

# Establishment of Occupational Safety and Health As A Minor

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Safety plays an essential role in the construction industry. With construction projects increasing in size, time, and overall complexity, it has become increasingly difficult to implement safe protocol and procedures. Present-day construction projects sometimes require more than 10,000 employees, including dozens of subcontractors, office teams, and more on-site. In addition to the increased need for laborers, increasing project size means an increase in demand for individuals with expertise and experience in safety practices. Projects of all shapes and sizes are in need of professionals with proven expertise in implementing safety practices. Currently, many incoming project engineers and field engineers lack the important knowledge that is crucial to protecting an individual or group of individuals from being at high risk of exposure to imminent danger. For these reasons, it is important that Cal Poly College of Architecture establish an Occupational Safety and Health Minor. Increasing the number of industry professionals with safety backgrounds from Cal Poly will be immensely advantageous. Establishing Occupational Safety and Health as a Minor at Cal Poly would prove our students, especially when compared to those from other universities, are determined, intuitive, reliable, and prepared to be involved in the industry. By making this minor available to all students, primarily those who intend to be involved in the construction industry, annual construction-related injuries and deaths will vastly decrease, and the demand for more safety professionals will be met. This new curriculum would follow Occupational Safety and Health Administration (OSHA) guidelines and make job-sites throughout the United States safer and more productive projects.

**Keywords:** Occupational Safety and Health, Curriculum, Construction Industry, Construction Management

## Introduction

In a typical construction project, there are several different phases and aspects involved in fabricating a successful one. A general contractor usually has different teams which include project engineers, assistant project managers, project managers, field engineers, superintendents, administrative analysts, accountants, purchasing agents, a scheduling team, and most pertaining to this paper, safety engineers and safety managers. Typical roles for a safety team are conducting daily job-site walks to ensure construction integrity with all subcontractors, issuing safety audits when necessary/applicable, meeting with the owner and his or her team to discuss construction progression and keep communication with all parties, to distribute safety permits for different individuals (usually for hot work for welding and cutting, energized electrical work, lockout-tagouts, confined space, numerous equipment like a scissor lift, excavation, and more), conducting job-site orientations, and overall certifying all individuals on a construction project follow company policies and regulations. Occupations regarding Safety is a growing professional field in construction, and construction companies are developing this sector annually. With constant-growing projects, it is tremendously necessary to allot efforts in an efficient safety team.

The construction industry continues to be the highest amount of fatalities in any given work force. In 2016, The Bureau of Labor Statistics reported that the fatal injury rate of construction-related occupations reached 12.4 per 100,000 full-time workers. (Bureau of Labor Statistics, 2017) Furthermore, primary construction-related deaths are categorized under The Fatal Four. The Fatal Four injuries and death include falls, being struck by objects, electrocutions, and caught-in/between, with falls being the leading cause of injury and death. According to the Occupational Safety and Health Administration (OSHA), in 2016 there were 384 deaths in regards to falls, 93 with struck by objects, 82 with electrocutions, and 72 with caught-in/between. OSHA also says eliminating the Fatal Four

would save 631 workers' lives in America every year. (OSHA, 2017) More construction professionals educated in safety would assist in decreasing this shocking number of deaths annually.

## Literature Review

### *Pursuing A Safety Profession At Cal Poly*

There are several ways to pursue a Safety Engineer/Manager position in the construction industry. Individuals typically study Construction Management or Occupational Health and Safety as a Bachelor of Science at a 4-year university, but it is not limited to these two majors. (Meier, 2018) However, safety professionals have pursued a double-degree in both have been proven to be most qualified. In making Occupational Safety and Health a minor at California Polytechnic State University, San Luis Obispo, construction-related majors including Construction Management, Civil Engineering, Mechanical Engineering, Architectural Engineering, and Architecture will benefit immensely upon completion of college when entering the construction industry.

### *Advantages*

There will be numerous benefits to Cal Poly students entering the construction industry upon the availability of safety as a minor at Cal Poly. Quite often, it takes a long period of time for college graduates in the construction industry to learn everything about safety; this can take many years of experience. Cal Poly students who pursue a safety minor will learn everything regarding safety protocol at an accelerated level, and the escalating need for more safety professionals will be met. According to an article, *Toward an Understanding of the Impact of Production Pressure on Safety Performance in Construction Operations*, a successful construction project needs to meet performance and delivery requirements specifically to ensure acceptable cost, time, quality, and safety (Han, S., Lee, S., Mohamed, Y., Peña-Mora, F., & Saba, F., 2014). With additions of new safety professionals to project teams, issues regarding time, cost, quality, and safety will dwindle and thus increase productivity on any given job-site. This not only proves to be beneficial to all general contracting teams acquiring for qualified professionals, but is also beneficial to Cal Poly students who choose to pursue a safety minor. Whether Cal Poly students want to actively have a position on a safety team or not, obtaining this minor at Cal Poly will also serve to assist in becoming a Project Manager or Superintendent.

