

A. COVER PAGE

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Final Progress Report
NIOSH Training Project Grant: 2T03OH008624
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BS/BA - Industrial Hygiene/Occupational Health Science

PROGRAM OVERVIEW

The University of North Alabama (UNA) Occupational Health Science (OHS) Program (*formerly Industrial Hygiene*) is one of four baccalaureate programs in the U.S. accredited by the Applied and Natural Science Accreditation Commission (ANSAC) of ABET. The program, which requires a major in OHS and minor in chemistry (*formerly double major in IH/Chemistry*), has earned a reputation for graduating a pool of qualified industrial hygienists who provide valuable services to workers and employers in this geographical region and beyond. The objectives of the UNA NIOSH-TPG during the 2017-2022 cycle were threefold: (1) promote the recruitment of qualified students in the occupational health and safety field; (2) support the efforts of continuous academic improvement; and (3) expand the educational opportunities and services of the OHS Program.

Recruitment of qualified students

Enrollment

The average enrollment of the UNA IH/OHS Program from 2017-2021 was 33 students per semester with a range of 20 to 48 students. Enrollment figures reported to NIOSH during the current cycle are shown in Table 1. Enrollment in the program reached a record high (61 students) during the 2015-2016 academic year then gradually returned to traditional levels over the next three years (2017-2020). A possible explanation is UNA's debut of the Bachelor of Science in Engineering Technology (ET) program in the fall of 2016. The ET program offers options in electro-mechanical, chemical, and bio-engineering. It is plausible the OHS and ET programs are competing from the same pool of potential recruits. Another likely explanation is the overall national decline in undergraduate enrollment at public 4-year institutions. From fall 2019 to fall 2021, undergraduate enrollment in bachelor's degree-seeking programs decreased between 0.5% and 3.0% annually (*National Student Clearinghouse Research Center*). Undergraduate enrollment in Health Professions and Related Programs (CIP Code 51) at 4-year institutions also declined with the most notable decrease in fall 2021 (down 4.8% from fall 2020). Despite these challenges, the current enrollment levels of the OHS program have necessitated consistent offerings of OHS courses and yielded viable graduation outputs. Additionally, the OHS program remains small enough to allow close and productive interaction between faculty and students. The size of the OHS courses and the face-to-face delivery mode facilitates personalized attention to students and promotes interaction and bonding among student cohorts. These are perhaps one of the best attributes of this program.

Table 1. Enrollment Trends 2017-2021

	Year 1 2017-2018		Year 2 2018-2019		Year 3 2019-2020		Year 4 2020-2021		Year 5 Fall 2021	
	Fall Enrollment	NIOSH Trainees	Fall Enrollment	NIOSH Trainees	Fall Enrollment	NIOSH Trainees	Fall Enrollment	NIOSH Trainees	Fall Enrollment	NIOSH Trainees
Full-Time Students	48	13	45	8	38	12	28	11	20	10
Part-Time Students	0	0	0	0	0	0	0	0	0	0

Program outputs and placement

During the 2017-2022 grant cycle, the program graduated 55 students. Placement records indicate 45 (82%) graduates were employed in the OHS field within 3 months of graduation, 5 (9%) enrolled in graduate programs (*OHS: 4, Medical School: 1*), and 5 (11%) are employed in non-OHS fields. The employment of graduates in recent years has been very successful. The success is reflected by the importance of the hiring companies and the satisfaction expressed by these companies with the performance of our graduates. It is not

uncommon for UNA OHS graduates to acquire managerial responsibilities in OHS after only a few years of employment. Employers' satisfaction is indicated by recurrent recruitment. A number of companies have offered employment to multiple graduates of the UNA OHS program. 3M has employed six; Alcoa and Bridgestone Firestone have both employed five; Constellium and Southwire have both employed four, BP Amoco, United Launch Alliance, TVA, Hexcel, and Tarkett have each employed three; and NASA, Georgia Pacific, Navistar, Terrell Technical Services, and Wyle Laboratories have each employed two. In addition, these companies continue to recruit our students for summer internships in OHS. During the current cycle 36 students (65%) completed a pre-professional internship while 19 students (35%) completed a theoretical capstone project. Although not a program requirement, 6 students participated in undergraduate research.

