA	1	2	3	4	5	6
Availability of my program advisor.	25	31	12	22	10	0
Willingness of my program advisor to help me.	40	30	14	12	4	0
Quality of career advising in the program.	26	32	20	14	6	2
Quality of curricular advising in the program.	27	35	17	15	4	2
Quality of instruction in my program courses.	40	47	9	4	0	0
Opportunities for interaction with faculty in my program.	37	33	18	10	0	2
Quality of library holdings in my major area.	6	18	36	18	20	2
Library hours and services.	4	25	25	37	11	0
Availability of professional activities or clubs in my	21	31	35	8	2	4
Helpfulness of the College of Allied Health Sciences	25	33	33	2	2	4
Quality of courses for providing a good general	24	37	37	2	0	0
Internship experiences in the program.	12	17	17	0	5	49
Laboratory facilities related to the program.	11	20	41	11	11	7
Classroom facilities related to the program.	12	24	41	16	4	2
Quality of courses in preparing me for employment.	16	49	24	10	2	2
Fairness of grading in my courses.	23	44	27	6	0	0
Clarity of the degree requirements.	25	47	18	6	2	2
Opportunities for formal student evaluation of instruction	12	48	20	12	4	4
Quality of my initial contacts with the program.	22	33	29	12	0	4
Willingness of the departmental chairperson to help me.	19	28	30	6	2	15
Quality of computer laboratory support for student work	9	17	20	33	13	7
Quality of computer facilities.	9	17	24	37	9	4
Availability of computer facilities.	5	28	18	32	14	4

10. Please rate your preparation by Ferris in the following, based on the rating scale below:

Part One

- 1. Excellent
- 2. Very good
- 3. Good

- 4. Fair
- 5. Poor
- 6. Not Applicable

AREA	1	2	3	4	5	6
Communicating my ideas clearly and simply in correct English.	21	35	31	5	3	5
Reading and interpreting what I read.	17	44	26	7	2	4
Writing and speaking clearly and effectively.	16	45	22	9	2	5
Identifying values and responding ethically.	18	49	25	6	2	0
Respecting the uniqueness and worth of each individual.	24	38	25	4	0	9
Calculating and interpreting data.	24	42	30	0	0	4
Understanding myself - abilities, interests and personality.	33	31	22	5	2	7
Improving my ability to think analytically and logically.	25	49	21	2	2	2
Gaining a broad general education about different fields of knowledge.	32	38	25	4	2	0
Ability to learn on my own, pursue ideas and find information I need.	25	53	16	7	0	2
Accepting my responsibility in preparing for the future.	36	40	20	5	0	0

11. How well did the IEHM program prepare you for internship? Please circle one number below.

(1=poor to 10 = excellent, 11 = Not Applicable)

2%	0%	0%	0%	0%	2%	5%	7%	5%	2%	77%
1	2	3	4	5	6	7	8	9	10	11
(Poor)									(Excellent)	(Not Applicable)

12. Other comments: See attachment.

12. Other Comments: (as actually written by the respondent)

- I really enjoy this program. The people (advisors & faculty) are great. Keep up the good work.
- Although I haven't completed the internship process, I am in 2 weeks beginning. The program quality is exceptional, but the actual internship process needs to be evaluated and revamped. The university has to become more involved in the process to make it easier for the student to locate a site they are interested in and communication between the university and potential sites increased.
- I feel that this program need more library holdings can understand that funding to increase library holdings is very limited a lot of the question in parts 7 & 10 do not apply because I have a Bachelor's Degree from an other university.
- I feel as though the IEHM program is very versatile and I like the fact that you can take other courses which are not in your option and gain outside knowledge
- I haven't done internship yet, but feel that my courses are preparing me very well for anything I encounter in my field. The instructors, advisors and fellow IEHM have all been extremely courteous & helpful to help me get up to speed since my transfer here in winter semester of 1995.
- All programs should require Safety programs.
- I really enjoyed the curriculum, I feel I have a lot of knowledge in the field. Our professors are very knowledgeable in their areas.
- I am disappointed to learn that the summer block is not designed well enough to help prepare me for future job experiences.
- Need to keep current w/what is going on in the real world not the 70's like summer block.
- I think the IEHM program & the teachers in the program are great! It's great to be on a first name basis with a lot of the teachers, this allows for a very comfortable learning environment.
- IEHM is undoubtedly one of the best programs here, I would never ever think of switching my major.
- I've only been in the IEHM programs for semester, but I have been impressed. The instructors that I've dealt with have been great.
- The program also allows for the increasing of job positions form on often to another often graduation, with increases marketability.
- I am currently a sophomore in IEHM, but have not taken a lot of core technical classes yet.
- I feel that the General option is very misleading. When I chose it as my option I was told that I would get a little of everything in this option. This is simple not true. This program really "pigeon holes" people. At this level in the education process you shouldn't specialize, that should happen upon further education. I think that the general option needs the be expanded to include all the options. For those students who want to specialize in the sanitarian field give them their own option. Overall I've had an incredible experience with Ferris. The problem with the "options" is my only real concern.



## **Section 5: Faculty Perceptions of the Program**

The faculty perceptions component of the 1997 Industrial and Environmental Health Management program review consisted of a survey in which faculty responded to agree / disagree statements and provided written feedback about the program. All the faculty in the program (5) participated in the survey. The attached page compiles the numerical results and written comments from the survey. Survey statements with a mean response of 4.0 or greater (agree to strongly agree) are highlighted with a “ + ” symbol, statements with a 2.0 or less (disagree to strongly disagree) are marked with a “ - ” symbol, and statements where opinions seem divided (as indicated by 2 or 3 respondents agreeing and the rest disagreeing) are marked with a “ D ”. What follows on this page is a brief summary of the faculty responses according to these criteria.

### **The Administration:**

The faculty seem generally satisfied with their course assignments, class sizes, and support in dealing with student complaints. They are clearly dissatisfied with the level of financial support for operating and improving their programs and for faculty development. It also appears there is no functioning mechanism for the faculty to evaluate the performance of the administration. There is divided opinion about whether or not courses are scheduled to avoid time conflicts, whether equipment funds are equitably distributed, and whether or not secretarial support is adequate for the need.

### **The Faculty:**

The faculty seem generally satisfied with their performance in all areas although there is divided opinion about their teaching effectiveness, their concern about the needs of their students, and whether or not their academic education is appropriate for the job. At the same time, highest marks were given for being aware of tutoring opportunities for their students and for being current in their fields.

### **The Students:**

The faculty seem satisfied that students leave the program with an appropriate level of maturity and competence. There is disagreement about whether or not they leave with strong critical thinking skills or with a sense of professional identity. Although there were no mean scores of 2.0 or less, there is a sense that faculty are only marginally satisfied with the caliber of incoming students.

### **The Curriculum:**

The faculty gave high marks to all statements in this section. They seem quite satisfied with the curriculum as it is (assuming the survey spoke to all appropriate areas) although one respondent felt there should be better continuity between courses.

### **The Facilities, Equipment, and Materials:**

The faculty agree the lecture rooms are adequate for the number of students scheduled, but more lab and field equipment is required to meet the student's needs. The faculty also feel strongly there is a need to improve the quality and availability of computer resources for the program and students.

**The Advisory Committee:**

The advisory committee received mixed reviews from the faculty although there was general agreement that it consists of the right mix of people. If one ignores the neutral responses in this section, which are numerous, there is a sense the advisory committee does not meet often enough and is not adequately utilized by the program. On the other hand, the committee appears to be knowledgeable about, and supportive of, the program.

**The Alumni:**

The faculty agree that IEHM alumni express loyalty to the program, but disagree about whether or not the department maintains good communication with alumni.

# INDUSTRIAL AND ENVIRONMENTAL HEALTH MANAGEMENT PROGRAM

## 1997 PROGRAM REVIEW RESULTS

### *FACULTY PERCEPTIONS OF THE PROGRAM*

This is a compilation of the results of the faculty survey for the IEHM program review of 1997. On the left are the statements that faculty were asked to respond to. On the right are the number of people that responded with a given level of agreement to the statement. See the written report for discussion about statements that showed strongest agreement or disagreement, or showed strongly divided opinions. Written comments at the end reproduce ALL comments that were provided, verbatim. Each person who made comments is identified with a letter so that all comments by any one individual can be identified.

	Strongly Disagree		Neutral		Strongly Agree		mean	
	1	2	3	4	5	5		
	1	2	3	4	5			
<b>THE ADMINISTRATION</b>								
1. Scheduling of courses is done at appropriate times of day.	1	-	-	4	-	3.4		
2. Scheduling of courses is done in appropriate rooms and labs.	-	-	1	4	-	3.8		
3. Scheduling of courses is done in a way that prevents time conflicts.	-	2	1	2	-	3.0		D
4. Scheduling of courses is done with faculty input.	-	-	2	2	1	3.8		
5. The appropriate instructors are assigned to courses.	-	-	1	3	1	4.0		+
6. Lecture class sizes are appropriate for the available facilities.	-	1	-	2	2	4.0		+
7. Lab class sizes are appropriate for the available facilities.	-	-	-	3	2	4.4		+
8. The operating budget for the program is adequate.	3	2	-	-	-	1.4		-
9. The program gets its fair share of capital improvement moneys.	2	3	-	-	-	1.6		-
10. Equipment funds are equitably distributed among the program options.	2	1	-	2	-	2.4		D
11. Course prerequisites are adequately enforced.	-	1	3	1	-	3.0		
12. Faculty receive adequate support in dealing with student complaints.	-	-	1	3	1	4.0		+
13. Adequate funds are allocated for faculty development.	1	4	-	-	-	1.8		-
14. Adequate provisions are made for release time for faculty development.	1	3	1	-	-	2.0		-
15. Adequate provisions are made for release time for course development.	1	2	1	1	-	2.4		
16. Adequate secretarial support is provided.	1	2	-	2	-	2.6		D
17. Adequate technical support is provided.	1	2	2	-	-	2.2		
18. The administration is technically competent to manage the curriculum.	-	1	2	2	-	3.2		
19. The administration considers teaching to be the most important aspect of my job.	1	-	-	4	-	3.4		
20. The administration spends their time and resources on things important to the program.	1	3	1	1	-	3.0		
21. The administration allows the faculty to specialize in specific areas of the curriculum.	-	-	-	3	2	4.4		+
22. The administration seeks faculty evaluation of their performance.	3	1	1	-	-	1.6		-
<b>THE FACULTY</b>								
23. The faculty are technically competent.	-	1	-	2	2	4.0		+
24. The faculty know how to teach effectively.	-	2	-	2	1	3.4		D
25. The faculty are well prepared for class.	-	-	1	3	1	4.0		+
26. The faculty are concerned with the needs of the students.	-	2	-	-	3	3.8		D
27. The faculty are available for counseling / advising.	-	1	-	2	2	4.0		+
28. The faculty are aware of tutoring opportunities available to the student.	-	-	-	3	2	4.4		+
29. The faculty spend an appropriate amount of time in committees.	-	-	1	2	2	4.2		+
30. The faculty spend an appropriate amount of time keeping current in their field.	-	1	-	2	2	4.0		+
31. The faculty are current in their field.	-	-	-	3	2	4.4		+
32. The faculty have had adequate work experience.	1	-	-	1	3	4.0		+
33. The academic education of the faculty is appropriate for the job.	1	1	-	-	3	3.6		D
34. The faculty spend an appropriate amount of time developing and upgrading their courses.	1	1	1	1	2	3.8		
35. The faculty have a good working relationship with the administration.	-	-	2	3	-	3.6		
<b>THE STUDENTS</b>								
36. Incoming students are academically prepared for the curriculum.	-	2	3	-	-	2.6		
37. Incoming students are socially prepared for the responsibilities of college life.	-	3	1	1	-	2.6		
38. Incoming students possess a good work ethic.	1	1	2	1	-	2.6		
39. Students are aware of tutoring opportunities available to them.	1	-	1	3	-	3.2		
40. Students take advantage of tutoring opportunities available to them.	-	3	2	-	-	2.4		
41. Students in the program are active participants in curricular and extracurricular activities.	-	1	4	-	-	3.8		
42. Graduates of the program have attained an appropriate level of maturity and competence.	-	-	5	-	-	4.0		+
43. Graduates leave with strong critical thinking skills.	-	2	-	3	-	3.2		D
44. Graduates leave with a sense of professional identity.	-	2	-	1	2	3.6		D

	1	2	3	4	5	mean	
<b>THE CURRICULUM</b>							
45. The curriculum provides the right mix of courses.	-	-	1	3	1	4.0	+
46. The academic level of the curriculum is appropriate to the program's mission.	-	-	-	3	2	4.4	+
47. There is adequate continuity among courses.	-	1	-	3	1	3.8	
48. The curriculum provides adequate choices of specialization.	-	-	-	2	3	4.6	+
49. Courses in the curriculum are essential and appropriate for the program's mission.	-	-	-	2	3	4.6	+
50. The curriculum is relevant to the needs of the employers.	-	-	-	1	4	4.8	+
51. The curriculum provides its graduates with the tools to be "self-learners".	-	-	2	1	2	4.0	+
<b>THE FACILITIES, EQUIPMENT, AND MATERIALS</b>							
52. The facilities are kept neat and clean.	-	1	2	2	-	3.2	
53. The facilities present a good image to students and visitors.	-	1	2	2	-	3.2	
54. The lecture rooms are adequate for the number of students scheduled.	-	-	-	4	1	4.2	+
55. There is enough lab / field equipment for the number of students scheduled.	1	3	1	-	-	2.0	-
56. Lab / field equipment is up-to-date and state of the art.	1	2	1	1	-	2.4	
57. Instructional materials and supplies are adequately provided.	1	1	2	-	1	2.8	
58. Instructional equipment is adequately provided and maintained.	1	3	-	1	-	2.2	
59. The type of laboratory equipment is adequate for the curriculum.	1	2	1	1	-	2.4	
60. The computer facilities are adequate for the needs of the program.	2	1	2	-	-	2.0	-
61. The computer facilities are available at appropriate times for the needs of the student.	1	1	-	-	-	1.6	-
<b>THE ADVISORY COMMITTEE</b>							
62. The Advisory Committee meets often enough.	2	-	2	1	-	2.4	
63. The Advisory Committee is knowledgeable about the program.	-	1	1	3	-	3.4	
64. The Advisory Committee is supportive of the program.	-	-	2	3	-	3.6	
65. The Advisory Committee consists of the appropriate mix of people.	-	-	-	5	-	4.0	+
66. The Advisory Committee is adequately utilized by the program.	1	1	3	-	-	2.4	
67. The Advisory Committee provides useful feedback to improve the program.	1	-	3	1	-	2.8	
<b>THE ALUMNI</b>							
68. The IEHM alumni express loyalty to the program.	-	-	1	3	1	4.0	+
69. The department maintains good communication with the alumni.	-	3	-	-	2	3.2	D
70. The IEHM alumni support the program financially.	-	1	3	1	-	3.0	

## WRITTEN COMMENTS ABOUT THE IEHM PROGRAM

1. **If you had to write one recommendation for strengthening the IEHM program, what would it be?**
  - A. The IEHM Program could be strengthened by increasing the amount of on-campus reference material available for the various specialties within the program (i.e. newsletters, journals)
  - B. Integrate the four options to make students more marketable when they graduate. Follow through on plans, ideas, discussions. Many items from faculty meetings are left hanging and become incomplete items.
  - C. Fewer technical courses with those being replaced by IEHM overview courses teaching critical thinking skills.
  
2. **What comments do you have about the administration, faculty, students, curriculum, facilities, advisory committee, alumni, or other aspect of the IEHM program?**
  - A. There should be a stronger sense of teamwork amongst the faculty and with the administration.
  - B. The students have been a pleasure to work with and to watch them developing their professional skills. There should be more financial support and release time for faculty development. There should be more clerical support to ensure that faculty are working on tasks that best use their talents.

- B. Administration comments: incompetent; their priorities don't seem to be consistent with program priorities or interests. Program is not viewed favorably by College compared to other health sciences curriculum. Appear to have major flaws in hiring/search committees.

Faculty comments: some faculty do not have student interests in mind; some faculty are not around much nor involved with program functions; lack of some technical competency of faculty.

Student comments: students are a pretty decent bunch; need more computer skills training, hands-on program training and critical thinking skills.

Curriculum comments: more integration and mix of option courses needed; support summer block capstone course for students plus internship; strengthen the internship program, get more IEHM faculty involved.

Facilities comments: more money for equipment purchase, videos, software to use in classes; labs need to be maintained more orderly and neater; provide a LCD mobile computer cart for dept. use.

Advisory Committee comments: not had a meeting in over three years; seems to be low priority in department to have but it could be valuable to get outside input.

Alumni comments: seem to lose track of students once they leave; not strong contacts made to keep in touch - should be developed more and get their input on the IEHM curriculum.

Other comments: faculty seem divided at times - "Safety" faculty (3) versus "Environmental Health" faculty (2) - need to be consistent and like minded in program mission and philosophy. Some are too casual dress, first name basis with students, away from work doing personal consulting and jobs on "company time" which hurts the students.

## **Section Six:        Advisory Committee Survey**

Fourteen surveys were mailed and nine were filled out and returned (64%), one was returned due to address (7%), and four (26%) were not returned (no response).

Only a few of the questions were answered by all of the committee members on the numeric scale provided. This was a fault in the design of the survey. The scale was based on a 1-5 with 5 being strongly agree and 1 strongly disagree. This caused a problem in using the numerical data as it stands, so a percentage was used for all areas, based on the amount of responses in that area. The agree area was numbers 4 and 5, the neutral area was 3, and the disagree area was 1 and 2.

For question one “Do you feel the Industrial and Environmental Health Management Curriculum adequately prepares our graduates for employment?” The overall opinion is that the IEHM program has an adequate educational curriculum. 55% of respondents agreed with the question, 33% were essentially neutral, and 33% disagreed.

Question two “ Do you feel there are employment opportunities for graduates of Industrial and Environmental Health Management program over the next 5 years?” All (89%) but one respondent agreed that the employment opportunities were good.

Question three asked if there were any specific areas of study that should be added or deleted? Their answers indicated that not all members of the Committee were totally familiar with the program curriculum and wrote in areas that we now teach. The common request was for more “worker’s compensation.” 88% agreed that the students need additional areas of study as cited above, while 13% were neutral. Interestingly, no one suggested deleting any subject material from the curriculum. This again points out the fact that the committee needs to become educated about the academic process and the problem of continuing to add material to a curriculum that is already too full.

Question four asked if the IEHM program should stay accredited by an external agency. The majority (67%) agreed that we should while only 33% were neutral.

Question five dealt with the question of do our students get enough “hands on experience” The overall response was positive with 63% agreeing, and 38% being neutral. It also appears that from the responses from the alumni and employers survey that the students are receiving the “hands on” necessary to function in the work world.

Question six dealt with “How can Ferris State University better market the Industrial and Environmental Management program?” The majority of the answers were to make videos for both industry and school, use outside resources more and do more one on one recruiting. Due to the wording of the question the rating scale did not relate to the question in the appropriate manner. These answers also indicate that Ferris needs to educate the Advisory Committee better on Ferris recruitment activities. All of this costs money and release time. Responses to this question did not truly relate to the question of HOW can FSU market but rather whether or not it should market its curriculum. In that regard 33% agreed that it should be marketed while 33% were neutral and 33% disagreed about marketing the program.

The general comments were positive and indicated a better relationship with local industry.

## **Summary**

January 1997, was the first time that the advisory committee has convened in several years. The committee also had many new members that were not familiar with Ferris's IEHM curriculum. Each member received a packet well before the meeting that described the options in the program and the requirements for each one. Some members were familiar with the paper work and our curriculum and some were not. We have tentatively scheduled an Advisory Committee meeting for the first week of November, 1997.

Even though, our return was 64% the survey did not elicit the responses we were looking for. This had to do with the design of the survey which will be corrected for the next mailing. Some of the common positive attributes that most of the committee members agreed with were that Ferris has a good curriculum, good "hands on" experiences, and that there are employment opportunities for our graduates. These results held true with the other surveys. When we look at ourselves, we need to have more advisory committee meetings and familiarize the committee with our present curriculum and the up and coming changes. Finally, we need to have the committee members help us with recruiting.

