

Safety

Program Changes Based on Assessment

During the 2006-2007 academic year, the Safety Program faculty made a series of modifications to the Safety curriculum on the basis of survey data, feedback from alumni, employers, and a review of practice. The net result is that the curriculum provides a stronger preparation for practice and the curriculum is accreditable by the Applied Science Accreditation Commission of the Accreditation Board for Engineering and Technology (ASAC/ABET), the most rigorous accreditation standard for safety degree programs in the United States, and the accreditation held by all of our peer programs. In this section, the changes that were implemented are described. Following the section describing changes in the curriculum that were implemented 2006-2007, there are examples of other modification that have been made in individual courses to address other recommended changes.

Chemistry Sequence

Safety majors are now required to complete CHE 140/141 (an 8-hour sequence of general chemistry), rather than CHE 110/112 (a single 5-hour survey course). Organic chemistry (CHE 220) has been moved to a list of recommended electives. This change facilitates a minor in Environmental Health. Over several years, we've compared the performance of students in HSC 380 (*Fire Protection and Prevention*), a required Safety course, who have completed the CHE 110/112 series (*Fundamentals of Chemistry w/ lab*) vs. students who have completed CHE 140/141 (*General Chemistry*). The students with CHE140/141 perform consistently better in HSC 380. CHE 220 is not a prerequisite to any required Safety courses. Organic chemistry is not needed by Safety majors, except in certain industries, based on feedback from employers and alumni. Safety majors wishing to pursue a career in an industry that requires background in organic chemistry will be guided to that course by Program faculty and the Departmental Academic Advisor.

Human Anatomy and Physiology

Safety majors are now required to take KNR 182 (Human Anatomy and Physiology). A basic understanding of human anatomy and physiology will better prepare the student to understand the effects of toxic materials, impact of personal protective equipment, and heat stress on human performance. Note: KNR 182 has no prerequisites. This background will prepare the students for success in occupational health (HSC 248), industrial hygiene (HSC 359), and ergonomics (HSC 362). KNR 181 is listed as a recommended elective, and will be useful to students who wish to specialize in occupational ergonomics.

Required Safety Courses

The faculty have increased the number of safety courses which Safety majors are required to take, based on feedback from alumni and employers. Students are now required to complete the following additional courses: Ergonomics (HSC 362), Accident Investigation and Recordkeeping (HSC 372), Disaster Preparedness (HSC 378), and System Safety (HSC 385). Details appear below:

- *HSC 362 (Ergonomics)*: ergonomics is an important part of practice and ergonomics-related costs have considerable financial impact on employers.

- *HSC 372 (Accident/Incident Investigation and Recordkeeping)*: accident/ incident investigation and recordkeeping are routine responsibilities of the safety professional.
- *HSC 378 (Disaster Preparedness)*: comprehensive disaster management programs are receiving increased emphasis in the public/private sectors.
- *HSC 385 (System Safety)*: risk-based decision making and analysis of complex manufacturing systems to enhance safety, productivity and profitability are common duties of the safety professional.

Elective Safety Courses

Students now select two of the following three courses, on the basis of discussion with the academic advisor and program faculty: HSC 272, HSC 383, HSC 384. Twelve hours (HSC 362, 372, 378 and 385) from the previous list of electives are now required courses. The three remaining HSC courses (272 (*Construction Safety*), 383 (*Agricultural Safety and Health*) and 384 (*Hazardous Materials Regulation*)) represent professional specialization areas. Change in required electives from 12 hours (select 4 from a list of 8 courses) to 6 hours (select 2 from a list of 3 courses). A review of benchmark peer programs and feedback from alumni/employers supports this change.

- *HSC 272 (Construction Safety)*: the construction industry is attractive to many of our students who want a challenging and well-compensated career. Even if students do not choose to make a career in construction safety, they will likely have involvement with construction projects at their place of employment.
- *HSC383 (Agricultural Safety and Health)*: with its location in an area where agriculture is a major player, ISU was the first university in the US to develop a college-level course in agricultural safety and health. This course is considered an asset by agricultural products companies, such as ADM and insurance companies that specialize in coverage for the agricultural sector.
- *HSC 384 (Hazardous Materials Regulation)*: responsible care efforts and substantial liability for mishandled hazardous materials create career opportunities for students who can guide companies through the regulatory maze.

Professional Practice: Increase required hours from 6 to 9.