Summary of recruitment efforts

An important contributor to OHS recruitment is the scholarship program created with funding from the NIOSH TPG. These NIOSH scholarships have proven critical in recruiting and retaining students, particularly those with good scholastic merits who are competitively recruited by other academic institutions and by other majors. The NIOSH scholarships are awarded to full-time OHS students who have reached junior status and maintain an overall institutional GPA of 2.70 and a GPA of 3.00 in all OHS courses. Recipients must enroll in at least one OHS or chemistry course each semester. The eligibility has been limited to junior/senior students majoring in IH/OHS since 2010, per a NIOSH request. The reasoning for the NIOSH restriction was that OHS courses are taken at the junior and senior level and support below the junior level is uncertain. Since our objective is to recruit quality candidates, qualifying and promising freshman and sophomore candidates are initially supported by departmental scholarships until they reach a classification at which they can transition to NIOSH scholarships. With the provision of NIOSH scholarships, 30 students were recruited to the OHS field during the 2017-2022 cycle. Currently, 4 of these NIOSH trainees remain enrolled in the program and 25 trainees graduated from the program. Only 1 trainee elected to change majors (Physics) and was discontinued from NIOSH support.

During the previous grant cycle (2012-2017), recruitment efforts consisted of passive approaches (e.g. faculty attendance at high school career fairs and college preview days; mass mailings). The plan for recruitment of underrepresented groups targeted high school students in the surrounding region who participated in an annual chemistry exam competition proctored by the Department of Chemistry and OHS. Participants included students enrolled in chemistry courses (first- and second-year) from private and public high schools of the Wilson Dam Section of the American Chemical Society (five counties in Alabama, four counties in Tennessee and one county in Mississippi). Students from underrepresented groups who participated in the chemistry competition and obtained a minimum acceptable score were provided with information about the OHS program (letter and brochure) and encouraged to contact the Program Director if they had interest in the field and would like to tour the facilities. Overall, 153 students from underrepresented groups were contacted. Unfortunately, response was poor. Only one student chose to major in IH/OHS and graduated from the program as a result of this effort. Consequently, this initiative was stopped.

During the most recent cycle (2017-2022), in addition to continued OHS representation at university sponsored preview days and career fairs, a strategic recruitment approach was employed by the OHS Program Director to target underrepresented groups of high school students in the immediate geographical region. Seven recruitment events (both on- and off-campus) were held with high school students. These events included presentations, activities, and campus tours to promote careers in OHS and the UNA OHS Program.

The following university sponsored recruitment events were supported during the 2017-2022 cycle:

- **UNA Preview Days:** Faculty from the OHS program made contact with approximately 200 potential incoming freshman and their parents during UNA Preview Days, a university sponsored event designed for potential students to peruse various academic options (Fall 2017, 2018 and 2019).
- **Madison County College and Career Fair:** Dr. Kimbrough represented the Department of Chemistry and OHS at the Madison County College and Career fair held on the campus of the University of Alabama at Huntsville (UAH). More than 6,000 students from six high schools within the Madison county school district (*demographic: 25% African American and 5% Hispanic*) attended (Fall 2018).
- **Meet and Greet for Admitted Students:** The UNA Student Association of the AIHA (*an affiliated student section of AIHA*) participated in a meet and greet sponsored by the university where

approximately 30 incoming admitted students and their parents had the opportunity to speak with current students regarding a career in OHS (Spring 2019).

The following strategic recruitment activities were supported during the 2017-2022 cycle:

- **High Schools (42) in Colbert, Franklin, Lauderdale, Lawrence and Limestone counties:** All high school chemistry teachers and guidance counselors were emailed information promoting the OHS program (letter and brochure) along with scholarship information (Fall 2017, Spring 2021).
- **Wilson High School:** Dr. Kimbrough spoke with 79 students from Wilson High School (*total economically disadvantaged: 56%*) about a career in OHS and students were given a tour of the Science Building (April 2018).
- **Florence High School:** Dr. Kimbrough spoke with 150 Human and Anatomy students on the campus of Florence High School (*demographic: 31% African American, 8% Hispanic*) about a career in OHS during their “career of the month” lesson (September 2018).
- **Mississippi School of Mathematics and Science:** Dr. Kimbrough represented the Department of Chemistry and OHS on the campus of the Mississippi School of Mathematics and Science (*demographic: 22% African American, 13% Asian*) (September 2019).
- **Russellville High School:** Dr. Kimbrough spoke with 25 junior and senior AP Chemistry students from Russellville High School (*demographic: 43% Hispanic, 5% African American*) about a career in OHS. Students were provided lunch and given a tour of Science Building and OHS laboratory (October 2019).
- **Brooks High School:** Dr. Kimbrough spoke with 20 students from Brooks High School (*demographic: 4% African American, 2% Hispanic*) about a career in OHS and students were given a tour of the Science Building (November 2019).
- **Muscle Shoals High School:** Dr. Kimbrough spoke with 40 chemistry students on the campus of Muscle Shoals High School (*demographic: 15% African American, 5% Hispanic*) about a career in OHS. (September 2021)
- **Brooks High School:** Dr. Kimbrough spoke with 8 AP chemistry students on the campus of Brooks High School (*demographic: 4% African American, 2% Hispanic*) about a career in OHS. (September 2021)
- **Social Media Advertisement:** Social media advertisements via Facebook and Instagram were published targeting users age 18-65 within a 50 mile radius of Florence, Huntsville and Birmingham, AL (Fall 2021)