## Advisory Committee Program Review Questionnaire

As professional in the field, please answer the following questions according to your experiences. Please keep in mind the Industrial and Environmental Health Management program has four options: General Environmental Health, Industrial Hygiene, Hazard Waste Management, and Industrial Safety. If you do not feel that you are able to answer a question, please put NA in the area. Since we need as much information as possible please be specific and comment in each area. Please circle the number you feel best describes the situation.

1. Do you feel the Industrial and Environmental Health Management curriculum adequately prepares our graduates for employment?

Strongly Disagree					Strongly Agree
1	2	3	4		5

Comment:

2. Do you feel there are employment opportunities for graduates of the Industrial and Environmental Health Management program over the next 5 years?

Strongly Disagree					Strongly Agree
1	2	3	4		5

Comment:

3. Do you believe there are any specific areas of study should be added or deleted? Explain.

Strongly Disagree					Strongly Agree
1	2	3	4		5

Comment:



4. Do you feel that external accreditation is essential for the Industrial and Environmental Health Management program? Why?

Strongly Disagree 1                      2                      3                      4                      5 Strongly Agree

Comment:

5. Do you believe the curriculum provides students with practical job application experience?

Strongly Disagree 1                      2                      3                      4                      5 Strongly Agree

Comment:

6. How can Ferris State University better market the Industrial and Environmental Health Management program?

Strongly Disagree 1                      2                      3                      4                      5 Strongly Agree

Comment:

General comments:

## Section 7: Market Analysis

Injuries and deaths due to accidents have a major social and economic impact to the United States. In the United States, approximately 17 employees are killed each day on the job due to uncorrected safety hazards. The total cost of 1995 fatal and nonfatal work-related unintentional injuries estimated by the National Safety Council was \$119.4 BILLION. This equals the combined 1995 profits of the fifty largest U.S. corporations and is equal to 53 cents of every dollar of 1995 corporate dividends to stockholders.

Market analysis for the Industrial and Environmental Health Management curriculum is extremely difficult to conduct for several reasons. The first reason is diversity. Diversity in environmental health exists in titles, subject matter, technologies, settings, employers and clients. In the environmental health area, for example, professional practitioners were once known as Sanitarians. In the 1960's however, the environmental movement precipitated a change in the name to Environmental Health (EH) Technician, EH Technologist, and/or EH Specialist. The problem that this created is that now, within the above job titles, the following job titles/employment areas can now be found: Air Quality Worker, Water Supply Personnel, Wastewater Personnel, Milk and Food Sanitarian, Institutional Environmental Health Manager, Institutional Environmental Health Specialist, Environmental Epidemiologist, Environmental Toxicologist, Hazardous Material Manager, Industrial Hygienist, Occupational Health Nurse, Occupational Physician, Occupational Safety Professional, Radiological Health Professional, Radiation Safety, Land Use Planner, Solid Waste Manager, Housing Professional, Vector Control Professional, Injury Control Professional, and Loss Control Professional. This diversity issue is further complicated by the response from the listing of the U.S. Department of Labor's job title listing for the category "Safety." Within this job title, the following titles were listed: safety engineers, safety managers, fire protection engineers, and industrial engineers. Within this category are also found meteorologists, quality control managers, standards engineers, liaison engineers, manufacturing engineers, production planners and material schedulers who are recognized as probably not having any direct safety or health responsibilities but who may be involved with decisions relating to safety or health. A search of the U.S. Department of Labor's Dictionary of Occupational Titles, the word "safety" scored fifty eight hits, twenty-nine (50%) of which were job titles for which IEHM graduates would be qualified to fill at entry level.

A second reason for difficulty in performing a market analysis is one of semantics. Many people call themselves environmental health professionals however they are, in actuality, professionals in the field of environmental health. An example would be an Architect. An architect must be cognizant of indoor air quality, water supply and wastewater disposal, and land planning however most if not all have had no relevant environmental health training in their post-secondary education. He/she is therefore a professional IN environmental health (PEH) and not truly an environmental health professional (EHP). The EHP is one whose education and training have been in the preventive medicine aspect of environmental health science and protection.

The third reason is that much of the data is more than ten years old and is therefore not current. Normally, most marketing analysis studies are performed by professional associations and occasionally by the federal government. Such is the case in the IEHM curriculum. The U.S. Department of Health and Human Services commissioned the last study of the environmental health work force in 1987. In this study, the Health Resources and Services Administration study found 715,000 professional and

technical positions of which only approximately 80,000 (11%) have a formal education in environmental health. The former would be referred to as PEH's while the latter would be EHP's. Another 155,000 (22%) were PEH's (engineers, chemists, architect's, etc.). What is also relevant for this current program review, is that the same study found that 40,000 (17%) of the 715,000 work force were inadequately trained. This indicates a large need for continuing education.

In addition, the IEHM field is characterized by rapid change. Twenty years ago, hazardous materials/waste management was not viewed as a problem area. Now it has its own academic programs, work force, credentialing and professional level associations. There have also been significant changes in program content, emphases, and size. New job titles have arisen as result.

Table 1 illustrates the supply and needs of the environmental work force:

**TABLE 1**  
**Supply and Needs of the Professional Environmental Health**  
**Work Force, by Specialty(1)**

Specialty	Supply (1987)	Need Add'l Training	NEEDED (1992)
<b>TOTAL</b>	<b>297,450</b>	<b>39,500</b>	<b>74,400</b>
Air	19,00		
Water Supply	44,000		6,800
Wastewater	47,000		10,000
Milk/Food	11,000	500	6,500
Institutional Env. Health	12,000	3,000	10,000
Environ. Epidemiology	750		200
Environ. Toxicology	3,500		2,000
Hazardous Materials/Waste	50,000	5,000	25,000*
Industrial Hygiene	14,000		4,000
Occupational Nursing	33,000	20,000	
Occupational Physicians	5,000	3,000	
Occupational Safety	26,000	5,000	
Radiological Health	14,000		
Land Use	3,500		2,000
Solid Waste	4,000	1,000	
Housing	4,000	1,000	
Vector	4,000	1,000	3,000
Injury Prevention	500		4,500
Academicians	2,200		400

(1) Levine Associates, Inc., *Evaluating the Environmental Health Work force*, U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Bureau of Health Professions, Rockville, MD, January, 1988.

\* The U.S. Public Health Service, Bureau of Health Professions estimated the need for 100,000 additional environmental health professionals by 1992!

Another problem is one of role articulation. There are no widely accepted career ladders in environmental health. We see this more and more within the curriculum. Students who intend to pursue careers in general environmental health, end up in jobs as industrial hygienists and visa versa. Incumbent upon this is the problem of overlapping. There are considerable overlapping of areas of responsibility within the field of environmental health.

### **Current Marketing Information Published in Professional Materials**

#### The Synergist, January, 1997

The Synergist, the official publication of the American Industrial Hygiene Association published a white paper about the world of Industrial Hygiene in their January, 1997 issue. The paper concerned the results of a survey mailed to 8,000 people identified as industrial hygiene professionals. While no specific market analysis was conducted, some information can be gleaned from the responses received. Twenty three percent of respondents expect to increase the size of their staff in the coming months, and 16% of respondents were contemplating retirement. Both of these will have an impact on the demand for additional industrial hygienists.

#### The Synergist, August, 1997

In this issue, The Synergist reported about Industrial Hygiene as a "Profession in Transition. In a survey conducted at the Annual Meeting of the American Industrial Hygiene Association in Dallas, Texas, 82% of respondents felt that in the next five years, health, environment and safety will be integrated and more than 62% felt that their jobs will be changed by this integration. This will have a two fold impact. First, it will demand that IEHM students be multi-disciplinary. Second, it will demand continuing education for those already employed in professional level positions.

#### Environmental Health & Safety News, January, 1997

The 13th Annual Environmental Health & Safety White paper was published in the January, 1997 issue of Environmental Health & Safety News. This was also the result of a survey mailed to approximately 8,000 readers and the results are listed in the tables below:

**TABLE 2**

<b>Title</b>	<b>% Who Expect an Increase in Staff Size</b>
Safety Professional	16%
Industrial Hygienist	16%
Environmental Manager	20%
Operations/Administration	14%

**TABLE 3**

Type of Industry	% Who Expect an Increase in Staff Size
Manufacturing	10%
Health Services	15%
Chemical	15%
High Tech	16%

o emphasize a point made above regarding the overlapping of professional responsibilities, Table 4, next page) also a result of the 13th Annual Environmental Health & Safety White paper, listed by professional title the percent of professionals within each category who perform a combination of environmental, health and safety functions. This must be interpreted as a responsibility of the curriculum to train, on a broad professional basis, and for advisors to advise this way as well.

**TABLE 4**

Title	% Who Manage a Combination of E, H and S Functions
Safety Professional	94%
Industrial Hygienist	86%
Environmental Manager	93%
Operations/Administration	93%

Environmental Protection, August, 1997

he August issue of Environmental Protection contained three articles on IEHM related professional employment: the 1997 Salary Survey, Where the Jobs Are, and an article on Job Hunting via the internet. The salary survey was the result of responses of 300 people to the April, 1997 issue Which contained a one page questionnaire. In the survey it was noted that the average salary for "HazMat" workers with a BS degree and 0-5 years of experience was nearly \$42,000 per year. Environmental health and Safety (EH&S) workers of the same qualifications and experience earned \$43,000+ per year. Also interesting was the report that a BS degree added nearly \$9,000 to a "Haz Mat" workers annual salary, and nearly \$6,000 to an EH&S workers salary. Unfortunately, males earned an average of \$13,000 more than females in both the "HazMat" and the EH&S categories.

he same article had mixed reviews regarding the job outlook. While some industry representatives felt there was currently a "glut" of EH&S trained people, others believed that this was due to mergers and downsizing and that the continued regulatory atmosphere should provide ample opportunity for positions for these people and more, and that salaries should be forced up as a result. Others noted changes of a growing integration of business concepts with environmental programs and the increasing need for expertise in multimedia programs. Several suggested a trend toward fewer technical requirements and more managerial responsibilities in the conduct of duties. In regards to

marketability, it was often noted that environmental professionals will increasingly have to handle duties related to safety and health, workers' compensation, lost control and risk management.

In the article entitled "Where the Jobs Are," professional staffing specialists felt that industrial and environmental, health and safety jobs will "continue to grow". "Job hunters with skills in industrial hygiene, safety and the environment will find a plentiful market," however, smaller companies will look "for one person to meet both needs (EH&S) in an effort to save money.

In conclusion, there is a strong demand for IEHM graduates but these graduates must be knowledgeable in all of the IEHM fields if they wish to pursue a career in the industrial sector.

Salaries:

Salaries for IEHM program graduates, shown in Tables 5 and 6 below, were derived from two sources. Table 5 was derived from an environmental health career recruiting brochure published by the Association of Schools of Public Health and was copyrighted in 1991. Table 6 contains materials excerpted from Environmental Protection magazine, August 1997.

**Table 5 Salary Information for General Environmental Health**

Specialization	Entry Level Salary	3-5 Years Experience
Sanitarian	\$17,000 - \$50,000	\$30,000 - \$70,000

**Table 6 Average (Mean) Salary Information for HazWaste and Env. Health and Safety Professionals**

Workplace	Haz Mat	EH&S
Manufacturing	\$55,171	\$51,233
Government	\$51,744	\$69,237
Consulting Firm	\$57,986	\$45,000
Education (BS)	\$50,744	\$47,861
Experience		
0-5 years	\$41,483	\$43,339
6-10 years	\$49,650	\$53,977
Gender		
Male	\$56,885	\$42,015
Female	\$43,864	\$53,039

## **Section Eight: Evaluation of Facilities and Equipment**

The laboratory facilities of the IEHM program are located on the fourth floor of the Victor F. Spathelf Center for Allied Health Sciences. These rooms are VFS 421 and VFS 423, and are separated by a preparation area, VFS 422. Several smaller storage rooms are accessed from VFS 421 and 423.

VFS 421, formerly referred to as the Environmental Microbiology Laboratory, provides ~1500 square feet of floor area and has a capacity of 32 students. The room is equipped with incubators and a walk-in refrigerator and has access to an autoclave (steam sterilizer) in VFS 422. The room is lined on all walls with storage drawers and cabinets for equipment and supplies.

VFS 423, formerly referred to as the Environmental Chemistry Laboratory, also provides ~1500 square feet of floor area and has a capacity of 32 students. This room also has access to VFS 422. The room is lined on all walls with storage drawers and cabinets for equipment.

Classroom instruction takes place mainly in the VFS building. A computer laboratory is located within the VFS building as well and is available for student use five days per week, for approximately hours 7. Currently, the lab is open from 8 A.M. until 8 P.M. Mon.-Thurs., and Friday 8-5. It is not open during the weekends (closed from 5 P.M. on Friday until 8 A.M. on Monday). During summer semester, it is open 5 days per week for an average of 39 hours. Summer 1997, the lab was open Mon.-Thurs., 9 A.M. to 6 P.M., and Friday from 9 A.M. to 2 P.M., and was closed from 2 P.M. Friday afternoon until 9 A.M. Monday morning. Unfortunately, due to a lack of budget and available student employees, it is not open during the weekends, nor late into the evenings. This causes a great frustration to summer block students each summer as they attempt to complete the production of two documents, which are 80 – 100 pages each in size. For a University the size of FSU, computer facilities in the CAHS should be open much later in the evenings and also open much more during the weekend.

Within the last two years a change has taken place which has precipitated a change in the teaching locations for many IEHM courses. This change has been precipitated by the merging of the IEHM, and CLS programs into one department, and by a desire of the administration to teach lecture sessions in lecture style rooms, i.e. NOT in laboratory rooms. This has limited those rooms formerly reserved for the sole use of IEHM courses to only the laboratory sessions of the course. The rooms are also becoming more and more heavily used by the CLS program. The problem that this causes for the IEHM program faculty is that our professions are heavily involved with instrumentation. As such, during any time in both laboratory AND lecture sessions, there is a continuing need to demonstrate equipment, use microscopes to view specimen slides, etc. Eliminating lectures in laboratory rooms forces the faculty to load all necessary materials on to steel laboratory carts, and push these carts down the quarry tiled floors of the VFS building. This adversely effects the reliability of the instruments and tends to damage some types of specimens (soil monoliths). It also makes for a very noisy trip down the halls especially if a faculty member wants to set up some materials in a classroom early.

On the other hand, having only laboratory sessions in the lab rooms makes sense from an occupational safety and health perspective. Unfortunately, the result is a creation of unnecessary noise in the halls prior to class change, and limited room utilization.

The office of the Department Head for Environmental and Clinical Sciences is located on the fourth floor of the VFS building. It occupies 200 square feet. Some student and program records are stored in this office. The offices of 4 of the program faculty occupy approximately 100 square feet each on the third floor. The office of a fifth faculty member is called the Environmental Management Studies Center and occupies approximately 200 square feet on the fourth floor. Housed in this office are all of the research records generated by the Environmental Management Studies Block (Summer Block) since 1972.

Most of the environmental health equipment is old and not serviceable. The microscopes for example were originally purchased prior to 1970! In the past 10 years, the only time when the program was provided with substantial equipment replacement dollars were in the two years immediately preceding re-accreditation activities. If the program currently had a full compliment of students, there would be an woefully inadequate number of working microscopes. Five new microbiology microscopes and one new dissection microscope were purchased approximately five years ago. Other dissection microscopes are also more than 25 years old. Parts do not exist for any of these microscopes as well as the external light sources for the dissection microscopes.

In the case of water chemistry field kits, most kits are more than 20 years old and cannot be re-supplied with chemicals because they are no longer being manufactured.

In regards to specific IEHM computer needs, there is only one computer in the College of Allied Health Sciences which has the Groundwater Modeling software loaded onto it. This computer is in Mr. Ells' office. While students have access to it at times, special arrangements have to be made. Groundwater Modeling is the state of the art in the local environmental health services division of local health departments. Each system requires not only a 486 computer, but two monitors, software and a large digitizer. Students graduating from the general environmental health option of the IEHM curriculum have virtually nothing other than a verbal introduction to this software/system because of the lack of a computer laboratory dedicated to systems of this nature.

From an equipment request perspective, the general environmental health option faculty alone have submitted prioritized equipment requests annually exceeding \$100,000 for each of the last several years. In 1995-96, >\$30,000 was made available to the Department. This was divided equally, between the CLS and IEHM programs. Of the IEHM allocation, the IH, IS and HazWaste options received >90% of the funds, while the General Environmental Health option <10% of the funds! Faculty in the GEH option feel that there is a serious inequity in the distribution of program equipment funds.

In addition, while the UAW-Chrysler grant has profited the Department handsomely in the past two years, there is a distinctive feeling by some IEHM faculty that this money is for the IH, IS and/or HazWaste options only. This is part of the reason for the division within the faculty. A bright spot however is that new computers are being purchased for all faculty in the program. These will be purchased with the money made as a result of the UAW-Chrysler contract.

Faculty with primary responsibilities for teaching the IH, IS and HazWaste options are also equipment poor. Due to the rapidly changing nature of the sampling and analysis field, instruments which are



urchased as “state-of-the-art” one year, are woefully out of date within two years. This equipment ends to be very expensive because it is state-of-the-art and because of their microcircuitry.

n 1981, the program was the recipient of an atomic absorption spectrophotometer which we found out was out of date and, given the nature of the unit, needed literally thousands of dollars of ancillary supplies to become functional. It has never been operated. About that same time, an analytical laboratory donated a gas chromatograph. Likewise, with it’s age and necessary ancillary supplies, it has never been operated. The IEHM program has never been wildly successful in gaining equipment donation support from our alumni. This is probably because our alumni work in large part for governmental agencies which keep equipment until its falling apart. This was the case in the late 1980’s when the Occupational Safety and Health Administration donated scores of personal air amplifying pumps to the program. Of course, the reason they donated them is because they were able to acquire state-of-the-art pumps as replacements. We were never able to get most of these to work and were busy for years using the non-working units as salvage items for parts. As with the GEH faculty, the IH, IS and HazWaste faculty annually produce a large list of needed equipment.

n regard to the microbiology and chemistry laboratories, a safer environment would be provided if single use glassware (pipettes, beakers, etc.) were used. This however is very expensive especially when compared to the salary paid to work study students who clean the glassware for reuse. Essentially, we are using pre-1970’s techniques in the laboratories which even from a quality control standpoint, would not be tolerated in accredited laboratories!

The faculty were surveyed regarding the equipment currently available and currently needed for student instruction in the IEHM curriculum.

**. Please list the equipment that you are currently using:**

- Quest Sound Level Meters
- Quest Calibrator
- Quest Octave Band Analyzer
- 5 Packs of SKC Air Sampling Pumps
- Eagle Combustible Gas Monitor
- Q-Track Indoor Air Quality Monitor
- Miscellaneous Respirators (Survivair)
- Buck Calibrator
- 5 Pack Noise Dosimeter
- Different Types of Voltmeters
- Gas Meters
- Lockout Equipment
- GFI
- Fire Extinguishers
- Electrical Testing Equipment
- Fire Alarms, Sprinklers Heads
- Different Types of Manometers
- Ventilation Equipment
- Flammable Gas Meter
- Safety Cans
- Fire Demo Equipment
- Sheet Metal Fabrication Equipment
- Cans

Photovac TIP  
Variety of Sampling Equipment  
Augers  
PPE  
Explosion Meter  
Eagle 3 Gas Meter  
A Multitude of HACH Company Field Test Kits-both individual Chemical Test Kits and Full Field Laboratories (multiple parameters)  
Microscopes  
    1000x Binocular  
    Dissecting Microscopes  
pH Meters  
Many types of Water and Air Samplers and Analyzers

**2. Is there any equipment not being used because it is too old, missing parts, etc? Please list them:**

Numerous Air Sampling Pumps (Damaged or Calibrators Missing)  
Sound Level Meters (Damaged or Calibrators Missing)  
Supplied Air Hood  
Velocity/Static Pressure Testing Station (needs blower)  
Hard Hats  
4 Velometers need calibrator/repair  
Full Face Mask for SCBA  
Ventilation Tool Kits  
Manometer  
Several Air Sampling Pumps  
Very Few Hazardous Waste Items are Out of Date  
Photovac TIP is in need of repair/replacement  
All Ambient Air Monitoring Equipment-Too Old, Broken, and No Longer Used in the Field (outdated)  
Most Water Laboratories (Hach Model DR/EL 1/1A) - Obsolete Chemicals No longer made for them

**3. List the equipment that you must have in order to provide a quality education for students in the program: (Include price information as well)**

Heat Stress Monitor \$800  
Dry-Cal Calibrator \$1200  
Assorted Fire Extinguishers \$400  
Body Harness \$150  
Lanyards \$80  
Lifeline Equipment \$650  
Tripod and Winch \$3500  
2-Turn Out Gear \$1460  
12 Hard Hats \$144  
Grounding/Bonding Kit \$150  
ADA Compliance Kit \$450  
Light Meter \$200  
Computer \$3500  
Velometer Calibration \$800  
Vacuum Cleaner \$150  
CGFI (commercial) \$100  
Ventilation Test Station Blower \$1700  
Safety Cans \$200

Applied Air Hood \$300  
Refurbish Tool Kits \$120  
Velometers \$8000 (total)  
Anemometer \$350  
Electrical Testing Kit \$400  
Monitoring Wells Around Lake Andrews \$750 (total)  
Better Selection of Personal Protective Equipment \$1000  
Training Software \$1500  
"Toolbook" CBT Training Development Software \$1500  
New Scott Air Packs \$10,000 -SCBA  
Soil Sampling Kits at \$1800 each  
Digital Food Thermometers \$400  
Micro Lab Equipment \$1500  
Cover Slides of Bacteria Cultures (Micro) \$250  
Lap-Top Computer \$3,000  
Computer Cart with Color Overhead LCD Projector \$10,000  
Computer with Stations Including Digitizer Boards and Software for Groundwater Modeling  
\$10,000 per station for hardware, software and furniture.  
Dependable Distilled Water Still \$6,000  
We need a Ultra-Pure Water Purification Unit to increase the purity of our distilled water to grade  
water \$3,000

#### Software

Environmental Health Software – literally scores of environmental software programs are available from air modeling to water modeling to environmental simulation. Programs vary in cost from \$200 - \$1500 depending on network licensing fees.