- This change is a result of comparisons with benchmark/peer programs and analysis of feedback from alumni/employers. Alumni and employers report that the professional practice experience is an extremely important component of the program. This change also addresses a previous inequity. Students were required to complete 9 weeks of full-time professional practice, for which they received 6 credit hours under 398.04. Under the revised program, we will follow the University guideline (1 week of professional practice employment earns one credit hour).

Other Recommended Electives: (BSC 160; CHE 220; ENG 145.13 or 249; FIL 250; HSC145, 156, 247; KNR 181, 282, 342)

- The new list of required HSC courses and electives discussed previously will allow the graduate to be successful in many industries. However, because Safety graduates can pursue a variety of career specializations in many different

industries, a list of potentially useful (recommended) electives will help them to position themselves for entry into certain career specializations, as well as faster career growth. The student will select from among these electives after consulting the HSC Departmental Academic Advisor.

- *BSC 160 (Microbiology and Society)* and *CHE 220 (Elementary Organic Chemistry)* are listed as prerequisites for some courses in environmental health, and would also be appropriate for students who wish to pursue a career in the pharmaceutical, chemical or food processing industries.
- Communication is an important part of professional safety practice. Depending upon the writing skills of the particular student, *ENG 145.13 (Language and Composition II Business & Government)* or *249 (Technical and Professional Writing)* is an appropriate course.
- Since about 30% of the Safety majors take positions in the insurance industry, *FIL 250 (Introduction to Insurance and Risk)* is a useful adjunct for those students.
- Completion of *HSC 145, 156 and 247* will allow the Safety major to graduate with a minor in Environmental Health.
- The *KNR 181, 282 and 342* sequence is appropriate for students who wish to specialize in industrial ergonomics.

Terrorism as a Loss Exposure

Terrorism (using biological, chemical, radiological or explosive agents) is an increasing concern for the Safety Professional. With the events of September 11, 2001, disaster preparation and planning has been added to the task list for the safety professional. We have increased coverage of terrorism in HSC 378 Disaster Preparation, HSC 381 Occupational Safety and Health Act (specifically Emergency Action Plans), and HSC/AGR 383 Agricultural Safety and Health (particularly bioterrorism).

Management and Training Skills

Data from the revalidation study conducted by the BCSP in 1998-2000 reveal that the safety profession has increased its emphasis on management and training skills. Safety graduates are often promoted to supervisory roles within a few years of graduation. Class projects in HSC 248, 271, 370, 382 and 383 include development of training materials. Coverage of program auditing has increased in HSC 370.

Computer and Communications Skills

Data from the HSC Departmental surveys revealed that computer technology, computer-based skills, and communications skills were areas that needed improvement. The Safety Program faculty members are making increasing use of a variety of current instructional methodologies and technologies. Faculty members may employ lecture/discussion, demonstrations, case studies, discussion and study groups, role-playing, and program learning modules as teaching techniques. All faculty members use PowerPoint presentations to augment lectures. Two of the faculty members store class notes and other handouts on the department's server, so students can have access to the files as needed. One faculty member makes extensive use of Blackboard™ in his course delivery. Another faculty member offers Construction Safety (HSC 272) as an on-line course during the summer term.

With the 2001 arrival of a new faculty member with expertise in system safety, the Department Head authorized purchase of state-of-the-art software for fault tree analysis and preliminary hazard analysis and risk assessment for installation in the student computer laboratories. Computer-based hazard analysis is required as a component of projects in HSC 271, HSC 272, HSC 370, HSC 374, HSC 380, HSC 384, and HSC 385.

Every course requires computer-based written assignments and/or computer-based presentations. One faculty member uses a virtual reality fire investigation as a class project. All required 300-level courses include a project that is based on an assessment of an actual worksite, product, process or system.

Professional Practice

The assessment instrument for the professional practice program has been updated. With the budget-related loss of a full-time Professional Practice Coordinator, the responsibility for implementation of this instrument has reverted to the Safety Faculty. Under the new curriculum, the required hours for Professional Practice have increased from six (6) to nine (9).

Academic Advisement

Student and alumni satisfaction surveys indicated that academic advisement was one area that could be improved. The current academic advisor has been very good about working with the faculty to identify at-risk students for special counseling before their grades fall below 2.0 GPA. The current academic advisor also works more closely with program faculty to develop a plan of study tailored to the student's professional goals and interests.