Due to the COVID-19 pandemic, in-person recruitment efforts were suspended March 2020 through July 2021. Events were not hosted on-campus and faculty were not permitted to visit local high schools. As an alternative to in-person events, social media presence was increased through enhanced interactions on the Department of Chemistry and OHS’s official Facebook and Instagram pages. In addition, a professional production company was contracted to create custom recruitment videos highlighting the OHS program. These videos were filmed during the summer of 2021 and featured interviews with former and current OHS students. The recruitment videos were financed (*partially*) via reallocation of unspent NIOSH grant travel funds due to the pandemic.

Dr. Sara Johnson, *Assistant Professor in Chemistry* and Dr. Kimbrough, *Associate Professor and OHS Program Director* also engaged in a research study to explore what motivates students to pursue degrees in chemistry and OHS. The mixed method study utilized semi-structured interviews with existing students and regression analysis of institutional data available for the past ten years. Preliminary findings were presented at the American Chemical Society (ACS) 2021 Fall Conference and results were used to inform recruitment and retention efforts and develop a strategic recruitment and retention plan for the 2021-2022 academic year. Efforts included on-campus events to promote retention of current majors and target undecided majors; off-campus events focused on area high schools identified as feeder schools and schools with underrepresented populations; and an enhanced social media campaign utilizing custom made videos highlighting the OHS major.

Continuous Academic Improvement

Internship Requirement

In the past, students had the option to participate in pre-professional internships and cooperative education programs. Participation in these practicums was highly encouraged; however, it was not a requirement for graduation. An assessment of IH graduates (2013-2016) indicated 91% (39 of 43) completed paid pre-professional internships. This figure was noteworthy considering internship participation was not a program requirement. In addition, a survey of recent alumni indicated those who completed an internship were more likely to obtain employment in the OHS field prior to or immediately after graduation compared to those with no internship experience. The basic purpose of a pre-professional internship is to provide a transition from the university curriculum to a professional career setting while affording students the opportunity to apply comprehensive and cumulative knowledge acquired in industrial hygiene and supporting courses. Consequently, after consultation with the OHS Advisory Board and recent graduates, the curriculum was revised to include a mandatory pre-professional internship. The curriculum change was submitted and approved by regular institutional procedures (effective fall 2018). The curriculum change replaced the previous Capstone Project in Industrial Hygiene (IH 496) with the Industrial Hygiene Internship (IH 494) and Senior Seminar in Industrial Hygiene (IH 496) course sequence. Course descriptions are provided below:

Former Curriculum Requirement

IH 496 (1) *Capstone Project in Industrial Hygiene*. This course requires the application of comprehensive and cumulative knowledge acquired in industrial hygiene and supporting courses to an assigned case study or industrial operation. Students may choose a theoretical study (Option I), or a pre-professional internship (Option II). For Option I, students will be required to complete three reports during the semester addressing in succession, the areas of recognition, evaluation, and control. For Option II, students must obtain approval from the instructor as to the comprehensiveness of the proposed experience and also by the submission of a proposal prior to beginning the internship. At the completion of the internship, the student must generate a detailed report with components of recognition, evaluation and control. In addition, all students will be given a comprehensive exit exam. Open to industrial hygiene majors in their last semester of studies. Departmental approval required. (Fall, Spring)

- Program Outcome Accessed: provide a comprehensive project that demonstrates cumulative knowledge and skills acquired in earlier course work

New Curriculum Requirement

IH 494 (0) *Internship in Industrial Hygiene*. Students are required to complete a pre-professional internship. The internship affords students the opportunity to apply comprehensive and cumulative knowledge acquired in industrial hygiene and supporting courses to an industrial operation. Internships involve 150 hours of direct contact work and must be completed during one regular semester or a regular summer term. Students must obtain approval from the instructor as to the comprehensiveness of the proposed experience and also by the submission of a project proposal prior to beginning the internship. Prerequisites: minimum cumulative GPA of 2.00; completion of 84 credit hours; approval of the Industrial Hygiene Program Director. (Fall, Spring, Summer) (Pass/Fail)