**If sufficient funds were available, list additional equipment that you might be interested to have for the program:**

Portable Gas Chromatograph + Calibration Accessories \$15,000  
Calibration Wind Tunnel \$800  
Polarized Light Microscopes \$3,000  
Professional VCR-VHS Pipeline Viewer and Recording System \$5000  
Gas Meter \$3600  
Lockout Valves \$150  
Flammable Liquid Storage Cabinet \$600  
Corrosive Storage Cabinet \$600  
Extractor Hood \$2200  
Manometers \$180  
Acid Storage Cabinet \$600  
FPA Standards \$750  
More Air Packs at \$2500 each  
Additional Soil Sampling Equipment at \$2000 each  
Lap-Top Computer and Portable Color LCD Overhead Projector, \$10,000  
Ideas

**Do you have enough supplies (such as chemicals) for laboratories? If not, list what additional supplies are needed:**

Personal Protective Equipment:

Gloves, Suits, Boots, Earplugs (various types), Ear Muffs, Respirators \$1500

Quantitative Fit-Testing Cartridges \$200  
Detector Tubes \$200  
Microbiology Agar \$600  
Petri Dishes \$100  
Single Use Pipettes \$500  
Pipettors \$1000

Faculty Comments:

Sometimes! In 1995 all lab supplies were discarded or "old" and/or hazardous. Most were immediately replaced. We are usually supplied with enough funds to replace used supplies but there is no money for extras.

In addition we are frequently asked to test water samples for private citizens at various events such as Health Fairs, HS Recruiting, etc. The replacement costs came out of our budget alone.

There are large numbers of computer software programs and Databases which would serve our students well. We cannot afford any of them due to their costs. (Air Modeling, Water Modeling, Regulations).

**6. Are you aware of sources from which donations may be solicited? If so, please provide the names of the companies.**

SKC, Incorporated  
Argus Supply Company  
Draeger  
Foxboro Company  
3M  
North  
Sensidyne  
TSI

Faculty Comments:

Usually Requires Individual Efforts-Release Time Would Help.

No! Most companies want to donate old equipment which is woefully out of date in order to get a top write off.

The U.S. Department of Labor, OSHA has donated personal air samplers but most are out of date and in poor working condition.

**7. List historical sources of equipment donations:**

Alumni  
Out of Date, Needs Repair, or Odds and Ends that would cost too much to get all parts necessary to use safely.  
Past Graduates

Faculty Comments:

Some Glove/Respirator/PPE Companies

Herber Products once donated a Relic Atomic Absorption Unit  
An Env. Consulting firm once donated a relic Gas Chromatograph.

**. Any other pertinent comments?**

As we are constantly revising our courses and teach current industrial techniques, newer equipment is needed. OSHA and EPA are forever changing, this also requires newer and additional equipment to keep in compliance.

As access to government resources is being increased each day, we must be able to teach the students how to access this information in the classroom. This can only be done by dedicated computers so we can assign assignments. There are many new programs industry and the government are using. We must keep our students current. We do have computer needs in the classroom.

We also have computer needs from my office-it's outdated. The acquisition of books by the library is unacceptable. The library purchases books from their publisher lists. Our technical publishers are not on their list. The technical books in the library are, indeed, inadequate.

The IEHM program has typically received equipment funding only immediately preceding re-creditation by our official accrediting body then funding is drastically reduced immediately following re-accreditation until the next cycle.

In 1995-6 our entire department (Environmental/Clinical Services) received \$30,000 for equipment which was divided equally between the CLS and the IEHM programs. For IEHM Share, funds are NOT equally or equitably distributed within the curriculum area although all option areas had equal needs!

## **Section Nine: Curriculum Evaluation**

The curriculum currently provides an excellent foundation for the Industrial and Environmental Health Management career field. The curriculum is accredited by the National Council for the Accreditation of Environmental Health Science and Protection Curricula. It is broad based, multi-disciplinary and is supported as it currently exists by alumni, employers, advisory committee and by currently enrolled students. In addition, it provides options (specialty areas) in which students can obtain more specific courses and content. These option areas are General Environmental Health (GEH), Industrial Hygiene (IH), Industrial Safety (IS), and Hazardous Waste Management (HW). The GEH option supplies sanitarians for local and state health departments, for the pest control industry and for food processing. The IH curriculum educates students in the anticipation, recognition, evaluation and control of workplace exposures to vapors, gases, noise, dusts, radiation, fumes, etc., which may cause an industrial disease/illness. The IS curriculum educates students in the anticipation, recognition, evaluation and control of workplace accidents which may cause death, personal injury or damage to property. The HW option educates students in the control of hazardous wastes in industry, the assessment of hazardous waste disposal sites, or the remediation of hazardous waste sites. No matter what the option, all students take a common core of general education (arts and sciences) courses and a common technical core. Option courses allow the student to specialize in a particular area of interest. The program has always been a good degree and remains so, however the curriculum undergoes continuous revision in an effort to ensure that our graduates are prepared for an ever-changing governmental, business, or industrial workplace. Individual courses are also continuously upgraded to reflect changes in environmental, occupational, health, and safety regulations.

The market has slowly evolved over the past ten years from one where ample positions were available for each of the four options. Now, however, many of those jobs have disappeared and what has appeared in their place is a single position wherein the professional has responsibility for "Health, Safety and Environmental." What this means is that the industrial health graduate in particular, is responsible for all IH, all IS, all HW and much of the air permitting, wastewater permitting, etc. in the environmental arena. This means that the curriculum must change to reflect the changing conditions in the job market. Curriculum revision discussions have been ongoing for approximately 18 months. The faculty hope to finalize the curriculum revision and begin to take it through the approval process during the current academic year.

### **Common Arts and Sciences Core Courses: All Options**

Ferris State University requires all graduates to have completed a minimum series of courses called the general education requirements. The IEHM program has complied with these requirements by creating a core group of courses to provide a uniform foundation for future graduates. Each of the four IEHM options, Industrial Hygiene, Hazardous Waste Management, Industrial Safety, and General Environmental Health, require the following core courses:

#### **Communications (12) hours**

Each student is required to take;

ENGL 150 English 1

ENGL 250 English 2

ENGL 311 Advanced Technical Writing  
COMM \_\_\_\_ Speech Elective (COMM 105/121 are preferred)

Few students and all first-year students are encouraged to complete English and communication courses early in their academic career. These courses form a foundation for all further progression within the discipline. Developments of writing and communication skills are essential tools for the first-year student.

The faculty have spent considerable time discussing several perceived shortcomings of the English courses presently offered at FSU. The major concern is that students in ENGL 311 are not being asked to write in any significant manner. They are often producing only resumes and cover letters.

### **Cultural Enrichment (9 hours)**

As part of the General Education Requirements, each student must complete nine credit hours of Cultural Enrichment. Faculty discussed whether to direct the student toward certain specific cultural activities and decided against it. Students are free to choose the course that they prefer. The faculty has only minimal input into this area, although they assist their advisees in selecting appropriate global consciousness, race, gender and ethnicity courses based upon the students interests.

### **Social Awareness (9 hours)**

Prior to the institution of the General Education Requirements, the IEHM curriculum already met the social awareness requirement. Faculty reviewed what we require and feel those social awareness courses which we require now (essentially as directed electives) are also appropriate for our proposed curriculum revision. The following courses have been selected by IEHM faculty as the most likely to benefit our graduates in the future:

- PLSC 311 American State and Local Government
- SOCY 121 Introductory Sociology
- PSYC 150 Introduction to Psychology

### **Mathematics (3 hours)**

The mathematics requirements for the IEHM program are minimal, including only MATH 120 Trigonometry. All students are expected to enter the program with an understanding of basic algebra, and take needed coursework to upgrade their skills early in their academic careers. Faculty have extensively discussed the mathematics requirement because our accreditation guidelines require a pre-calculus. In addition, some agencies from which we would also like to receive accreditation require a course in calculus. The IEHM faculty consider MATH 120 Trigonometry to be equivalent to a pre-calculus course and therefore meets the requirements of our current accreditation. Many IEHM students enter the program with extreme mathematics anxieties. Due to this, the faculty feel that increasing the mathematics requirement to the completion of calculus level would adversely affect our enrollment.

### **Computer Sciences (3 hours)**

Students in the IEHM curriculum need to have an understanding of microcomputers and software applications including, word processing, spreadsheet, database management, and power point. ISYS 105 Microcomputer Applications is the course that has been chosen to meet this requirement. .

### **Biological Sciences (7 hours)**

All students must have a basic understanding of biology. Some options require additional, more in-depth, biological studies, but all options are required to complete BIOL 121 General Biology and a course in microbiology (BIOL 218 Microbial Ecology). These courses provide IEHM students with both a macro biological and microbiological knowledge base for future technical IEHM courses that they will re required to take.

### **Common Technical Core: All Options (18 hours)**

The IEHM faculty have undertaken an extensive series of meetings and discussions with advisory committee, employers and alumni, in an effort to determine the core needs of our students. In modern employment situations, the new graduate must be broad-based, and possess a variety of knowledge, skills, and attributes. In an effort to provide each and every graduate with a base of knowledge that will serve them throughout their academic and professional careers, the IEHM faculty has selected the following courses that are required for all students in the IEHM program.

IEHM 101 Introduction to Industrial and Environmental Health Mgmt.  
IEHM 310 Environmental Radiation  
IEHM 319 Orientation to Internship  
IEHM 345 Hazardous Waste Management  
CAHS 410 Introduction to Epidemiology and Public Health Statistics  
IEHM 412 Industrial Ventilation

The IEHM faculty believe that the core courses shown above provided the opportunity for each student to understand the central knowledge base required for an IEHM graduate. However, due to the changing nature of the IEHM practitioner, the faculty are suggesting an expansion of the core curriculum for each option as follows:

#### **Proposed Changes in Technical Core**

IEHM ??? Materials and Waste Management  
IEHM ??? General Environmental Health Concepts  
IEHM ??? General Safety Concepts  
IEHM ??? Industrial Hygiene Concepts  
IEHM ??? Environmental Regulations  
IEHM 101 Introduction to Industrial and Environmental Health Management  
IEHM 319 Orientation to Internship  
IEHM 330 OSHA Law and HAZCOM



IEHM 375 Toxicology  
IEHM 412 Industrial Ventilation  
IEHM 491 Internship  
CAHS 410 Introduction to Epidemiology and Statistics  
CAHS 317 or MGMT 301 or PLSC 251 Public Health Admin., Management, or Public Mgmt.

Completion of the new technical core would provide all graduates with a much more thorough introduction to each of the IEHM option areas. In addition, it would provide specific coursework in OSHA law and toxicology. Currently only IH and HW students take both of these courses and the IS student takes only OSHA law. The GE student currently takes neither. The core outlined above provides a laboratory in each IEHM ??? overview course.

### **Courses in Individual Options**

Faculty responsible for each option have, in discussion with other faculty and field professionals, selected courses which will provide specialized knowledge for students within the academic study option. Courses in each of the four options are presented and discussed below.

#### ***Option-Specific Courses: Hazardous Waste Management***

The Hazardous Waste Management option targets students in a field requiring individuals that deal with all stages of the chemical life cycle, from production through shipping, handling, waste generation, and final disposal. Professionals in the field no longer just work with just waste materials, but must have expertise in all aspects of chemical management in the environment. For this reason, the faculty is suggesting a name change with the proposed curriculum revision. The proposed option name will be Hazardous Materials/Waste Management. This name change indicates that the student/graduate must be cognizant of both hazardous materials and hazardous wastes. In addition, another fundamental change will be suggested within technical courses of the curriculum. Surveys of alumni and employers revealed that there were no laboratory experiences in any of the IEHM HW technical courses. As such, the students were graduating a lecture knowledge of sampling however they were never afforded the opportunity to design sampling plans, drill monitoring wells and take samples. The lead faculty member for the HW option is suggesting lecture + laboratory course modifications in the proposed curriculum revision.

The courses presented below have been selected as the core for students in the Hazardous Waste Management option.

#### **Biological Sciences (4 hours)**

BIOL 109 Basic Human Anatomy and Physiology

In order to understand the implications of chemicals on human health and the environment, the student must have a basic understanding of human anatomy and physiology. BIOL 109 provides the necessary content now and the faculty feels it will continue to serve the future needs of graduates from the curriculum.

### **Physical Sciences (19 hours)**

CHEM 121 General Chemistry 1  
CHEM 122 General Chemistry 2  
CHEM 214 Fundamentals of Organic Chemistry  
PHYS 130 Concepts in Physics

Knowledge of the physical sciences has been deemed a critical knowledge area for Hazardous Waste Management students. Since the management of hazardous materials and hazardous wastes centers on chemical materials, two semesters of inorganic and one semester of organic chemistry is the minimum requirement. The single physics course has been determined to be adequate for students in this major, although all students are informed that a full year of physics should be taken if the student anticipates future enrollment in graduate level curricula. These physical sciences currently provide the necessary content now and the faculty feels it will continue to serve the future needs of graduates from the curriculum.

### **Technical Courses (47 hours)**

GEOL 121 Physical Geology  
GEOL 321 Hydrogeology  
IEHM 211 Water Supply and Pollution Control  
IEHM 308 Solid Waste Management  
IEHM 332 Industrial Hygiene & Ergonomics  
IEHM 375 Toxicology  
IEHM 440 Hazardous Waste Law  
IEHM 492 Internship

Environmental Management Summer Block (Summers only, must be taken as a block)

BIOL 314 The Biological Environment  
IEHM 405 Environmental Engineering  
IEHM 409 Environmental Management  
IEHM 410 Environmental Assessment & Impact Analysis  
IEHM 422 Environmental Management Systems Techniques

The courses listed above provide more detailed knowledge about technical areas specific to the management of hazardous materials and wastes. Professionals in this field are expected to deal with radiation as an environmental contaminant. They must also be prepared to work with all aspects of occupational hazard because most contaminated sites are closely associated with industrial activities. These courses provide the appropriate background for this option.

Hazardous Waste Operator Training (HAZWOPER) is a 40 hour training program mandated under both environmental and occupational health and safety law. Under most circumstances, workers cannot work on sites of environmental contamination unless they have completed the HAZWOPER training program.

The hydrogeology course was created specifically for the Hazardous Waste Management option. Again, the management of chemical materials that may reach or have reached the natural environment is an important area of expertise for students in this option. The hydrogeology course provides an important link to the present importance of maintaining sources of clean groundwater as a potable water source.

The summer block of courses is designated as a capstone experience and as an enhancement for hands-on activities. Alumni enthusiastically support the summer block experience but suggest that the HW option students be provided with a hazardous materials/waste project rather than a general environmental assessment. The lead faculty for the HW option proposed a HW “mini-block” as a replacement for the summer block in order to provide the laboratory experiences needed currently in the curriculum. Faculty however felt that the laboratories should be a part of courses earlier in a student's curriculum and not introduced in the final capstone experience.

### **Technical Electives (0 hours)**

There are currently no technical elective hours available for this option. Students are encouraged to undertake additional courses in other option areas if they wish to diversify further. Some suggested, but not mandatory, electives include:

IEHM 335 Air Sampling and Analysis  
IEHM 490 Safety Management  
IEHM 403 Indoor/Outdoor Air Quality  
IEHM 317 Public Health Administration  
IEHM 416 Noise and Vibration  
MRIS 102 Medical Terminology

### ***Option-Specific Courses: General Environmental Health***

The General Environmental Health Option is designed to prepare students for employment in the field of environmental health. Specifically, graduates in this option are qualified to work in a variety of Federal, state, and local governmental agencies. County health departments, pest control firms and food production/ processing facilities have been primary employers of graduates in this option.

The courses presented below have been selected as the core for students in the General Environmental Health option.

### **Physical Sciences (18 hours)**

CHEM 121 General Chemistry 1  
CHEM 122 General Chemistry 2  
CHEM 214 Fundamentals of Organic Chemistry  
PHYS 130 Concepts in Physics

Knowledge of the physical sciences has been deemed a critical knowledge area for General Environmental Health students. The agency accrediting the IEHM curriculum has determined that the

courses listed above are required to provide the necessary foundation in the physical sciences. The single physics course has been determined to be adequate for students in this major, although all students are informed that a full year of physics should be taken if the student anticipates future enrollment in graduate level curricula.

### **Technical Courses (55 hours)**

Lead faculty for the General Environmental Health Option have determined that students in this option will require an extensive background in all aspects of public and community health. Graduates must have skills in disease, food quality, sanitation, shelter, air quality, and pest control in order to adequately function in the professional world. The courses outlined below have been determined to provide the maximum benefit to students majoring in this option.

IEHM 211 Water Supply and Pollution Control  
IEHM 212 Shelter Environment  
IEHM 214 Vector Control  
IEHM 250 Integrated Pest Management  
IEHM 302 Communicable Disease Control  
IEHM 308 Solid Waste Management  
IEHM 311 Environmental Health Laboratory  
IEHM 317 Public Health Administration  
IEHM 320 Institutional Sanitation  
IEHM 311 Environmental Health Laboratory  
IEHM 350 Food Technology  
IEHM 491 Environmental Health Internship  
IEHM 403 (Air Pollution) or IEHM 408 (Environmental Chemistry)

Environmental Management Summer Block (Summers only, must be taken as a block)

BIOL 314 The Biological Environment  
IEHM 405 Environmental Engineering  
IEHM 409 Environmental Management  
IEHM 410 Environmental Assessment & Impact Analysis  
IEHM 422 Environmental Management Systems Technology

The summer block of courses is designated as a capstone experience and an enhancement for hands-on activities.

### ***Option-Specific Courses: Industrial Safety***

Students majoring in Industrial Safety are required to have the same core arts and sciences and technical courses as all options in the Industrial and Environmental Health Management Program. Lead faculty in this option have determined that students in this option must have an extensive knowledge of safety management and regulatory compliance strategies. Every worker has the right to a safe and healthy work environment. Students study techniques that allow a worker to return from work each day in the condition they were in when they went to work. This option of the curriculum is designed for the academically weaker student (see physical sciences below). This option currently provides the knowledge, skills and attributes (KSA's) needed for success in the field however it is

deficient with respect to accreditation requirements. Our accreditation agency requires an additional physical science, however the faculty feel that this additional science is not truly needed in the field of Industrial Safety. IS graduates from the proposed curriculum change will be much better prepared in the IH, HW and GE fields and, with the toxicology course, will be much more effective in the HS&E field.

The courses presented below have been selected as a critical knowledge base for students in the Industrial Safety option.

### **Biological Sciences (4 hours)**

BIOL 109 Basic Human Anatomy and Physiology

In order to understand the implications of chemicals on human health and the environment, the student must have a basic understanding of human anatomy and physiology. The course above provides the necessary content.

### **Physical Sciences (11 hours)**

Students in this option are expected to provide basic safety services for the industrial field upon graduation. Since Industrial Safety majors will deal with a wide variety of industrial processes, a basic knowledge in chemistry and physics is needed. At one academic year, this option requires the least amount of chemistry.

CHEM 114 Introduction to General Chemistry

CHEM 124 Introduction to Organic Chemistry and Biochemistry

PHYS 130 Concepts in Physics

A basic knowledge of the physical sciences has been deemed a critical knowledge area for Industrial Safety students. The single physics course has been determined to be adequate for students in this major, although all students are informed that a full year of physics should be taken if the student anticipates future enrollment in graduate level programs.

### **Business Courses (9 hours)**

MGMT 301 Applied Management

MGMT 471 Production/Operations Management

INSR \_\_\_ Insurance Elective

Management courses represent a critical area of responsibility for Industrial Safety personnel. This course of study, including a course in the Insurance program prepares Industrial Safety graduates for their role in industry.

### **Technical Courses (36 hours)**

MRIS 102 Orientation to Medical Vocabulary

EDUC 378 Media Presentation Techniques  
IEHM 222 Fire Prevention and Control  
IEHM 231 Mechanical Safety  
IEHM 322 Accident Investigation & Reporting  
IEHM 330 OSHA Laws & Regulations  
IEHM 332 Industrial Hygiene & Ergonomics  
IEHM 416 Noise & Vibration  
IEHM 491 Internship  
Technical Electives (8 hours)

The courses listed above provide more detailed knowledge about technical areas specific to the management of industrial safety issues. Professionals in this field are expected to deal with general industrial safety, which includes ensuring safe equipment operation, fire planning, and training in a wide variety of safety topics. They must also be prepared to work with all aspects of occupational hazards associated with industrial activities. The Media Presentation Techniques course offered by the College of Education was not successful (it has not been offered since semester conversion, 1993). Therefore, students have been advised to take IEHM 490 Safety Management as a substitute. In the proposed curriculum change, IEHM 490 will be the requirement.

### **Suggested Technical Electives**

Students are advised that an Insurance Minor is available. The minor can be obtained with a combination of 17 specified additional semester hours in the Management Department of the College of Business.

### ***Option-Specific Courses: Industrial Hygiene***

Students majoring in Industrial Hygiene are required to have the same core courses as all options in the Industrial and Environmental Health Management Program. Lead faculty in this option have determined that students in this option must have an extensive knowledge of chemistry, anatomy, physiology, and toxicology. Students study techniques that protect workers from industrial stresses associated with the modern workplace. These stresses include ergonomics, air quality, chemical exposures, noise exposures, and a wide variety of other occupational stresses.

The courses presented below have been selected as a critical knowledge base for students in the Industrial Hygiene option.

### **Biological Sciences (4 hours)**

BIOL 205 Basic Human Anatomy and Physiology

In order to understand the implications of chemicals on human health and the environment, the Industrial Hygiene student must have a more advanced understanding of human anatomy and physiology. The course above provides the necessary content.

### **Physical Sciences (24 hours)**

Students in this option are expected to provide advanced services for the industrial field upon graduation. Since Industrial Hygiene majors will deal with a wide variety of industrial processes, an advanced knowledge in chemistry and physics is needed. Because it is needed for the type of work that they are going to perform, this option requires the most amount of chemistry of any option in the curriculum.

CHEM 121 General Chemistry 1  
CHEM 122 General Chemistry 2  
CHEM 221 Organic Chemistry 1  
CHEM 222 Organic Chemistry 2  
PHYS 130 Concepts in Physics

An advanced knowledge of the physical sciences has been deemed a critical knowledge area for Industrial Hygiene students. The single physics course has been determined to be adequate for students in this major, although all students are informed that a full year of physics should be taken if the student anticipates future enrollment in graduate level programs.

### **Technical Courses (37 hours)**

MRIS 102 Medical Terminology  
IEHM 310 Environmental Radiation  
IEHM 322 Accident Investigation/Reporting  
IEHM 330 OSHA Laws & Regulations  
IEHM 332 Industrial Hygiene & Ergonomics  
IEHM 375 Toxicology  
IEHM 403 Air Pollution or 408 Environmental Chemistry  
IEHM 335 Air Sampling and Analysis  
IEHM 416 Noise & Vibration  
IEHM 491 Internship  
Technical Electives (10 Hours)

The courses listed above provide more detailed knowledge about technical areas specific to the management of industrial hygiene issues. Professionals in this field are expected to deal with a wide variety of chemical hazards and conduct wide-ranging investigations of industrial exposure issues. They must also be prepared to work with all aspects of occupational hazards associated with industrial activities. The courses listed above provide additional depth of knowledge for all industrial hygiene graduates. Other than changes in the technical core suggested in the new curriculum, few additional changes are being recommended. The IH graduate is well trained now and will be even more so in the future.

## **Summary**

The IEHM curriculum provides an excellent introduction to each profession and to the KSA's required for success. The proposed curriculum revision will provide them with a broader base of knowledge base in addition to skills and attributes. The IEHM faculty anticipate completing the curriculum revision proposal and forwarding beginning the approval process this academic year.



## Current Common Core Courses for the IEHM Curriculum

<b>Communications:</b>	12 hrs.	
	ENGL 150	English 1
	ENGL 250	English 2
	ENGL 311	Advanced Technical Writing
	COMM Elective	(COMM 105 or 121)
<b>Cultural Enrichment:</b>	9 hrs	
<b>Social Awareness:</b>	9 hrs.	
	PLSC 311	American, State and Local Government
	SOCY 121	Introductory Sociology
	PSYC 150	Introduction to Psychology
<b>Mathematics and Computer Science:</b>	6 hrs	
	MATH 120	Trigonometry
	ISYS 105	Microcomputer Applications
<b>Biological Sciences:</b>	3 hrs.	
	BIOL 121	General Biology 1
	BIOL 218	Microbial Ecology
<b>Common Technical Core:</b>	18 hrs.	
	IEHM 101	Introduction to Ind. and Env. Health Management
	IEHM 310	Environmental Radiation
	IEHM 319	Orientation to Internship
	IEHM 345	Hazardous Waste Management
	IEHM 412	Industrial Ventilation
	CAHS 410	Intro. To Epidemiology and Pub. Health Statistics

### *General Environmental Health Option Courses:*

#### Physical Sciences: (18 hours)

CHEM 121	General Chem I
CHEM 122	General Chem II
CHEM 214	Fundamentals of Organic Chem.
PHYS 130	Concepts of Physics

#### Technical Courses: (52 hrs)

CAHS 317	Public Health Administration
IEHM 211	Water Supply and Pollution Control
IEHM 212	Shelter Environment
IEHM 214	Vector Control
IEHM 250	Integrated Pest Management
IEHM 302	Communicable Disease Control

*Gen. Environmental Health Technical Courses (continued)*

- IEHM 308 Solid Waste Management
- IEHM 311 Environmental laboratory
- IEHM 320 Institutional Sanitation
- IEHM 350 Food Technology
- IEHM 492 Internship
- Environmental Management Studies Block
  - BIOL 314 The Biological Environment
  - IEHM 405 Environmental Engineering
  - IEHM 409 Environmental Management
  - IEHM 410 Env. Assessment and Impact Analysis
  - IEHM 422 Env. Systems Management Techniques
- Tech. Elective
  - IEHM 403 (Air Pollution) or IEHM 408 (Env. Chemistry)

*Hazardous Waste Management Option Courses:*

Physical Sciences: (18 hours)

- CHEM 121 General Chem I
- CHEM 122 General Chem II
- CHEM 214 Fundamentals of Organic Chem.
- PHYS 130 Concepts of Physics

Biological Sciences: (4 hrs.)

- BIOL 109 Basic Human Anatomy and Physiology

Technical Courses: (47 hrs.)

- GEOL 121 Physical Geology
- GEOL 321 Hydrogeology
- IEHM 211 Water Supply and Pollution Control
- IEHM 308 Solid Waste Management
- IEHM 332 Industrial Hygiene
- IEHM 375 Toxicology
- IEHM 440 Hazardous Waste Law
- IEHM 491 Internship
- Environmental Management Studies Block
  - BIOL 314 The Biological Environment
  - IEHM 405 Environmental Engineering
  - IEHM 409 Environmental Management
  - IEHM 410 Env. Assessment and Impact Analysis
  - IEHM 422 Env. Systems Management Techniques

*Industrial Hygiene Option Courses:*

Biological Sciences: (5 hrs.)

- BIOL 205 Human Anatomy and Physiology

Physical Sciences: (24 hours)

CHEM 121 General Chemistry 1  
CHEM 122 General Chemistry 2  
CHEM 221 Organic Chemistry 1  
CHEM 222 Organic Chemistry 2  
PHYS 130 Concepts of Physics

Technical Courses: (37 hrs.)

MRIS 102 Medical terminology  
IEHM 322 Accident Investigation and Reporting  
IEHM 330 OSH Laws and Regulations  
IEHM 332 Industrial Hygiene and Ergonomics  
IEHM 335 Air Sampling and Analysis  
IEHM 375 Toxicology  
IEHM 403 (Air Pollution) or IEHM 408 (Env. Chemistry)  
IEHM 416 Noise and Vibration  
IEHM 491 Internship  
IEHM Technical Electives: 10 hrs.

*Industrial Safety Option Courses:*

Physical Sciences: (18 hours)

CHEM 114 Introduction to General Chemistry  
CHEM 124 Intro. To Organic and Biochemistry  
PHYS 130 Concepts of Physics

Biological Sciences: (4 hrs.)

BIOL 109 Basic Human Anatomy and Physiology

Business Courses: (9 hrs.)

MGMT 301 Applied Management  
MGMT 371 Production and Operations Management  
Insurance Elective

Technical Courses: (28 hrs.)

MRIS 102 Medical Terminology  
EDUC 378 Media Presentation Techniques  
IEHM 222 Fire Prevention and Control  
IEHM 231 Mechanical Safety  
IEHM 322 Accident Prevention, Investigation and Reporting  
IEHM 330 OSH Laws and Regulations  
IEHM 332 Industrial Hygiene and Ergonomics  
IEHM 416 Noise and Vibration  
IEHM 491 Internship  
IEHM Technical Electives: 8 hrs.

## Section Ten: Enrollment Trends over the Past Five Years

It is indeed unfortunate that the review of enrollment trends is only requested for the preceding five year period of time. This timeframe is assumed to be the result of a desired five year turnaround for academic program review. Even so, it truly does not provide as complete a picture as would an examination of the entire program's enrollment history. The reviewer of this section is urged to review the "Program History" portion of Section 1, and especially the material beginning on page 6 relative to the 1982-1990 period of time.

IEHM program enrollment in Fall 1992 was 157 students on campus, and 2 students off campus (External Degree). This has fallen to 63 currently enrolled. See the table below for annual fall semester enrollment. The 1997 enrollment, when compared to the 1993 enrollment is a 36% decline in enrollment.

Enrollment Type	Fall 1993	Fall 1994	Fall 1995	Fall 1996	Fall 1997
On-Campus	136	115	110	88	63
Off-Campus	2	0	0	0	0
<b>Total</b>	138	115	110	88	63

IEHM faculty and administration have been aware of this trend and have been actively involved in recruiting activities for the past three years. Unfortunately, the disadvantage of our successful recruiting efforts of 1982-1990 resulted in such an increase in student numbers, that additional sections of courses and laboratories had to be added to accommodate them. This also meant that more faculty time was directed toward the education of these new students. This additional time detracted from the amount of time needed to put faculty into the field, recruiting at high schools and community colleges all across Michigan.

In the past two years, program faculty have participated in recruiting activities at all of their regional and state professional meetings. In addition, we have participated in Autumn Adventure and every other College of Allied Health Sciences open house and/or tour. We have developed a recruiting poster for distribution across Michigan to all community colleges and to local high schools, and have developed recruiting flyers for distribution at all recruiting functions. The student Ferris Industrial and Environmental Health Association have also helped faculty in recruiting, in donating T-shirts for raffles and in recruiting activities associated with the annual Earth Day celebration.

More time does need to be devoted to recruitment as well as more of a personal commitment by all program faculty. It should go without saying however that in order for a recruiting program to be successful, it requires total administrative support in the form of released time for recruitment activities away from campus, plus funding for travel. The program's successful campaign in 1982-1990 was a result of Time (to commit to the development of materials), Time (away from campus to recruit), Workforce (all faculty contributing) and Money (adequate to run a QUALITY campaign).

Program graduates are in demand which helps in the recruiting effort. In recent years, the program has produced the following numbers of graduates:

Enrollment Type	AY'91-92	AY'92-93	AY'93-94	AY'94-95	AY'95-96
On-Campus	29	59	36	39	36
Off-Campus	0	0	0	1	1
<b>Total</b>	29	59	36	40	37

Program graduates should be expected to decline until the recruiting drive is successful. The result of this will be the enviable position of a lack of supply (of quality graduates) with an increasing demand. Another result of the recruiting successes in 1982-1990 was a decrease in readily available jobs, i.e. the same number of positions advertised as in years past, but with many more available job graduates. This was compounded by a Republican Administration in Washington, D.C. which was decreasing an emphasis on the environment and on occupational safety and health. Currently, one site on the World Wide Web (Careepath.com) lists in excess of 100 environmental positions and normally less than 10 hazardous materials positions weekly.

## Section Eleven: Program Productivity and Costs

It must first be noted that the IEHM program is one of two programs within the Environmental and Clinical Sciences Department, in the College of Allied Health Sciences. Statistics provided in the Productivity Report, cited below, in some cases use combined statistics from both programs and at other times use separate IEHM and CLS statistics. In addition, the IEHM faculty, deliver several CAHS (CAHS 410, 317, 150, 205, and 232) courses for which they are not credited in the statistics. Also, it is an IEHM faculty member who delivers the FSMT 113 course an average of once per semester. Credit hour production for this course is also not included from the IEHM count.

According to the FSU Productivity Report: Fall 1993 – Winter 1997, published by the Office of Institutional Studies, the IEHM curriculum generated 0 Student Credit Hours (SCH) in Summer 1993, but 464 in 1994, 370 in 1995, and 384 in 1996. Faculty question these statistics because they have taught students in each summer since 1972 (with the exception of 1988 and 1990). It is unknown why the statistics for summer, 1993 are zero. Fall semester SCH's have fallen from 1,155 in 1993 to 684 in 1996. Likewise, winter semester SCH's have fallen from 881 in 1993 to 549 in 1996. The sum of fall + winter + summer SCH's fell from 2,036 in 1993-94, to 1,617 in 1996-97.

The same problem with summer, 1993 data appears again in the Full Time Equated Faculty (FTEF) statistics. Again, the summer block was offered that semester with the same number of faculty that have taught in the block since 1980. Since that time, three faculty members have been hired to teach IEHM courses in the summer block. One is hired at a  $\frac{3}{4}$  time rate, while the other two are hired at a  $\frac{1}{2}$  time rate for each faculty member. At any rate, FTEF from 1993 to 1996 appears from the statistics to have risen from zero in 1993, to 2.5 in 1994. From that summer, it has fallen to 2.36 in 1996. Fall semester FTEF's have ranged from a high of 4.88 in fall, 1995-96, to 4.27 in fall, 1996-97. This decline may be due in part to the retirement of Mr. George Rouman and the hiring of a three year temporary replacement.

Fall FTEF's have ranged from a high of 4.24 in 1993-94 to a low of 3.95 in 1995-96. Average F+W FTEF's have varied from 4.51 in 1993-94 to 4.20 in 1996-97

Comparing SCH/FTEF, average F+W statistics fell from a high of 451.17 in 1993-94 to 293.36 in 1996-97. The Environmental and Clinical Sciences aggregated departmental SCH/FTEF equaled 309.15, which placed the department ahead of all other CAHS departments/programs with the exception of the Allied Dental Department (379.96), and the Health Management Department (449.66).

The IEHM curriculum delivers courses which are service courses to many curricula throughout the University. Some programs serviced (course/*training* taught) are:

- Heavy Equipment Technology (Occupational Safety and Health Law)
- Health Care Systems Administration (Institutional Sanitation)
- Health Care Systems Administration (Public Health Administration)
- Nuclear Medicine (Epidemiology and Public Health Statistics)
- Dental Hygiene (*Blood borne Pathogens*)
- Radiography (*Blood borne Pathogen*)

## Food Service/Hospitality Management (Food Sanitation and Safety)

In addition, some programs recommend our IEHM courses to their students as electives. Students from curricula such as auto service, printing management and insurance occasionally take OSHA Law as an elective.

### Costs:

Costs have been obtained from the Office of Institutional Studies for 1995-1996 and are provided by Option area below:

### IEHM Program Costs

IEHM Option	Cost / SCH
General Environmental Health	\$280.68
Hazardous Waste Management	\$117.55
Industrial Hygiene	\$117.13
Industrial Safety	\$124.29

## **Section Twelve: Conclusions**

### **Specific Criteria Conclusions Required by the *APR Guide***

#### **Centrality to the FSU Mission**

The IEHM program's mission is indeed central to that of the University as published in the 1995-97 University Catalog. It is providing students with strong curricula which emphasize practical, usable skills and which incorporate the general education requirements. The faculty in the program care about their students and are available for advising. Faculty participate with students in professional, community service and social activities.

The program is responsive to the needs of governmental, industrial and business and maintain close contact with their Advisory Committee members, internship centers, and professional colleagues.

Faculty and students participate in community service such as Adopt-A-Highway, Radon Screening, Health Expo Water Analyses, etc., and serve as unpaid consultants to various University operations in conducting surveys of workroom environments and making recommendations. In 1995, students in the ASSE chapter contracted verbally to conduct an Emergency Egress Survey for all academic buildings on campus. The survey was to be conducted and egress maps produced. Although the all-student project completed its work to the fullest extent possible, the \$8,000 fee has not been paid. This is however, another example of the IEHM programs centrality to the mission of the University. It also gave the program visibility within the university.

#### **Uniqueness and Visibility**

The IEHM program is unique in the State and the Nation. It is the only accredited curriculum in the State and one of only 24 in the Nation. It maintains its visibility by continuing to graduate highly qualified alumni who are entry level ready, and by participating in regional, state and national professional organizations. One interesting comment that was relayed by a program alumnus to IEHM faculty recently related to a meeting of public health professionals on the West Coast. Being discussed at that meeting was the problem of obtaining fully qualified entry level environmental health professionals. The statement that was made was "...it's really too bad that we don't have an FSU in the West!"

#### **Service to the State and Nation**

Our graduates can be found all across the nation and, in fact, the world. We have graduates in nearly every state in the U.S. and in at least one Province in Canada. In the past 10 years, we have also had alumni serving in the Peace Corps.

Faculty have served on at least one standards setting committee for the Michigan Department of Natural Resources and one faculty sits on a committee which recommends the establishment of workroom environmental standards.



Industrial + Environmental  
Health Management

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Four of the five faculty are active as consultants and provide service not only to businesses across the state of Michigan but also to other states in the U.S.

### **Demand by Students**

Over a 30 year history, enrollment in the curriculum has fluctuated wildly, from nearly 200 in 1971, to approximately 35 students in 1984, to ~165 in 1990 to the current 63 students. Planning and implementation of a recruiting strategy in 1984 halted the enrollment decline and led to the large increase in students. A lack in active recruiting has led to the current low enrollment.

### **Quality of Instruction**

Alumni, employer and student surveys indicate that the IEHM program faculty provide high quality, up-to-date instruction.

### **Demand for Graduates**

Graduates who possess not only the Knowledge and Skills but also the Attributes of an IEHM professional are successful in obtaining professional level employment usually within a few months of their graduation. This demand is expected to continue however rather than positions being available in IH, IS, or HazWaste individually, the new positions are expected to be combinations of all of those responsibilities.

### **Placement Rate and Average Salary of Graduates**

Typically the program enjoys an 85% to 95% employment success rate. EH and IS graduates typically make \$20-25K to start. IH graduates typically start in the upper \$20K's to low \$30K's and HazWaste graduates start anywhere from the mid-\$20K's to the low \$30K's. All entry level salaries are based on the amount of relevant experience possessed by entry level applicants.