IH 496 (1) *Senior Seminar in Industrial Hygiene*. Students will generate and present a detailed overview of their pre-professional internship project with components of recognition, evaluation and control. In addition, all students will be given a comprehensive exit exam. Open to industrial hygiene majors who have completed or are currently enrolled in IH 494 and are in their last semester of studies. (Fall, Spring)

- Program Outcomes Accessed: provide a comprehensive project that demonstrates cumulative knowledge and skills acquired in earlier course work; evaluation of the student's ability to function on a multidisciplinary team during pre-professional internship by the student's field supervisor

ABET re-accreditation

The UNA IH/OHS Program is accredited by ANSAC of ABET. The program completed a comprehensive general review in 2020-2021. The self-study report was submitted to ABET on July 1, 2020, and a (virtual) comprehensive site visit was held November 8 – 10, 2020. The ABET final statement, received on August 10, 2021, indicated no deficiencies, weaknesses, or concerns were found. The program's accreditation will continue through September 30, 2027.

The program curriculum is conformed to serve a set of educational objectives and program outcomes set forth by the OHS faculty and members of the OHS Program Advisory Board. The program outcomes also comply with expectations set under general and specific criteria by ANSAC of ABET for applied science programs in industrial hygiene. The Advisory Board continues to advise faculty on matters related to curriculum improvement, placement of graduates, and career opportunities.

Rebranding to align with the profession

In June 2020, the AIHA engaged in a global campaign to rebrand the profession and position the association to represent occupational health and safety science professionals rather than solely industrial hygienists. To remain relevant, the faculty, in consultation with our advisory board, decided to restructure and rebrand the industrial hygiene degree to better align with the professional association. The Department of Chemistry and Industrial Hygiene voted unanimously to rename the industrial hygiene program to "Occupational Health Science". In addition, curriculum changes were implemented allowing for the addition of two new OHS courses and the chemistry component was reduced to a minor. These changes were submitted and approved by regular institutional procedures in the spring of 2021, and became effective August 1, 2021.

Expanded educational opportunities and services

Student participation in professional association

The UNA Student Association of the AIHA (*affiliated student section of the AIHA*) remains active. This group meets monthly during the fall and spring semesters. During the 2017-2022 cycle, student members attended:

- Alabama Local Section, AIHA (AL-AIHA) Fall Event in September 2017, where AIHA Chief Executive Officer, Larry Sloan outlined AIHA's strategic priorities.
- 6th Annual Future of the Profession Symposium organized by the AL-AIHA. The purpose of this event is to connect safety and health professionals and students.
 - Two UNA IH/OHS Students presented at the event.
- AL-AIHA Fall Workshop in September 2018.
- 7th Annual Future of the Profession Symposium organized by the AL-AIHA
 - Three UNA IH/OHS Students presented at the event.
- AL-AIHA Fall Workshop in September 2019

Supporting courses for other majors

UNA continues to add degree options which require supporting components in OHS provided by the OHS Program. During this grant cycle, three Bachelor of Science (BS) programs required students to complete supporting courses in OHS. The BS in Interdisciplinary Studies has an option which requires students to earn 42 hours of coursework in an area of emphasis. Areas of emphasis with a potential connection to OHS are Business and Applied Entrepreneurship, Health, and Technology. To date, approximately 10 students have completed OHS courses as part of this program. The BS in Sustainability requires students to complete Occupational Safety and Health (IH/OHS 301) and Environmental Regulations (CH 465) as supporting courses. During the current cycle 8 students completed IH/OHS 301 and CH 465 and graduated with a BS in Sustainability. The BS in Engineering Technology, which offers options in electro-mechanical, chemical, and bio-engineering technology, requires students to complete Occupational Safety and Health (IH/OHS 301) as a supporting course. During the current cycle 29 students completed IH/OHS 301 and graduated with a BS in Engineering Technology.

International collaboration

In November of 2021, UNA and Guizhou University (GZU) signed an agreement to establish the Guizhou University-University of North Alabama International College of Engineering and Technology on the campus of GZU in China. The BS in OHS, along with other degree options, will be offered at the international college. Students graduating from the program will receive a degree from GZU and UNA. All degrees will be accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC). Faculty at GZU and UNA will provide instruction to students enrolled across all programs annually. All OHS courses will be taught by UNA faculty. We expect to teach the first OHS course in China in the summer of 2025 and have our first cohort of international graduates in December 2027.