### **Service to Non-Majors**

Courses and training modules are taught by IEHM to various parts of the campus community including: Health Care Systems Administration, Food Service/Hospitality Management, Nuclear Medicine, Dental Hygiene, and Radiography.

### **Facilities and Equipment**

Facilities are adequate although they could be more appropriately used at times.

All options are lacking in up-to-date equipment. As it is equipment that is available is barely adequate to meet the needs of educating students to the level necessary to enter the field. It is inadequate in regards to performing environmental water quality assessments which are provided as a capstone course and as a public service to the community. Each faculty annually prepares prioritized equipment request lists in the event money is forthcoming. Recently, lists of some of the individual faculty members have exceeded \$100,000!

## **Library Information Resources**

Students are frustrated by the limited professionally oriented resources of the library and with the service hours of the library. Splitting the library did not help as it tended to divide some of the IEHM resources.

Students are also concerned about the lack of computer technology and the lack of computer access, especially during the summer.

## **Cost**

Depending upon the enrollment, the IEHM program is, at times, a high cost program from a Student to Faculty ratio perspective. Additionally, the cost for supplies grows each year with environmental sampling and analysis supplies being particularly expensive. About the time that laboratory fees for IEHM courses were being justified, the University suspended lab fees in favor of an across the board fee to all students which would include graduation fees, etc. Justification for the new fee was that it would provide a fund which programs could draw on for their laboratory supplies. To the knowledge of the faculty in IEHM, we have never been the recipient of any of those collected dollars!

## **Faculty: Professional and Scholarly Activities**

Faculty are active in their respective Regional, State and National professional associations. Two faculty have recently completed sabbatical leaves. Dr. Rodabaugh published a text book on hazardous waste management, and Mr. Ells conducted research on high altitude human waste management and published a paper in the April, 1997 issue of the Journal of Environmental Health.

## **Administration Effectiveness**

The Department Head is increasing in her effectiveness in administering the program. She has had a steep learning curve since taking over the program in the early 1990's and has done an admirable job. Program faculty feel that the upper management of the college doesn't understand the program areas because they are not traditional to the Allied Health Sciences, i.e. IEHM is preventive medicine in nature, and not diagnostic medicine or curative/restorative medicine.

## **Conclusions Derived from Survey's and the APR Process**

A common response/result from all (Alumni, Employers and Faculty) surveys indicated that students need to develop an understanding of how all EH, IH, IS and HW fit into an organization and how to work creatively to protect human health and the environment.

## **Alumni**

Nearly all IEHM technical courses were highly rated by alumni. The major exception was the low ranking for Public Health Administration.

Having computer skills are essential to today's IEHM professional. At the time of this survey, the College of Allied Health Student Computer Laboratory had only been open two years and may account for the low (20%) ratings on computer preparation for the alumni surveyed. The IEHM faculty have been incorporating more computer-related assignments in IEHM courses, however there is a need for continued improvement in this area. In fact the IEHM faculty feel a dedicated computer area is necessary to allow students an opportunity to use computer-related tools that are essential parts of today's profession.

Mathematics and computer preparation ranked lowest in terms of how alumni felt FSU prepared them for their careers.

Student comments were generally supportive of the IEHM program and reported a comfortable learning environment with the faculty accessible and willing to help as needed. The students indicated a desire to continue to receive information in the classroom that is relevant to their future careers.

Alumni also feel that the IEHM faculty works diligently at keeping up with current developments in each of their disciplines.

Survey results indicate that the summer block environmental studies requirement for General Environmental Health and Hazardous Waste Management Option students was valuable (75%). However written comments suggest that hazardous waste management projects should be incorporated into the block experience to make sure students in this option obtain some hands-on experience in their discipline.

Overall the IEHM program alumni are pleased with the program. Ninety-two percent of the respondents said IEHM prepared them well for their career choice.

The IEHM faculty believe that it is necessary to maintain closer contact with program alumni. This will benefit several areas. First it will allow for additional feedback regarding the program. Better contact will also expand the network for currently enrolled students to communicate with recent graduates for job shadowing, internships, and job opportunities. Alumni contact could include such activities as newsletters, additional surveys and alumni gatherings. Input from the program graduates is essential to making sure the academic program is meeting the needs of the IEHM related professions.

## **Employers**

96% of employers are satisfied with the performance and quality of IEHM graduates and would seek out another graduate for their organization. Employers reported that program graduates were technically competent and well prepared to adapt to the professional arena.

According to the written comments in the employer survey, areas that need continued emphasis are communication skills (written and verbal), ability to deal well with people, working in teams, critical thinking and critical problem solving skills.

## **Students**

Enrolled students are generally satisfied with the academic program. Exceptions to this satisfaction are: quality of the library holdings and library service hours, quality of computer laboratory support and the availability of computer facilities. This, it should be noted, is similar to concerns expressed by alumni. It also must be noted that the computer facilities and software, while still lacking, have increased by a great extent in the past 5 years. There is a need for both student education about hardware and software and a need for increased equipment and services.

Program students are supportive of the IEHM program and reported a comfortable learning environment with faculty accessible and willing to help as needed. They are satisfied with the overall academic program.

The low ranking by students of their science courses indicates that students don't understand and/or appreciate the importance of these disciplines to their chosen professional field.

Students need to continue to develop their computer skills.

## **Faculty**

IEHM faculty feel, upon reviewing the outside survey's (Alumni, Employers and Advisory Committee), that an area that needs to be improved is that of helping students understand that an IEHM degree is a professional degree and not a technician level degree. A part of this professional degree understanding would be better integration between the basic science and math courses with IEHM courses to demonstrate why the science and math foundation is necessary for developing into a well-rounded, well-prepared IEHM professional.

Faculty also see a need for the students to gain a better understanding of what their career options can be in this field.

Faculty encourage students to participate in such activities as professional societies, student organizations and classroom field trips. Additional activities could include additional guest speakers, contact with alumni and job shadowing programs.

While beneficial for the program both in terms of name recognition and economically, the UAW-Chrysler contract and other outside consulting has also had negative effects on the curriculum. Positive aspects are that outside consulting and contracts provide the opportunity for faculty to remain current in the field and provides a source of funds to the program. These funds can be used by the program to purchase equipment not ordinarily available due to inadequate college funding. A disadvantage is the unavailability of faculty on campus during the one week that training sessions are being delivered.

## **Advisory Committee**

The advisory committee feels there are adequate employment opportunities for graduates over the next 5 years.

The advisory committee feels that the program would be perceived as stronger if it continued to be accredited by an outside agency.

It would also appear that Ferris needs to further familiarize the advisory committee on the objectives and content of IEHM courses.

The Advisory Committee feels that the students receive adequate “hands-on” experiences.

The program needs to educate the advisory committee on the How’s and Why’s of student recruitment, including the costs and time commitments involved.

### **Market Analysis**

There is sufficient market for IEHM graduates at the current level and at an increased enrollment and graduation level for the foreseeable future.

### **Facilities / Equipment**

Facilities are adequate but could be better used with respect to course content and lecture/lab utilization.

Current equipment (state-of-the-art) is less than desirable in order to have the student entry level ready for the profession. Substantial equipment requests are made annually with little to no faculty enthusiasm that they will ever be adequately funded or, in some cases, equitably funded.

### **Curriculum**

The IEHM Program continues to be a dynamic program that seeks to fulfill the needs of governmental agencies, industry, and businesses throughout the United States. In an effort toward continuing improvements in IEHM graduates, the faculty have been in detailed discussions to modify the curriculum. This process of constantly upgrading of individual courses and the program itself is supported by the very high placement rates of IEHM graduates

English (ENGL) 311 needs to be upgraded to better reflect the advanced writing skills required by IEHM students.

The current mathematics requirement of the IEHM curriculum is adequate. Much discussion has been centered around the possibility of requiring calculus for all IEHM graduates. Faculty discussion has indicated that requiring calculus for all IEHM graduates would be counterproductive and would likely result in a loss of enrollment.

Continuing program enhancements will further prepare graduates to work in a variety of areas by building a knowledge base in topics critical to protecting human health and the environment through core courses in occupational health, safety and environmental law, toxicology, ventilation, management, epidemiology and statistics.

The program must continue to increase its recruiting activities to bolster enrollment.

The program must continue to enhance courses to meet the continuing needs of our students and their future employers.

## **Section Thirteen: Recommendations**

### **General Recommendations:**

#### **Recruitment Activities**

Recruiting and retention efforts since the last recruiting campaign have not been overly organized. Faculty need to plan and develop a R&R plan. They then need to support it totally and make it happen. R&R activities much have the total commitment of the faculty.

To support R&R activities, the CAHS and FSU need to support these activities with adequate financial resources, and released time, when faculty have full academic loads.

A new program brochure has been developed however the brochure has been “in production” for more than 18 months with no end in sight. Admissions counselors are currently photocopying the IEHM brochure to use for recruiting. If the University wants the faculty to do a quality job in recruiting and retention, they need to prioritize the production of quality materials for that purpose!

IEHM faculty must insure that graduates still have the professional attributes as well as knowledges and skills to function effectively in the field.

FSU/CAHS should credit IEHM program faculty for SCH's when CAHS 150, 205, 232, 317, 410; and FSMT 113 are taught as service courses to non -IEHM students.

#### **Alumni**

Graduates should be encouraged to interact more actively with currently enrolled students through activities such as field trips, guest speakers and job fairs. It is recommended that the program and faculty more effectively use the alumni in this regard.

#### **Employers**

Employers encourage the faculty to continue to enhance the importance of risk communication, written and verbal communication skills, interpersonal skills and critical problem solving skills in all of the courses they are currently teaching and in those under consideration in the curriculum revision.

#### **Students**

According to the IEHM faculty interpretation of the student survey, an area that needs improvement is helping students understand that an IEHM degree is a professional degree and not a technician level program. As part of this professional degree understanding would be better integration between the basic science and math courses with IEHM courses to demonstrate why the science and math foundation is necessary for developing into a well-rounded, well-prepared IEHM professional. The faculty also see a need for the students to gain a better understanding of what their career options can be in this field. Currently the faculty encourage students to participate in such things as professional



societies, student organizations, and classroom field trips. Additional activities could include such things as additional guest speakers, contact with alumni, and job shadowing programs.

Faculty need to continue to encourage students to appreciate the value of life-long education to their professional careers and in the maintenance of their professional certifications.

### **Faculty**

Consulting aids in keeping faculty up to date in addition to earning badly needed money for the program, however faculty need to understand that the reason that they are employed at FSU is for the education of students, and that their first priority should be to the university and its students. Too much consulting time away from the campus whether for part of a day, an entire day or a week tends to limit contact with students and creates pressures on other faculty for advising and other counseling. It is recommended that the faculty achieve a better balance between consulting and program responsibilities.

### **Advisory Committee**

Increased contact with and education of the IEHM Advisory Committee is essential for program progression into the 21<sup>st</sup> century.

### **Market Analysis**

Faculty must continue to assess the changing career fields and keep the curriculum and course content current in order to continue to educate the multi-disciplinary IEHM student.

Faculty must also continue to make employer/business contacts to improve the job market for students.

FSU must strive to maintain its image in the State and the Nation as a provider of quality IEHM graduates.

### **Facilities / Equipment**

Facilities are adequate in number but should be used more effectively.

Equipment is barely adequate to meet entry level job requirements. FSU and CAHS administration need to produce a funding Plan that will equitably and adequately fund IEHM program equipment acquisitions and consistently commit to the plan.

### **Curriculum**

The curriculum modification/revision proposal needs to be solidified and moved through the approval process

## **Section Fourteen: A Historical Perspective of Recruiting Activities in the Industrial and Environmental Health Management Curriculum\***

\* Statistical information based on data obtained from Enrollment Services in April, 1982.

First and foremost, Environmental Health and Occupational Safety and Health are plagued with a name recognition problem. Children know all about doctors, nurses, firefighters, etc. These are common professions, and children have contact with these professionals throughout their childhood even in their books where they learn about the different things that they can do “when they grow up.” The professions of and professionals in Environmental Health, Industrial Hygiene, Industrial Safety and Hazardous Waste Management, on the other hand, are rather hidden from students. None are commonly discussed in career selection/awareness literature available to grade, middle or high school students. This can be documented by the number of students that enter the IEHM curriculum as Freshman. The 1996 Alumni Survey of graduates between 1984 and 1996 indicated that only 12% entered the IEHM program as freshmen. 35% transferred from within FSU, 22% transferred from another university within Michigan, and 28% transferred from a community college. Within the general adult population the professions are also obscure and esoteric with most people depending upon these professionals for a safe and healthful work environment and for safe and healthful air, food and water supplies but with that population unaware of just who is responsible. Parents are generally just as surprised about their child’s choice of IEHM as a career field as is the student him/her self.

### **1971**

Enrollment in Fall, 1971 stood at 196 students with four full time faculty (Armbruster, Ells, Hunter and Rouman) plus a department head (Fleming) who taught one course. At this point, the program educated only general environmental health (EH) students (no other technical options). Multiple sections of lectures and labs were offered to these students.

### **1975 - 1977**

Four options were developed within the environmental health curriculum including one in occupational safety and health. This OSH option was to develop by 1977 into its own separate BS degree and became the first BS degree offered by two colleges within the university. The College of Technology offered the Safety side of the degree and the

College of Allied Health Sciences offered the Industrial Hygiene side of the degree. This caused a reduction of students in the EH degree and the drop in enrollment was expected and ignored. Another faculty member was added to teach Industrial Hygiene related courses (Tillotson).

Also during this time, two grants were awarded to the department which resulted in the acquisition of two additional new faculty members (Cross, VanEss). These grants were awarded to develop an external degree curriculum and a model internship experience.

## 1979-1981

Some faculty noted that there were fewer and fewer students in the curriculum and that those courses which had been taught in multiple sections, were being taught in single sections and those sections were not filled. They were told that it was normal and not to worry about it and not to say anything about it. In the middle of this time period, a decision was made to combine the Safety and Health curricula within the CAHS so a faculty member from COT (Allen) transferred over to CAHS) and the COT no longer was involved in the OSH degree.

## 1981-1982

Due to a consistent decline in student enrollment, and after some classes were canceled due to low enrollment, Professor Ells was asked to study the problem and propose some solutions. He found in a discussion with the Admissions Officer at the time, that **“Ferris gets 2.16% of the high school student population! It always has and it always will.”** By this time, it was generally widely known about the Ferris and Michigan university communities that the population of high school seniors was declining and would continue to do so until well into the 1990’s. It was also anticipated that this population reduction would amount to a total reduction of between 33% and 50%. This meant that 2.16% of a declining student population would be 30% to 50% less students registering at Ferris if nothing further was done. At the time, admissions personnel from Ferris visited schools but a true **marketing** of an individual program within the university was virtually unheard of.

Professor Ells recommended to the department head that a major recruiting drive be undertaken and offered a detailed plan.

## 1982-1986

Department Head retires and the enrollment of the EH curriculum is determined to be approximately 40 students and the OSH curriculum is determined to be approximately 20 students! During this four year period, the combined enrollment would eventually drop to approximately 35 students. The program by this time had 7 faculty members and a glaring student/teacher ratio!

In 1983 the A.A.S. degree in Pesticide Technology was dropped by the University and with it went the courses supporting the BS Option in Pesticide Technology. This was deemed a unfortunate because although few students entered the A.A.S. degree program, they invariably stayed for the BS degree. In other words, it was a consistent entry point which fed the BS degree program, but it was lost. At the same time, the A.A.S. degree in Environmental Sanitarian Assistant was also closed, again affecting the enrollment.

## The Plan:

The plan for the program consisted of several concurrent actions as follows:

1. Combine the EH and the OSH degrees into one single degree.
2. Curriculum Revision: The curriculum was determine to be badly out of date and in need of revision to reflect then current field activities.

3. Plan and implement a program marketing strategy including paper informational items.
4. Begin a promotional blitz about the program to four principal audiences:
  - FSU University Students
  - Community Colleges
  - Area/Regional High Schools
  - Statewide Voc-Tech/Skills Centers
5. Determine whatever was possible in order to reduce the number of faculty teaching in the curriculum.

During meetings with the faculty, each was requested (expected) to volunteer to participate in carrying out the plan. Not only were there program meetings, but there were also weekly meetings with each faculty in order to determine what exactly they were doing, planning on doing, or had accomplished.

### **Curriculum Combination / Curriculum Revision**

In view of the requirement to revise the curriculum, it was decided to revise both the EH and the OSH curricula and then to combine them into one degree in Industrial and Environmental Health Management (IEHM). The reason for the name change is that during the late 1970's-early 1980's time period, faculty noted that graduates of the EH curriculum, while desperately needed by industry, were hired by few. This was recognized to be due to the word "Environmental" having "bad" connotations to the industrial community. Basically, industry refused to hire "tree huggers!" It was decided to place the word environmental deep within the name in order to "hide" it and hope that it became more palatable to industry. In a word...it worked!

Since the option tract and A.A.S. degree in Pesticide Technology had been dropped, the options selected for the new degree were General Environmental Health, Industrial Hygiene, Industrial Safety, and Hazardous Waste Management and the new BS degree program was launched in the fall, 1985.

### **Planning and Implementing a Marketing Strategy**

#### **Marketing Brochure**

Work began by all faculty on the production of a new, updated marketing brochure. We were assisted by a "discovery" that there were fewer high school seniors entering the university systems and that FSU needed to market itself in this competitive arena. Conversations with the admissions office led to an approval of our contacting non-admissions personnel at any community college, high school or vocational-technical/skills center. A poster was developed with the assistance of the Michigan Department of Public Health. An MDPH artist designed the poster, and FSU paid for its production and distribution. This poster, including postage paid response cards, was mailed to all community colleges and all high schools in Michigan.

A major communication and visitation initiative was undertaken with community colleges. A work-study student was first assigned to telephone each community college and obtain the name of the department head or chair of each of their departments of physical/natural sciences and biological sciences. These units were targeted because of the use of their courses by "Pre-" students and by

students interested in biology and chemistry but perhaps unaware of some of the uses to which this course material may be put. These department heads/chairs were personally telephoned by Professor Ells. During each conversation, the FSU-IEHM program was discussed and a request was made to both mail him/her program literature to request a visit where Professor Ells might be able to talk to both faculty and students about the program. Visits of this nature were actually made to Muskegon CC, Montcalm CC, West Shore CC, Jackson CC, Kellogg CC, Monroe CC, Delta CC and Grand Rapids CC. In several cases lectures to chemistry or biology classes were delivered to introduce the students to the IEHM curricula and careers. In other cases, either discussions were held with biology, chemistry and/or physics faculty or table displays were set up in student areas to provide students with program information.

#### Health Occupations Educators Association and Health Occupations Students Association

Professors Ells and Gregorich (of the Dental Technology curriculum) joined the Health Occupations Educators Association and began to attend their meetings and the annual meeting and competitions of the Health Occupations Student Association. They were then invited to a number of Vocational-Technical ~ Skills Centers at high schools throughout southern Michigan. At those centers, Ells and Gregorich made presentations before the students about FSU, CAHS and their respective programs. This became one of our least effective recruiting tools in terms of IEHM because students in this curricula were generally not inclined to continue on to college. Those that did were more likely to enter into nursing programs or clinical programs of one type or another.

#### Michigan Science Teachers Association (MSTA)

Professor Ells also joined the MSTA in an effort to gain access to science teachers in the K-12 system of Michigan. He attended the annual meetings of the MSTA where the program had a display in the exhibit hall. Unfortunately this was also one of the least effective recruiting tools because the objective of most of the MSTA meeting attendees was to obtain "freebies" from major book publishing companies and most of our material was lost in the crush of those activities.

#### Professional Health Associations

During the early 1980's, the Plastics Engineering Technology curriculum was also experiencing an enrollment problem. In discussions with faculty in that program Professor Ells learned that the plastics association in Michigan had been a great help in recruiting. For this reason, help was requested from the Michigan Environmental Health Association (MEHA). At this time the West Michigan Chapters of the American Society of Safety Engineers (ASSE) and the American Industrial Hygiene Association (AIHA) were fledgling groups and were not prepared to actively participate. Positive responses were received from a presentation given before a general membership meeting at the Annual Meeting of the MEHA. In response, Professor Ells sent recruiting packets to all Directors of Environmental Health at each of the county health departments within Michigan. Instructions included within each packet specifically requested that the material be discussed with high school science teachers in each of their areas, and, if possible, presentations made to their classes. Unfortunately the majority of recipients simply took the materials to their high school counselors and let the matter drop. Some however, principally alumni of the FSU-EH or IEHM program, actively recruited by making classroom presentations and continue to this day requesting program information.

The MEHA Board of Directors also directed the development of a exhibit booth display for the profession of Sanitarian. This is a traveling display that is taken to high schools all across Michigan during Health Fairs and College Nights. The IEHM program currently provides the curriculum information for that display.

### **Program Promotional Recruiting “Blitz”**

#### Posters and Flyers

Posters and flyers were also produced and distributed around campus recruiting on campus students. One of the most successful was a flyer headlined “18 Jobs per Graduate.” This flyer delineated the geographic distribution of jobs across the U.S. and also separated the jobs by option tract. The design of flyers was changed periodically in order to maintain a fresh image before the student.

#### “Pre-” Letter

A letter was developed and was sent to all Pre-Medicine, Vet. Medicine, Optometry, Pharmacy and Dentistry students at FSU. The letter congratulated the student on their selection of a career choice but suggested alternatives should they not be successful in gaining admission to the professional school or program of their choice. These letters were sent in mid-September and mid-March for 3 years. Each time between ten and twelve students would respond and set up advising appointments. Generally a majority of these students would transfer into the curriculum. As a matter of fact, results of the recent IEHM alumni survey indicates that 35% of respondents entered the IEHM program as a transfer from another FSU curriculum.

During the 1982-1986 period, program faculty were invited into several class sessions across campus to discuss the career opportunities in IEHM.

#### High School Guest Lecturer

Professor Ells did contact local area high schools about being a guest lecturer in their spring classes. He was invited to talk to biology or chemistry classes in Farwell HS, Ewart HS, Big Rapids HS, Newaygo HS, and Morley Stanwood HS. It is interesting to note that during the late 80’s and early 90’s that a disproportionate number of IEHM students were BRHS alumni.

#### Advising Load

During this time periods, new students in the curriculum were advised by Professor Ells and no new advisees were added to faculty advising loads therefore their advising responsibilities decreased. This was felt to be appropriate due to the amount of time the faculty spent on recruiting activities.

## Student Help

Students enrolled in the IEHM program were also asked to help. In fact, faculty serving as internship coordinators requested that each student intern contact a high school in the area of their internship and speak to the biological and physical sciences faculty. If possible, they were to ask to speak to classes. In most cases, these were very successful in recruiting students. We found that there was almost no match between faculty recruiting for students and students recruiting for students. Because of their similarity in age, high school students can readily identify with college students. As with faculty recruiters however, not every student can be a good sales person. A "bad" sales person can do more harm than a good sales person can do good.

## Faculty

From 1981 to 1986, four faculty members left the program without being replaced (Armbruster (retired), Hunter (retired), Cross and VanEss (both reassigned)).

### 1986 - 1990

During this period, enrollment increased from a low of approximately 30 students to 165 students enrolled in the four options. Interestingly, the majority of these students were enrolled in the Hazardous Waste Management option. The problem that this created were large class sizes in hazardous waste associated courses and low enrollment in the other courses. During this period of increases in student enrollment, and large class sizes and advisee loads, the recruiting drive began to take a back seat to the classroom activity since Professor Ells had returned to the classroom by this time and since student numbers had increased.

### 1990 -1996

Program recruiting became virtually non-existent by 1990. Program faculty and administration, satisfied with enrollment, continued to address full classes (in some cases even complaining about too many students for effective teaching and laboratories). Class sizes however began their ever-so-slow decline to present numbers.

## What Did We Learn?

Basically, the four elements of a recruiting program are Time, Money, Workforce and Commitment.

### Time

Time must be available for faculty to develop and prepare recruiting information and to be off campus in order to visit community colleges and high schools. Time must also be allowed by the university for the program and faculty to achieve results. The solution to the enrollment problem of the 1970's-1980's took 5 years of effort and energy to produce.

## Money

Money MUST be available to support paper production activities including the development of glossy, eye catching posters. Money must be available to fund travel expenses to innumerable off campus sites. **The bottom line is that it takes A LOT OF MONEY TO RECRUIT.** I view this as a responsibility of the University to the program. If a program is deemed valuable to the State and to the University, money MUST be available for marketing. Recruiting cannot be the typical governmental response of having a wonderful program on paper while authorizing no budget to carry it out.

## Workforce

Personnel are needed to both TEACH on campus students **AND** TO RECRUIT. These visits are for program sales and not all faculty can (or should) be sales persons. Faculty sales persons must be committed to their university, program and profession. High School and Community College visits means that we cannot have faculty scheduled to teach five days each week and expect them to be out on the road at the same time and effectively recruit. Workforce requirements and commitments need to be coordinated among program administration and faculty.

## Commitment

ALL of the faculty have to be committed to their program and understand that recruiting is a part of the job. Teaching, Advising **AND RECRUITING** have to be the faculty members FULL TIME COMMITMENT. They have to realize that their livelihood may very well depend upon the existence of their curriculum and it (their curriculum) must be their FIRST PRIORITY!

There must also be a commitment from the administration to market the program. Program marketing also must be accomplished differently than regular recruiting efforts. Programs must be allowed to develop brochures and flyers using 4 color processes in order to "Advertise" their programs. Program marketing must be viewed in the same context as marketing cars, candy, perfume or clothes. Printed matter must reach out and "grab the eyeballs" of prospective students. The response of the Admissions office during the mid-1980's was that any program information was required to be printed in the same colors as all other CAHS program materials so that the display racks could be color coordinated. This is literally tying the hands of marketers trying to sell their program. When the IEHM program is the **ONLY** accredited curriculum of its type in the state of Michigan AND one of only 24 accredited in the entire U.S., it is therefore singularly UNIQUE to the state and needs to be marketed in the same way!

## Summary / Conclusion

Program faculty have a rich history in program recruiting. It Does Work! We have done it and shown others that it can indeed be successful. It takes faculty time during each week to develop marketing materials, and faculty time to visit campus classes, high schools and community colleges. There is also a time delay between when recruiting efforts are launched and when results are seen. This requires that the University be patient. It will take the current faculty resources of the program to react to the enrollment problem. Cutting back on faculty will cut back on the potential effectiveness of the recruiting plan. Finally, it takes commitment. Commitment by the university to see the value and contribution of the curriculum to the university, community and state. Commitment by the



administration to budget financial resources for marketing and to allow faculty time away from campus to recruit. Commitment by the faculty that their program is their FIRST priority.

## Section Fifteen: Program Review Panel Evaluation

### PROGRAM REVIEW PANEL EVALUATION

Program: INDUSTRIAL AND ENVIRONMENTAL HEALTH MANAGEMENT

Instructions: Circle the number that most closely describes the program you are evaluating.

1. **Student Perception of Instruction** Average Score 4.17

5 4 3 2 1

Currently enrolled students rate instructional effectiveness as extremely high.

Currently enrolled students rate the instructional effectiveness as below average.

2. **Student Satisfaction with Program** Average Score 3.92

5 4 3 2 1

Currently enrolled students are very satisfied with the program faculty, equipment, facilities, and curriculum.

Currently enrolled students are not satisfied with program faculty, equipment, facilities, or curriculum.

3. **Advisory Committee Perceptions of Program** Average Score 3.83

5 4 3 2 1

Advisory committee members perceive the program curriculum, facilities, and equipment to be of the highest quality.

Advisory committee members perceive the program curriculum, facilities, and equipment needs improvement.

4. **Demand for Graduates** Average Score 4.71

5 4 3 2 1

Graduates easily find employment in the field.

Graduates are sometimes forced to find positions out of their field.

**5. Use of Information on Labor Market** **Average Score** 4.43

5 4 3 2 1

The faculty and administrators use current data on labor market needs and emerging trends in job openings to systematically develop and evaluate the program.

The faculty and administrators do not use labor market data in planning or evaluating the program.

**6. Use of Profession/Industry Standards** **Average Score** 4.57

5 4 3 2 1

Profession/industry standards (such as licensing, certification, accreditation) are consistently used in planning and evaluating this program and content of its courses.

Little or no recognition is given to specific profession/industry standards in planning and evaluating this program.

**7. Use of Student Follow-up Information** **Average Score** 2.83

5 4 3 2 1

Current follow-up data on completers and leavers are consistently and systematically used in evaluating this program.

Student follow-up information has not been collected for use in evaluating this program.

**8. Relevance of Supportive Courses** **Average Score** 7.0

5 4 3 2 1

Applicable supportive courses are closely coordinated with this program and are kept relevant to program goals and current to the needs of students.

Supportive course content reflects no planned approach to meeting needs of students in this program.

**9. Qualifications of Administrators and Supervisors**

**Average Score** 4.29

5 4 3 2 1

All persons responsible for directing and coordinating this program demonstrate a high level of administrative ability

Persons responsible for directing and coordinating this program have little administrative training and experience.

**10. Instructional Staffing**

**Average Score** 4.07

5 4 3 2 1

Instructional staffing for this program is sufficient to permit optimum program effectiveness.

Staffing is inadequate to meet the needs of this program effectively.

**11. Facilities**

**Average Score** 3.83

5 4 3 2 1

Present facilities are sufficient to support a high quality program.

Present facilities are a major problem for program quality.

**12. Scheduling of Instructional Facilities**

**Average Score** 3.86

5 4 3 2 1

Scheduling of facilities and equipment for this program is planned to maximize use and be consistent with quality instruction.

Facilities and equipment for this are significantly under-or-over scheduled.

**13. Equipment**

**Average Score** 2.43

5 4 3 2 1

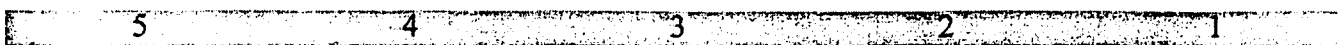
Present equipment is sufficient to support a high quality program.

Present equipment is not adequate and represents a threat to program quality.

**14. Adaptation of Instruction**

**Average Score**

**4.21**



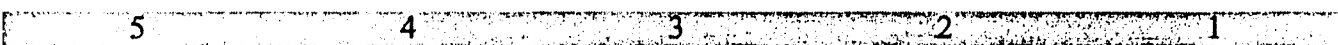
Instruction in all courses required for this program recognizes and responds to individual student interests, learning styles, skills, and abilities through a variety of instructional methods (such as, small group or individualized instruction, laboratory or "hands-on" experiences, credit by examination).

Instructional approaches in this program do not consider individual student differences.

**15. Adequacy and Availability of Instructional Materials and Supplies**

**Average Score**

**2.86**



Faculty rate the instructional materials and supplies as being readily available and in sufficient quality to support quality instruction.

Faculty rate the instructional materials are limited in amount, generally outdated, and lack relevance to program and student needs.

**Appendix One:**

**Curricula Vita for Department Head and Program Faculty**

**CURRICULUM VITAE**  
**JANICE MARIE WEBSTER**

ADDRESS: 20366 Campus View Drive  
Big Rapids, Michigan 49307

PHONE: Home: 616-796-0266  
Work: 616-592-2314

**EDUCATION:**

Ph.D. Microbiology	West Virginia University Morgantown, West Virginia
M.S. Biology	Villanova University Villanova, Pennsylvania
A.B. Biology	Lycoming College Williamsport, Pennsylvania

**CERTIFICATION:**

American Society of Clinical Pathologists, M.T. (ASCP) 106636

**EXPERIENCE:**

1979-Present	Department of Environmental and Clinical Sciences College of Allied Health Sciences Ferris State University Big Rapids, Michigan Department Head and Professor
1977-1979	Division of Medical Technology Department of Medical Allied Health Professions School of Medicine University of North Carolina Chapel Hill, North Carolina Associate Professor
1975-1977	Department of Clinical Laboratory Sciences School of Community and Allied Health University of Alabama in Birmingham Birmingham, Alabama Assistant Professor  Graduate School Faculty University of Alabama in Birmingham Birmingham, Alabama
1974-1975	Department of Medical Technology School of Allied Health Professions Medical College of Virginia Virginia Commonwealth University Richmond, Virginia Assistant Professor

Department of Pathology  
School of Medicine  
Assistant Professor

Graduate School Faculty

**COLLEGE/UNIVERSITY COMMITTEES:**

Search Committee for Department Head of Criminal Justice — Chair  
Ferris State University, 1995-1996

Financial Aid Advisory Committee  
Ferris State University, 1991-Present

Planning Committee — Chair  
College of Allied Health Sciences  
Ferris State University, 1985-1987

Search Committee for Associate Dean  
College of Business  
Ferris State University, 1986

North Central Accreditation Institutional Dynamics Committee  
Ferris State University, 1985-86

Search Committee for Department Head of Nursing  
College of Allied Health Sciences  
Ferris State University, 1985-86

Medical Records Program Director Search Committee  
College of Allied Health Sciences  
Ferris State University, 1985-86

Curriculum Committee  
College of Allied Health Sciences  
Ferris State University, 1985, 1989-Present

Recruitment and Retention Committee  
College of Allied Health Sciences  
Ferris State University, 1984-1987

Search Committee for Dean  
College of Allied Health Sciences  
Ferris State University, 1983-1984

Faculty Research Committee  
Ferris State University, 1983-1985

Journalism Program Review Committee  
Ferris State University, 1982-1983

Promotions Committee  
College of Allied Health Sciences  
Ferris State University, 1982-1984; 1995-1997

Campuswide Master Plan Committee  
Ferris State University, 1981-1984



Nursing Faculty Workload Committee  
College of Allied Health Sciences  
Ferris State University, 1981-1982

Restructuring Committee  
College of Allied Health Sciences  
Ferris State University, 1980-1981

Dental Hygiene Faculty Workload Committee  
College of Allied Health Sciences  
Ferris State University  
Chair, 1980-1981

#### NATIONAL ACCREDITING AGENCY FOR CLINICAL LABORATORY SCIENCES (NAACLS)

- 1992        Member — Accreditation Site Visit Team  
              Medical Technology Program  
              University of Wisconsin - Milwaukee  
              Milwaukee, Wisconsin
- 1989        Chair — Accreditation Site Visit Team  
              Medical Laboratory Technician Program  
              Alexandria Technical College  
              Alexandria, Minnesota
- 1988        Chair — Accreditation Site Visit Team  
              Medical Technology Program  
              National College of Education  
              Evanston, Illinois
- 1985        Chair — Accreditation Site Visit Team  
              Medical Technology Program  
              Bowling Green State University  
              Bowling Green, Ohio
- 1983        Member — Accreditation Site Visit Team  
              Medical Technology Program  
              State University of New York at Syracuse  
              Syracuse, New York
- 1981        Chair — Accreditation Site Visit Team  
              Medical Technology Program  
              Utica College of Syracuse University  
              Utica, New York
- 1981        Chair — Accreditation Site Visit Team  
              Medical Laboratory Technician Program  
              Eastern Kentucky University  
              Richmond, Kentucky
- 1981        Self-Study Critique  
              Medical Technology and Medical Laboratory Technician Programs  
              University of Vermont  
              Burlington, Vermont

- 1980      Chair — Accreditation Site Visit Team  
            Medical Technology Program  
            University of Tennessee  
            Memphis, Tennessee
- 1979      Self-Study Critique  
            Curriculum in Medical Laboratory Sciences  
            University of Illinois at the Medical Center  
            Chicago, Illinois
- 1978      Chair — Accreditation Site Visit Team  
            Medical Technology Program  
            University of Kentucky  
            Lexington, Kentucky
- 1977      Chair — Accreditation Site Visit Team  
            Medical Technology Program  
            Howard University  
            Washington, D.C.

#### PROFESSIONAL SOCIETIES:

American Society for Clinical Laboratory Sciences  
Central Michigan Association for Medical Technologists  
Michigan Association of Laboratory Science Educators  
Michigan Environmental Health Association  
Michigan Society for Clinical Laboratory Sciences  
National Environmental Health Association

#### PROFESSIONAL SOCIETY COMMITTEES

Michigan Society for Clinical Laboratory Sciences  
Past President 1992-1993  
President 1991-1992  
President Elect 1990-1991  
Board of Directors 1982-1984; 1987-Present  
Awards Committee Chair, 1982-1983  
Education Scientific Assembly Chair, 1982-1984

Michigan Association of Laboratory Science Educators  
Chair, 1987-1989

Medical Technology Internship Matching Program of Michigan  
Board of Directors, 1985-1987

American Society for Clinical Laboratory Sciences  
Region IV, Microbiology Scientific Assembly Chair, 1985  
Microbiology Scientific Assembly Nominations Committee, 1981  
Education Scientific Assembly Nominations Committee, 1979

North Carolina Society for Medical Technology  
Education Scientific Assembly Chair, 1979

PROFESSIONAL ACTIVITIES:

American Society for Clinical Laboratory Sciences  
National Meeting  
Information Exchange and Open Discussion for Educators  
Orlando, Florida  
Moderator 1985

American Society for Clinical Laboratory Sciences  
Region III Meeting  
Nashville, Tennessee  
Systemic Mycoses in the Southeast  
Moderator 1978

Student Bowl - Microbiology Judge  
New Jersey Society for Medical Technology, 1979  
North Carolina Society for Medical Technology, 1979  
American Society for Clinical Laboratory Sciences - Region II, 1978  
American Society for Clinical Laboratory Sciences, 1977-1980  
Alabama State Society for Medical Technology, 1976

North Carolina Society for Medical Technology  
Student Forum  
Health Careers Day  
Graduate Education in Medical Technology  
Spring 1979

American Society for Clinical Laboratory Sciences  
Education and Research Fund, Inc.  
Education Media Committee - Reviewer 1979

National Certification Agency for Medical Laboratory Personnel (NCAMLP)  
Evaluator of Microbiology and Immunology Questions 1978

American Society for Clinical Laboratory Sciences  
National Meeting  
Representative to the House of Delegates 1976, 1980, 1985, 1990, 1991, 1992

PROFESSIONAL MEETINGS ATTENDED:

Michigan Allied Health Administrators 1988-1989  
National Association of Women Deans, Administrators, and Counselors 1988  
Michigan Health Occupation Educators 1985, 1988  
American Society for Clinical Laboratory Sciences National Meetings 1974, 1976-1980, 1982-1985, 1990-1992  
Michigan Occupational Educators Association 1984  
Michigan Society for Clinical Laboratory Sciences 1980-1986, 1988-1993  
American Society of Allied Health Professions National Meeting 1979-1980, 1983  
North Carolina Society for Medical Technology 1977-1979  
Alabama Society for Medical Technology 1976  
Virginia Society for Medical Technology 1974-1975  
American Society for Clinical Laboratory Sciences, Region III 1978

## PRESENTATIONS:

- 1991 Central Michigan Association for Medical Technologists  
Mt. Pleasant, Michigan  
Perspectives on Medical Technology Education
- 1986 Phi Delta Kappa  
Big Rapids, Michigan  
AIDS: Current Information and Implications for Schools
- 1981 Vocational Technical Education Conference  
Ferris State University  
Big Rapids, Michigan  
Identifying and Eliminating Dental Clinic Health Hazards
- 1979 New Jersey Society for Medical Technology Spring Meeting  
Cherry Hill, New Jersey  
Rocky Mountain Spotted Fever - Do You Know How To Spot It?  
Anaerobic Bacteriology — How To Begin
- 1979 Northwest Area Health Education Center  
Winston Salem, North Carolina  
Legionnaires' Disease
- 1979 Eastern Area Health Education Center  
Elizabeth City, North Carolina  
Legionnaires' Disease
- 1979 Eastern Area Health Education Center  
Goldsboro, North Carolina  
Legionnaires' Disease
- 1979 Eastern Area Health Education Center  
New Bern, North Carolina  
Legionnaires' Disease
- 1978 Greensboro Area Health Education Center  
Greensboro, North Carolina  
Legionnaires' Disease
- 1978 North Carolina Society for Medical Technology  
Fall Seminar  
Durham, North Carolina  
Legionnaires' Disease
- 1978 Central Jersey Chapter of the New Jersey Society for  
Medical Technology  
Annual Winter Seminar  
Cherry Hill, New Jersey  
How to Select a Professional Society and What It Should Offer  
An Internal Quality Control Program for Microbiology
- 1978 Charlotte Area Health Education Center  
Charlotte, North Carolina  
Workshop - Anaerobic Bacteriology

- 1977 American Society for Clinical Laboratory Sciences National Meeting,  
Atlanta, Georgia  
Symposium - Educational Methodologies in Clinical Microbiology  
Practicum Instruction in Clinical Microbiology
- 1976 Alabama State Society for Medical Technology State Meeting,  
Birmingham, Alabama  
Workshop — Comparative Analysis of Rapid Methods of Identification of Enteric  
Organisms
- 1976 Veterans Administration Southeastern Regional Medical Education Center  
Birmingham, Alabama  
Workshop — Comparative Analysis of Rapid Methods of Identification of Enteric  
Organisms
- 1974 American Society for Microbiology National Meeting  
Chicago, Illinois  
Quantitation of Lymphocytic Choriomeningitis  
Virus and Serum-Neutralizing Antibodies by Immunofluorescent Cell Counting
- 1973 American Society for Microbiology, Allegheny Branch  
Regional Meeting  
Morgantown, West Virginia  
Assay of Lymphocytic Choriomeningitis Virus by Immunofluorescent Cell  
Counting

## CONTINUING EDUCATION — PARTICIPANT

- 1995 Michigan Safety Conference  
Lansing, Michigan
- 1991 National Clinical Laboratory Educators' Conference  
Grand Rapids, Michigan
- 1989 Connections  
Joint Conference of the American Association of Women  
in Community Colleges and the Michigan Association of  
Women Deans, Administrators, and Counselors  
Battle Creek, Michigan
- 1988 AIDS and Its Ramifications  
Central Michigan Association for Medical Technologists  
Mt. Pleasant, Michigan  
Trends in Occupational Studies  
Michigan Community College Educators  
Traverse City, Michigan
- 1987 Management Development Retreat  
Ferris State University  
Grant-Winning Techniques, David G. Bauer  
Oakland University  
Rochester, Michigan

The Accreditation Process Using the 1986 Essentials — Workshop  
National Accrediting Agency for Clinical Laboratory Sciences  
Framingham, Massachusetts

Clinical Laboratory Educators' Forum  
Indianapolis, Indiana

1986 Power Communication Skills for Women  
Grand Rapids, Michigan

Political Action Workshop  
Michigan Society for Clinical Laboratory Sciences  
Lansing, Michigan

Management Development Retreat  
Ferris State University

Clinical Laboratory Educators' Forum  
Birmingham, Alabama

1985 Management Development Retreat  
Ferris State University

Be Prepared: Staffing the Clinical Laboratory Today and Tomorrow  
American Hospital Association  
Chicago, Illinois

Conflict Management Workshop  
Ferris State University

The Future of Clinical Laboratory Science — A Crisis in Education  
Minneapolis, Minnesota

Who Develops the Study Habits?  
Group Instruction as Effective as Tutoring  
Medical Technology Educators' Meeting — Lansing

1984 DRGs — Your Interest Areas — Workshop  
Ferris State University

Legal Implication of Clinical Instruction — Workshop  
Department of Health Careers  
Lansing Community College

Program Evaluation: A Survival Tool Workshop  
American Society for Clinical Laboratory Sciences Region IV Meeting

Improving Teaching Skills Workshop  
U.S. Department of Health and Human Services  
Public Health Service, Centers for Disease Control  
Grand Rapids, Michigan

1983 Strategic Planning for Allied Health Managers  
Legal Concerns for Allied Health Educational Institutions:  
Student Admissions, Faculty Liability and Risk Management  
American Society of Allied Health Professions, National Meeting

- 1982            Coagulation — Update and Review  
Central Michigan Association of Medical Technologists  
Mt. Pleasant, Michigan
- 1981            Effective Bench Instruction — Workshop  
Michigan Society for Clinical Laboratory Sciences Spring Meeting
- Life, Death, and Transition  
Elizabeth Kubler-Ross, M.D.  
Ferris State University  
Big Rapids, Michigan
- The Medical Laboratory Worker and the Law  
Blodgett Memorial Medical Center  
Grand Rapids, Michigan
- 1980            Role of the Microbiology Laboratory in Bacterial Identification  
Saint Mary's Hospital  
Grand Rapids, Michigan
- Rapid Methods in Microbiology  
Saint Mary's Hospital  
Grand Rapids, Michigan
- 1979            Laboratory Procedures in Parasitology  
School of Health Sciences  
Grand Valley State University  
Allendale, Michigan
- 1978            Developmental Management Advancement Program — Course  
Department of Medical Allied Health Professions  
University of North Carolina at Chapel Hill
- Clinical Instruction — Workshop  
Durham, North Carolina
- 1977            Small Group Instruction — Workshop  
Office of Medical Studies, School of Medicine  
University of North Carolina at Chapel Hill
- Site Visit Surveyor Training Workshop  
National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)  
Atlanta, Georgia

#### AWARDS:

Omicron Sigma Service Award  
American Society for Clinical Laboratory Sciences 1983, 1984, 1990-1992

Tanner Distinguished Teaching Award  
University of North Carolina at Chapel Hill  
Finalist 1979

**PUBLICATIONS:**

Webster, Janice M., and B. E. Kirk. 1974  
Immunofluorescent cell-counting assay for lymphocytic  
choriomeningitis virus. *Infec. Immunity*. 28: 17-21.

Webster, Janice M., and B. E. Kirk. 1974  
Neutralizing antibody response of guinea pigs to lymphocytic  
choriomeningitis virus. *Infec. Immunity*. 10: 516-519.

Webster, Janice M., and B. E. Kirk. 1974  
Quantitation of lymphocytic choriomeningitis virus and serum-  
neutralizing antibodies by immunofluorescent cell counting.  
*Bacteriological Abstracts*. American Society for Microbiology.

**GRANT:**

1996- For Industrial and Environmental Health Management Program to develop Health and  
Safety Specialist Certification Program for UAW-Chrysler Employees - Ongoing grant

1995-96 For Industrial and Environmental Health Management Program to develop Health and  
Safety Training Course for UAW-Chrysler Employees - \$211,225



## Kevin Besey

512 Chestnut St.  
Big Rapids, Michigan 49307

616-796-2523

### Education

- 1987 **Masters in Public Administration, Western Michigan University.** Specialized in health care administration. Graduated with a 3.59 grade point average. Completed while working full time.
- 1977 **Bachelor of Science in Environmental Health, Ferris State College.** Graduated from general environmental health option with a 3.53 grade point average.

### Positions Held

- 8/97 to Current **Assistant Professor, Ferris State University.** Teach courses in the Industrial and Environmental Health Management Program in the College of Allied Health.
- 9/96 to 8/97 **Community Services Supervisor, Barry-Eaton District Health Department.** I supervised the Barry County office in Hastings, Michigan. Through a staff of six, I administered programs district-wide in: food service sanitation, communicable disease investigation, childhood lead poisoning, radon, swimming pools, campgrounds, children's camps and mobile home parks.
- 1987 to Current **Private Consultant.** Provide a broad array of services including: food service sanitation, asbestos, safety, water supply, sewage disposal, ventilation, noise and lighting. During the summer of 1996, I had the opportunity to work as a full time consultant. I often sub-contracted with another consulting firm, working on asbestos surveys, asbestos removal project monitoring and lead paint surveys of homes.
- 12/90 to 6/96 **Director of Environmental Health, Jackson County Health Department.** Managed a wide variety of programs and services delivered to Jackson County residents. Responsible for personnel management, budget preparation and administration, program planning, media relations and customer service. Major program service areas included: groundwater, sewage disposal, certified water testing laboratory, food sanitation and hazardous waste disposal. Division had a staff of fourteen and a budget of approximately \$500,000. Routinely made presentations.

## **Kevin Besey**

1983 to 1990

**Environmental Specialist, University of Michigan, Occupational Safety and Environmental Health Department.** Staff specialist for environmentally related programs. Managed in-house pest control services for 80% of campus buildings from 1988-1990, supervising a staff of four. Broad experience in areas of food service sanitation, industrial hygiene, asbestos, safety, hazardous waste, indoor air quality and bio-hazards. Guest lectured to nursing students on environmental health. Conducted several food sanitation training courses per year.

1978 to 1983

**Sanitarian II, Jackson County Health Department.** Provided field services in almost all the division's programs during my employment.

1977 to 1978

**Safety Engineer, Home Insurance Company, Grand Rapids, Michigan.** Inspected insured facilities throughout Michigan for hazards related to employee safety, fire safety and burglary. Evaluated potential problems related to general and product liability.

### **Professional Organizations**

Michigan Environmental Health Association.

### **Computer Skills**

Proficient in Word, Word Perfect, Foxpro, Powerpoint, Atlas and C-Map geographic information systems and a variety of other software. Regularly use word processing and database programs. Extensive experience in data system design. Chairman of the data management committee of the Environmental Health Forum of the Michigan Association for Local Public Health in 1994. Knowledgeable in use of presentation programs to enhance lectures, training and presentations.

### **Licenses and Certificates**

Registered Sanitarian in State of Michigan since 1981.

"Serve Safe" Food Service Sanitation Course completed 1997.

Certified Pesticide Applicator, 1982-1992.

### **Productions**

In 1993 I co-produced a professionally made fourteen minute video on environmental health for the Environmental Health Forum of the Michigan Association for Local Public Health. The video has been sold nationwide.

### **Teaching**

Taught Ferris State University extension course in epidemiology and statistics in 1992.

**MICHAEL D. ELLS, R.S., M.S., D.A.A.S.**

**HOME ADDRESS**            505 Ives Avenue  
Big Rapids, MI 49307-2033  
616.796.3307

**OFFICE ADDRESS**        Ferris State University  
College of Allied Health Sciences  
Industrial & Environmental Health Management  
200 Ferris Drive, VFS 418  
Big Rapids, MI 49307-2740  
Telephone 616.592.2295  
FAX 616.592.3788  
email: MELTS@ALH01.FERRIS.EDU

**EDUCATION**

Michigan State University, East Lansing, MI, 1981-1983, Ph.D. Courses,  
Vocational-Technical Education  
Harvard School of Public Health, Boston, MA, 1973, Post Graduate Fellowship,  
National Science Foundation  
University of Hawai'i, Honolulu, HI, 1971, M.S. Public Health  
Washington State University, Pullman, WA, 1967, B.S. Bacteriology and  
Public Health

**ADMINISTRATIVE EXPERIENCE**

July 1983-June 1986, Acting Program Director, Industrial and Environmental Health  
Management, Ferris State University  
April 1982-June 1983, Acting Department Head, Environmental Quality Programs,  
Ferris State University

**TEACHING EXPERIENCE**

May, 1977 - Present, Associate Professor, Industrial and Environmental Health  
Management, Ferris State University  
August, 1971-May, 1977, Assistant Professor, Department of Environmental Quality  
Programs, Ferris State University

**PROFESSIONAL EXPERIENCE**

1967-1970    District Sanitarian and Staff Bacteriologist, Grays Harbor-Pacific Health  
District, Aberdeen, WA  
1963-1965    Chemical Analyst, Chemical Technologist, N Reactor, Hanford Atomic  
Products Operation, General Electric Company, Richland, WA

## REGISTRATION

Registered Sanitarian, State of Michigan (#801)  
 Registered Sanitarian, National Environmental Health Association (#70508)  
 Registered Sanitarian (Sunset), State of Washington (#304)

## PROFESSIONAL ASSOCIATIONS

Michigan Environmental Health Association 1971 - Present  
 National Environmental Health Association 1969 - Present  
 Diplomate, American Academy of Sanitarians (#375) 1986 - Present

## NATIONAL OFFICES AND COMMITTEE MEMBERSHIPS

1990-1992 Member, National Council for the Accreditation of Environmental Health Science and Protection Curricula  
 1983-1985 National Advisor, Student National Environmental Health Association  
 1976-1981 National Advisor, Student National Environmental Health Association  
 1979-1981 President, Epsilon Nu Eta, National Environmental Health Honor Society  
 1976 Vice-Chairman and Program Coordinator, Injury Prevention and Occupational Health Section, NEHA  
 1976 Co-Chairman, Occupational Health Committee, NEHA

## RESEARCH

1995: "The Impact of Human Waste Disposal Practices on Surface Water Runoff from the Muir Snowfield on Mount Rainier: A Human Waste Flowpath Study," Mount Rainier National Park, Ashford, Washington  
 1972-1994: Directed or participated in Environmental Assessments conducted through the FSU Environmental Management Studies Center.  
 1971: Completed a four-month study concerning the levels of Total Coliform, Fecal Coliform, and Fecal Streptococcus organisms in Kapalama Canal, Oahu, Hawaii. An attempt was also made to determine whether the organism Pseudomonas aeruginosa could be used as an indicator of human fecal contamination.

## COLLEGE APPOINTMENTS

1997 Chair, IEHM Program Academic Program Review Panel  
 1997 Chair, IEHM Program Self Study for Re-Accreditation  
 1990 - Present Member, FSU Nature Preserve Committee  
 1994-1996 Member, College of Allied Health, Recruiting and Retention Committee  
 1987-1990 Member, FSU Long Range Strategic Planning Committee  
 1985-1986 Member, FSU Master Plan Committee  
 1980 Chair, All College Sabbatical Leave Committee  
 1971-1976 Student Health Advisory Committee, 1975-76 Chair  
 1975-1979 Member, Representative Faculty Advisory Council (RFAC)

- 1977-1979 Vice-Chair of RFAC  
 1974-1975 Member, Representative Faculty Advisory Council, Distinguished Faculty Award, Selection Committee

## STUDENT ORGANIZATIONS

- 1971- Present: Faculty Advisor to the Ferris Industrial and Environmental Health Association, a chapter of the Student National Environmental Health Association. **FIEHA** has been recognized as the Outstanding Student Affiliate of the SNEHA for 10 of the last 22 years (1975-1997)

## FRATERNAL MEMBERSHIPS

- Omicron Delta Kappa, National Leadership Honor Society  
 Iota Lambda Sigma, National Vocational-Technical Education Honor Society

## OTHER MEMBERSHIPS

- 1993 - Present: Trout Unlimited, West Michigan Chapter  
 1993 - Present: Ducks Unlimited, Big Rapids Chapter  
 1994 - Present: Big Rapids Good Neighbors Association

## COMMUNITY ACTIVITIES

- 1995-Present Cooperator/Sounding Board for Big Rapids City Manager and the city's engineering firm in the matter of the removal of the remnants of a power dam on the Muskegon River.  
 1996-Present Member of Mecosta County Cooperative Extension Service, Watershed Team.  
 1985-1987 Chair, Board of Trustees, Mecosta County General Hospital  
 1979-1987 Member, Mecosta County General Hospital, Board of Trustees  
 1978-1987 Assistant Scoutmaster, Troop 114, Boy Scouts of America  
 1976-1978 President, Riverview Elementary School, Parent-Teacher Organization  
 1973-1974 Member, Council of Consultants, Center of Environmental Studies, Grand Rapids, MI

## PUBLICATIONS

- Ells, Michael D. Impact of Human Waste Disposal on Surface Water Runoff, The Muir Snowfield, Mount Rainier. Journal of Environmental Health. Vol. 59, No. 8. April, 1997.  
 Ells, Michael D. Life Doesn't Begin at 40. It Begins at 5,420! The Insider. Vol. 1, No. 1. Ferris State University. May, 1996  
 Ells, Michael D. The Impact of Human Waste Disposal Practices on Surface Water Runoff from the Muir Snowfield on Mount Rainier: A Human Waste Flowpath Study. Mount Rainier National Park, Ashford, Washington. April, 1995.

- Ells, Michael D. Environmental Radiation (External Degree course Modules). FSU Copy Center. 1988.
- Ells, Michael D. Stewart, David A. and Hartley, Frank, A. Microbial Ecology Laboratory Manual. FSU Copy Center. Copyright 1987.
- Johnson, Jerry M. Ph.D., Ells, Michael D. and Young, Reginald, H.F., Ph.D. Bacterial Indicators in Kapalama Canal, Oahu, Hawaii. Technical Report No. 37. Water Resources Research Center. University of Hawaii. Honolulu, HI. 1972
- "A System Approach to Allied Health Education." (8 volumes); appendix 41, Competency Curriculum for Environmental Sanitarian Assistant, Unit I, Module 9, 10; Unit VIII, Modules 1-4; Unit IX, Modules 1-2; Unit XIV, Modules 1-5. Technomics, Inc. 2936 Chain Bridge Road, Oakton, VA. 1974.
- Allen, Robert W. Ells, Michael D. Hart, Andrew, W. Industrial Hygiene. Prentice-Hall, Inc. 1976. (Industrial Hygiene Textbook).

## ACADEMIC AWARDS

- May, 1982, Ferris State University, Distinguished Teacher of the Year  
 May, 1981, Finalist, Distinguished Teacher of the Year

## OTHER AWARDS

- March 1997: Recipient of the C. R. Evenson Award from the West Michigan Chapter of Trout Unlimited in recognition for my "Contributions Towards Preserving the Environment."
- Summer 1992, 1993: Selected for attendance at the National Science Foundations Constructed Wetlands for Wastewater Treatment Faculty Enhancement Program at Colorado State University, Ft. Collins, CO
- Summer 1973: Recipient of a grant to attend the Summer Institute in Environmental Health at the Harvard School of Public Health, Boston, MA
- 1965: N Reactor Department Safety Alertness Award and three Safety Suggestion Awards, General Electric Company, Richland, WA

## MAJOR ACCOMPLISHMENTS

- Initiated the First in a Series of Projects relating to Human Waste Impacts from Climbers in High Altitude Environments in Mount Rainier National Park.
- Directed or Participated in more than 20 Community and Environmental Assessments in the Mecosta-Osceola County Area.
- Appointed to the Michigan Department of Natural Resources "Rule 62 Committee" which promulgated the new E. coli surface water quality standard (1988-90).
- Developed a restructured, combined curriculum in Industrial and Environmental Health Management, 1982-1986.
- Established a major student recruiting initiative. Halted enrollment decline, as the enrollment grew from 30 to 180 students, 1982-1986.
- Initiated the use of computers and software in courses in the curriculum in the IEHM 403 Air Pollution course.

Honored by 400 colleagues as FSU Distinguished Teacher, 1982.

Initiated use of computer programs in classroom/laboratory teaching in the Environmental Health Curriculum, 1979.

Developed the Occupational Safety and Health B.S. Degree Curriculum, the first degree offered by two colleges within the University, 1977.

Developed Occupational Health Option to the Environmental Health B.S. Degree Curriculum, 1975.

Initiated use of videotape review of oral internship presentations, 1972.

## REFERENCES ON REQUEST

# **Bradley S. McCormick, M.A., C.H.C.M.**

**CURRENT TITLE AND DATE OF APPOINTMENT:** Associate Professor, September, 1985

**TITLE AND DATE OF INITIAL APPOINTMENT:** Assistant Professor, September, 1980

**NATURE OF APPOINTMENT:** Full-time, Salaried

## **EDUCATION:**

1982                      Central Michigan University  
M.A. Degree - Educational Administration

1977                      State University of New York at Buffalo  
B.S. Cum Laude  
Health Sciences Education and Evaluation

1974                      New York City Community College  
A.A.S. Honors  
Dental Laboratory Technology

## **EMPLOYMENT EXPERIENCE:**

1985-present            Associate Professor  
Industrial & Environmental Health Management  
Ferris State University, College of Allied Health Sciences  
Big Rapids, Michigan

1995-present            Adjunct Faculty, Masters level Central Michigan University

1993-present            OWNER - Safety Consultants, Private Business

1980-1985                Assistant Professor - Ferris State College

1984-1988                Consultant to P.T.L. Computer Systems, Inc.

1979-1980                Instructor - Dental Laboratory Technology  
Lake Area Vocational-Technical Institute  
Watertown, South Dakota

1975-1979                Instructor - Dental Laboratory Technology  
Union County Technical Institute  
Scotch Plains, New Jersey

1976-1979                Counselor - Continuing Education  
Union County Technical Institute  
Scotch Plains, New Jersey



## **EMPLOYMENT EXPERIENCE: (continued)**

1977-1979	Consultant - Dental Laboratory Education Thomas Edison College New Jersey
1974-1975	Dental Technician
1972-1974	Mechanist, Punch Press Equipment and Repair Brooklyn, New York
1971-1972	Dental Technician Weichert Laboratory Freeport, New York
1971	Dental Technician Professional Dental Laboratories Denver, Colorado
1968-1971	U.S. Army - Equipment Repair
1966-1968 1965 Summer	Dental Technician Wiechert Laboratory Freeport, New York

## **CLINICS/SPEAKING ENGAGEMENTS:**

1984	Coordinator/Instructor, Workshop on Computers
1985	Presentation to the A.A.D.S. on Computers in Education
1985	Panel Member, Computer Symposium MACDL Spring Meeting
1985	Coordinator/Instructor, Workshop on Computers
1986	Presentation: Table Clinic "Computerized Inventory Control System"
1987	Coordinator/Instructor, week long seminar for Hygienic Corporation.
1992-present	Michigan "Right to Know" Law
1994-present	Bloodborne Pathogens

## **COLLEGE COMMITTEE - RESAFETY**

1989-1991	Health/Safety Committee
1992-1997	Health/Safety Committee, Chair

## **CERTIFICATION:**

Certified Hazard Control Manager (Master): Hazard Control Manager Certification Board

Certificate in Environmental Health and Safety Law: Institute for Applied Management Law

OSHA 501 Trainer for 10 Hour and 30 Hour Voluntary Compliance in Safety and Health, OSHA Training Institute

OSHA 521 course Voluntary Compliance in the Industrial Hygiene Area, OSHA Training Institute

Hazwoper 40 Hour Course and Recertification

Hazwoper 8 Hour Supervisor Course

Certificate: Confined Space Entry Supervisor, Eastern Michigan University/MIOSHA

Certificate: Confined Space Rescue, Eastern Michigan University/MIOSHA

Certified Trainer: Powered Industrial Truck, Kalamazoo Valley Community College

Certified Dental Technician: National Board of Certification

## **PROFESSIONAL ORGANIZATIONS:**

American Society of Safety Engineers (ASSE)

National Safety Management Society

## **INDUSTRIAL EXPERIENCE RELATIVE TO SAFETY**

1995-present Senior Consultant: UAW-Chrysler - Safety Training

1994-1995 Consulting: Senior Investigator, Lockout and Confined Space and training, Foundry

1994 Consulting Senior investigator confined space and training, Manufacture

1994 Consulting Senior Investigator Lead training, abatement, Construction Firm

1994 Consulting: Senior Investigator confined space, Manufacture

1993 3 months Steelcase - Safety Department

1982-1988 Owner - Precision Cast Lab  
Custom Stainless steel parts-casting, finishing, polishing,

1972-1974 Mechanist, Punch Press Equipment and Repair

1968-1971 U.S. Army - Communication Equipment Repair

## *Curriculum Vitae*

### **Gary Rodabaugh, Ph.D., Professor, C.H.M.M. (Master)**

**Home Address** 15250 92nd Avenue  
Rodney, Michigan 49342

**Telephone** FSU Office: (616) 592-2308  
FSU FAX (616) 592-3788  
Home: (616) 972-2831  
EEAS Office (616) 972-4779 [FAX/Phone]

**Education** Doctor of Philosophy, 1987  
Program: Environmental Protection  
Michigan State University

Master of Science, 1981  
Program: Pollution Ecology/Biology  
Eastern Michigan University

Bachelor of Arts, 1976  
Program: Biology  
University of Michigan

**Heritage** Native American

**Present Position** Ferris State University  
Academic Rank: Professor - Hazard Waste Management  
Professor - Industrial Hygiene  
Professor - Industrial Safety  
Program: Industrial and Environmental Health Management  
VFS 300B, Big Rapids, Michigan 49307

**Certifications** Certified Hazardous Materials Manager at the Master Level (#539)

#### **Specialization and Areas of Interest**

Environmental law and regulatory compliance efforts; Phase 1 Environmental Site Assessments, indoor air quality, hazardous waste minimization; OSHA law and compliance efforts; RCRA, CERCLA, SARA, TSCA interpretation and compliance; OSHA Hazard Communication Standard compliance; ergonomics program development, ergonomic redesign; development of hazardous materials management strategies for PCB, groundwater contamination, wetlands activities, radiation safety, regulatory agency liaison; expert witness activities; occupational and environmental consulting as owner of Expert Environmental Assessment Services, industrial training.

### **Present & Past Positions**

- 1986 - Present      Ferris State University  
Position: Tenured Full Professor of Hazardous Waste Management,  
Industrial Safety, and Industrial Hygiene
- 1991 - Present      Expert Environmental Assessment Services [EEAS]  
Position: Owner & CEO
- 1984 - 1986          General Motors Corporation  
Position: Senior Environmental Specialist (Level 7)
- 1983 - 1984          General Motors Corporate Fellowship Scholarship at Michigan State  
University
- 1982 - 1983          General Motors Corporation  
Position: Environmental Specialist (Level 6)
- 1980 - 1982          General Motors Corporation  
Position: Associate Chemist (Level 5)

### **Awards and Accomplishments**

- Awarded academic tenure [1991]
- Promoted to Full Professor of Hazardous Waste Management, Industrial Hygiene,  
and Industrial Safety [1989]
- Nominated for Teacher of the Year award [1990, 1991]
- General Motors Corporate Fellowship award - [1983]
- Captain's Certificate of Meritorious Service, South Dakota State Police [1980]
- Listed in Who's Who in America [1985 through 1990]
- Listed in Who's Who in Environmental Activities [1992]
- Appointed to General Motors Divisional Task Force on Hazardous Materials  
Control Activities [1986]
- Nominated for service on Michigan Hazardous Waste Site Review Board [1989]
- Developed OSHA mandated 40 hour HAZWOPER training course [1990]
- Developed new courses in Hazardous Waste Law and Ergonomics [1990]
- Member: Michigan Department of Education Task Force on Occupational Education  
[1992]

### **Professional Societies**

- Michigan Association of Environmental Professionals
- Air and Waste Management Association
- American Society for Testing and Materials

## Publications

- *Act 201, Michigans Version of CERCLA*. Presented in New Orleans at the 1996 National Meeting of the Certified Hazardous Materials Managers.
- *Occupational Lead Exposure; OSHA's New Zero Tolerance Standard*. Summer Regional Meeting of the Michigan Chapter of the Air and Waste Management Association, June 1994.
- *Covenants Not to Sue*. Quarterly Newsletter of the Michigan Chapter of the Air and Waste Management Association. February 1994.
- *Changes in Michigan Environmental Law Through Compilation by the Michigan Environmental Code Commission*. Quarterly Newsletter of the Michigan Chapter of the Air and Waste Management Association. February 1994.
- *Handbook of Hazard Control* - Commissioned by the Board of Hazard Control, this textbook is designed to serve as a reference guide for those individuals interested in becoming a Certified Hazard Control Manager [unpublished].
- *The New ASTM Standard for Conducting Phase 1 Environmental Site Assessments* - Academy of Certified Hazardous Materials Managers - Proceedings of the August 1993 National Meeting in Seattle, Washington.
- *Voluntary Exposure to Hazardous Chemicals in Michigan Anglers Utilizing Contaminated Waters* - University Microfilm Publications, Ann Arbor, Michigan, August 1987.
- *Bioaccumulation and Competitive Uptake of Polychlorinated Biphenyls in Select Aquatic Organisms* - American Academy of Sciences, Michigan Division, April 1981.

## Textbooks in Progress

- *Hazardous Waste Management* - Publisher not yet selected. A textbook designed for introductory level courses in hazardous materials and hazardous waste management. The format of the text will center on instructing the reader in the methods of locating and interpreting the continuous changes in this field. It will be published in a paperback format to make it marketable and affordable for introductory level courses.
- *Hazardous Waste Operations Training Manual* - Publisher not yet selected. A textbook designed for individuals enrolled in a course of study to comply with the HAZWOPER occupational safety and health regulations.

## **Major Professional Projects and Experiences**

Author of major training manuals and programs in occupational health, safety, PPE, laws, regulations, ergonomics, indoor air quality, training techniques, and other topics for UAW-Chrysler [1996].

Assisted in the development and national press release of an Ergonomic Stress Reliever in association with KLAI Enterprises [1995].

Successful in de-listing a site of environmental contamination from the Michigan Act 307 Listing of Contaminated Sites [1992]. This site is the 17th de-listing from a list containing over 9,000 sites.

Conducted a detailed evaluation of indoor air quality complaints at the Mecosta County Courthouse. Recommendations are presently under review by the Mecosta County Board of Commissioners [1992].

Completion of Michigan Act 293 Reports for local industry.

Development and administration of OSHA Hazard Communication program for 5000 employees at a medium size General Motors facility.

Multiple Projects in: Ergonomic re-design and employee training related to ergonomics, noise, air quality, back safety, respiratory protection, and waste water treatment operations for a local industry. As a result of the re-design and training, the facility attained a 60% reduction in recordable injuries within 90 days of completion of the project.

Developed and presented new courses in, HAZWOPER, Hazardous Waste Law, and Ergonomics.

Conducted a peer review of the new Hazardous Waste Management (Masters) degree at Wayne State University.

Received over \$18,000 in suggestion awards within 4 years at General Motors.

Developed SPCC, PIPP, and Contingency plans required by various environmental regulations.

Successfully acted as expert witness in a variety of occupational and environmental litigations.

Coordinated precautionary removal, storage, and disposal of over 500,000 pounds of Polychlorinated Biphenyls from capacitors and transformers.

Conducted record searches and evaluated response plans for 11 Potentially Responsible Party actions under the Comprehensive Environmental Response, Compensation, and Liability Act.

Dr. Rodabaugh - Page 5

### **Committees and Offices Held**

- Chairman - Hazardous Materials Control Committee (GM)
- Chairman - Occupational Health and Safety Committee (FSU)
- Secretary - Regional Solid Waste Management Committee (GM)
- Radiation Safety Officer (GM)
- Coordinator - Pollution Emergency Response Team (GM)
- Member - Michigan Department of Education Task Force on Occupational Education
- Member - Divisional Hazardous Waste Task Force (GM)
- Member - Radiation Safety Committee (FSU)
- Member - Regional Solid Waste Management Plan Review Committee for Mecosta County
- Member - Graduate Programs Review Council (FSU)
- Member - Mecosta County Cooperative Extension Service Advisory Board
- Member - Editorial Review Board for *Journal of Environmental Engineering and Management*

### **Courses Taught At Ferris State University**

- IEHM 208 - Solid Waste Management
- IEHM 222 - Industrial Fire Prevention & Control
- IEHM 231 - Mechanical Safety
- IEHM 322 - Accident Investigation & Reporting
- IEHM 330 - OSHA Laws & Regulations
- IEHM 332 - Industrial Hygiene & Ergonomics
- IEHM 335 - Air Sampling & Analysis
- IEHM 340 - Hazardous Waste Law
- IEHM 412 - Industrial Ventilation
- IEHM 416 - Noise & Vibration
- IEHM 430 - Hazardous Waste Management

### **Graduate Courses for Wayne State University**

- CHE 554 - Hazardous Waste Law
- CHE 555, 556 Environmental Auditing I & II

### **Undergraduate Courses under Development**

- IEHM 44?- OSHA Certificates
- IEHM 44? - Environmental Sampling and Project Design
- IEHM 44? - Hazardous Materials Management

**Lori A. Seiler, CIH**  
**2580 West Deerfield Road**  
**Mt. Pleasant, MI 48858**  
**(517) 773-4259**

**EDUCATION:** University of Massachusetts, Amherst, MA.  
MS in Environmental Health, emphasis in Industrial Hygiene,  
September 1988.

Colgate University, Hamilton, NY.  
BA in Biology, May 1985.

**CERTIFICATIONS:** CIH, Certified Industrial Hygienist in comprehensive practice, 1992

**PROFESSIONAL EXPERIENCE:**

***Associate Professor/Program Coordinator***, Ferris State University, Big Rapids, MI.  
(September 1992 to Present) Responsible for teaching industrial hygiene courses in the Industrial and Environmental Health Management Program and working as Education Program Coordinator. Courses taught include: Industrial Hygiene & Ergonomics, Toxicology, Noise & Vibration, Industrial Ventilation, Air Sampling & Analysis, and OSHA Law. Responsibilities also include course scheduling, student internship supervision, and managing new student contacts, including transcript evaluations.

- Currently developing courses to be part of a 240-hour Health and Safety Certification Program given by Ferris State University for UAW-Chrysler Health and Safety Representatives. Courses include: Hazard Identification, Air Sampling, Noise & Noise Sampling, Heat & Cold Stress, Hazard Communication, Control Strategies, and Respiratory Protection.
- Developed and presented a 40-hour basic health and safety training program for UAW-Chrysler apprentices.

***President***, Seiler & Associates Inc., Mt. Pleasant, MI (September 1993 -Present)  
Provide comprehensive industrial hygiene consulting services on a contractual basis. Services include hazard assessments, air sampling, noise monitoring, ventilation system surveys, employee training, and program development.

- Conduct training courses for clients in the following topic areas: Respiratory Protection, Hazard Communication, Hearing Conservation, Ergonomics, New Employee Health & Safety Orientation.



- Provide research and expert witness services to law firms handling occupational health litigation.
- Developed a nationwide Beryllium Consultant Network for a large Midwestern beryllium producer. Project included development and presentation of beryllium-related health and safety information to a group of certified industrial hygienists, selection of qualified participants, and arrangement of technical meeting.
- Conducted various indoor air quality investigations for local school systems and community center. Work involved sampling, building inspections, and ventilation assessments.
- Conducted employee air and dermal exposure assessment to a fungicide used in the fruit packaging industry.

**Senior Industrial Hygienist**, Tosco Refining Company, Martinez, CA. (September 1990 - August 1992) Supervised an Industrial Hygiene Department consisting of three members. Responsibilities included development and management of industrial hygiene programs, air monitoring, personal protective equipment, radiation safety program, budgeting, interactions with regulatory agencies, process hazard reviews, MSDS development and employee training.

**Environmental Health & Safety Engineer**, Shipley Company, Inc., Newton, MA. (August 1988 -September 1990) Coordinated and implemented industrial hygiene, safety, and environmental programs at a specialty chemical company's research and development facility. Also conducted industrial hygiene surveys at other manufacturing sites. Job functions included environmental surveys, employee training, ventilation system evaluations, and process hazards review.

**Industrial Hygienist**, CLV Industries, Inc., Hanover, MA (June 1988 - August 1988) Conducted special industrial hygiene assignments on a contractual basis.

**Industrial Hygienist**, W.R. Grace Co., Lexington, MA. (May 1987 - September 1987) Conducted surveys to evaluate worker exposures to asbestos, methylene chloride, total dust, and noise for 17 plants in 13 states. Performed respirator training and fit testing. Conducted safety walk-throughs for compliance with OSHA regulations. Prepared reports and submitted recommendations.

**Research Assistant**, Harvard School of Public Health, Boston, MA. (August 1985 - August 1986) Set up air monitoring equipment for residential indoor air quality study. Administered questionnaires and compiled database for a personal monitoring pilot study

## **PUBLICATIONS**

- "Hazard Communication: A Training Alternative", Semiconductor Safety Association Journal, November, 1990.
- "Using Low-Velocity Air Patterns to Improve the Operator's Environment at Industrial Work Stations", ASHRAE Transactions, June 1990 Industrial Ventilation Symposium.
- "Chemical Risk Assessment Long and Short Term Strategies", Semiconductor Safety Association Journal, September, 1989.

## **CONTINUING EDUCATION**

- Beryllium Consultant Network-Technical Meeting, Washington DC, May 1996
- American Industrial Hygiene Conference and Exhibition, attended 1987-1996
- Michigan Safety Conference, attended 1992 -1996
- Industrial Hygiene Product Stewardship, AIHA 1995.
- Chemical Protection: Practical Use in Hazardous Waste Operations and Emergency Response, AIHA, 1994
- Occupational Ergonomics, AIHA, 1994
- Specialty Sampling Methods, AIHA, 1993
- Noise Control Engineering, AIHA, 1993
- Toxicology of Petroleum Hydrocarbons, AIHA, 1991
- Radiation Safety, Radiation Detection Company, 1990

## **PROFESSIONAL SOCIETIES & ORGANIZATIONS**

- American Conference of Governmental Industrial Hygienists (ACGIH), member since 1986
- American Industrial Hygiene Association (AIHA), member since 1986
- AIHA Workplace Environmental Exposure Limit Committee (WEEL), member since 1992.
- Michigan Safety Conference - Industrial Hygiene Committee, member since 1995
- Western Michigan Industrial Hygiene Society, member since 1993

**Appendix Two:**

**Administrative Program Review Reports for 1995**

## ADMINISTRATIVE PROGRAM REVIEW

Program/Department: IEHM/Environmental Clinical Sciences

Date Submitted: October 18, 1996 Dean: Isabel J. Barnes

Please provide the following information:

### Enrollment/Personnel

	Fall 1992	Fall 1993	Fall 1994	Fall 1995	Fall 1996
Tenure Track FTE	3	4	4	4	4
Overload/Supplemental FTEF	0.8	0.51	0.41	0.41	
Adjunct/Clinical FTEF (unpaid)	50	50	50	50	50
Enrollment on-campus total*	157	136	115	110	88
Freshman		20	18	17	6
Sophomore		22	20	13	8
Junior		31	16	27	18
Senior		63	61	53	51
Pre-IEHM		2			3
TBD					5
Enrollment off-campus*	2	0	0	0	0

\*Use official count (7-day count for semesters, 5-day count for quarters).

### Financial

Expenditures*	FY92	FY93	FY94	FY95	FY96
Supply & Expense	\$16,049	\$23,604	\$21,108	\$18,205	\$21,011
Equipment**		10,364	8,489		
Gifts & Grants	10,366	4,819	2,418	4,264	1,326

\*Use end of fiscal year expenditures.

\*\*Does not include Voc-Ed and General Fund dollars.

### Other

	AY 91-92**	AY 92-93**	AY93-94	AY 94-95	AY 95-96
Number of Graduates * - Total	29	59	36	40	37
- On campus	29	59	36	39	36
- Off campus	0	0	0	1	1
Placement of Graduates	86%	73%	83%	76%	N/A
Average Salary	\$23,714	\$25,763	\$23,254	\$24,842	N/A
Productivity - Academic Year Average	1,252	813	451	335	357
- Summer	447	329	0	185	152
Summer Enrollment	63	66	69	70	56

\* Use total for academic year (F,W, S)

\*\* Represents productivity on quarter system.

## I. Strengths

- A. Faculty - Faculty are active and current in their professional areas. New tenure track faculty member starts in January 1997. Make good use of computers as an instructional tool.
- B. Students - Active student organizations.
- C. Curriculum - Review and revisions currently in progress.
- D. Facilities - not applicable
- E. Budget - S&E funding appears to be adequate for instructional needs.
- F. Other - Only accredited undergraduate program in the State.

## II. Concerns

- A. Faculty - Consulting activities should be monitored to assure that they do not detract from instruction. Common advising approach should be used across the program.
- B. Students - Enrollment has been continually decreasing since 1992. Student difficulty with math and chemistry is leading to increased attrition.
- C. Curriculum - Current design/implementation with numerous courses results in small class sizes which decrease productivity and increase cost.
- D. Facilities - not applicable
- E. Budget - Not eligible for Voc-Ed funds. Availability of current equipment is a problem.

## III. Future goals (including time frame)

- A. Faculty - Develop a student outcomes assessment plan by May 1997 and begin implementation in Fall 1997.
- B. Students - Increase the number of ethnic diversity of students by 15% by the year 2000 from the 1995 base year.
- C. Curriculum - Seek curriculum revision approval by May 1997 and implement Fall 1997.
- D. Facilities - not applicable
- E. Budget - Develop a 5-year plan for equipment upgrading by May 1997.
- F. Other - 90% of graduates will find employment in their field or enroll for further education. The advisory committee should meet at least once by May 1997.

## IV. Recommendations

- A. Faculty - Should make community college contacts to maximize the use of the community college articulation matrices. The recruiting plan for on-campus and high school students should be refined and new activities added.
- B. Students - Reasons for student attrition should be determined and appropriate actions to enhance retention should be implemented.
- C. Curriculum - The potential for credit certificates should continue to be explored.
- D. Facilities - not applicable
- E. Budget - not applicable
- F. Other - Alternative ways to present instruction (Internet, CD, etc.) should continue to be explored.

## V. Progress toward 1995-96 Recommendations and Goals

The apprentice health and safety training program for UAW-Chrysler was completed. The non-credit professional certification program for UAW-Chrysler was developed and initiated. The advisory committee has been identified, but has not met yet.