Alongside the advantages of obtaining a safety minor regarding a safe and productive construction project, there are also benefits in being hired. Alex Kumar, the Environmental Health and Safety Area Manager in the Bay Area, specifically states that individuals who graduate with a degree in a construction-related major while also minoring in Occupational Safety and Health will be more qualified compared to their competitors from other universities (Interview, 2018). It is becoming more and more rigorous to obtain a job upon graduation, but Cal Poly students would not have an issue finding a job after graduating college. Those with this minor would prove to be qualified for a construction position. An Occupational Safety and Health minor would also benefit Cal Poly, as a whole. Cal Poly would increasingly be seen as a 4-year university that properly prepares its students to enter the work force, specifically students entering the construction industry.

### *Disadvantages*

Establishing Occupational Safety and Health a minor at Cal Poly appears to have its drawbacks. Adding a minor at Cal Poly is difficult. Because of Cal Poly's constantly growing student population, allotting classroom space for safety courses to happen when there is already limited space might be problematic. Along with finding space, there proper funding would need to be established to hire qualified professors with experience to teach. The average salary for a Cal Poly professor is currently \$83,000, so hiring three to four more professors to fill the roles would be costly. Cal Poly is currently battling the issue of paying current professors fair salaries, which poses difficulty in hiring more professors. (Wilson, 2015)

## Solution

Cal Poly is planning to add several more buildings to solve the classroom-space crisis. In the next 10 years, Cal Poly plans to develop a new Master Plan with additional buildings that will allow more space for courses to take place for the increasing amount of students. Cal Poly Administration is also planning to increase the budget for faculty in the next few years, so the demand for new professors for safety courses will be met.

### *Allotted Occupational Safety and Health Minor Program*

California State University, Sacramento, is a respectable example for a 4-year university that offers a safety major. The Health Science (Concentration in Occupational Health and Safety) program consists of 88-96 units (California State University, Sacramento, 2018). Alex Kumar, along with being the Environmental Health and Safety Area Manager in the Bay Area, is also a professor at Sacramento State. In accordance with him, the newly found Occupational Safety and Health minor would be an 18-unit program at Cal Poly with close correspondence to Sacramento State's program (*see Methodology, Figure 2. Occupational Safety and Health Minor Program*) Obtaining a Safety Minor would add approximately one extra quarter at Cal Poly. In 2014, Cal Poly students' average graduation rate in five years was 68 percent. (Miller, 2014) Adding another quarter to one's time at Cal Poly would not be significant regarding his or her time spent there.

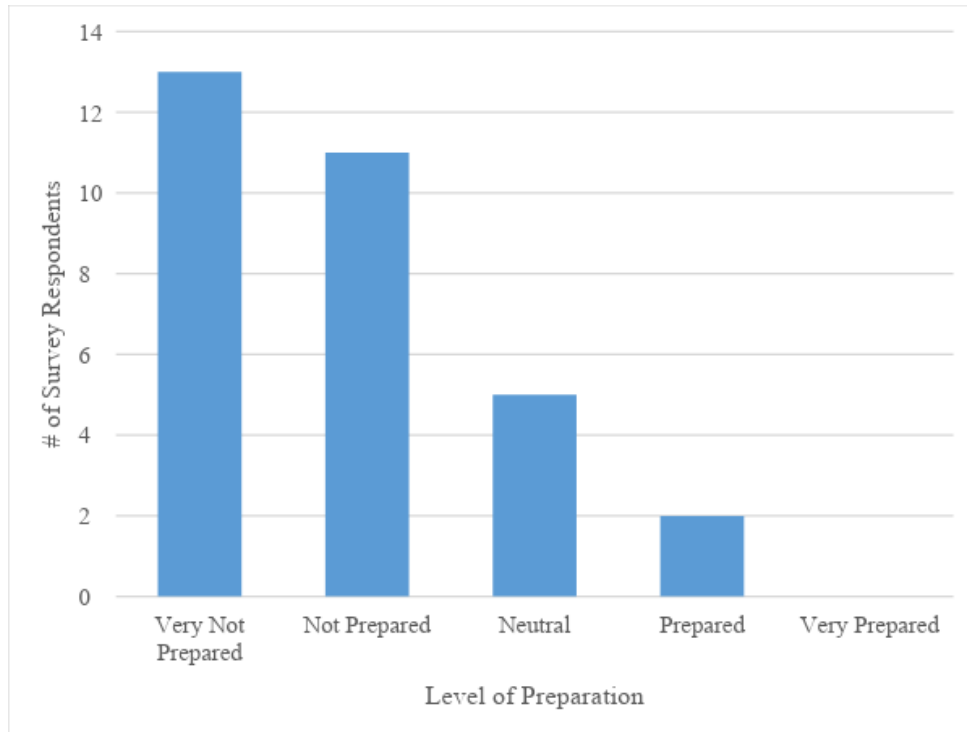
### Methodology

Type of Courses	Number of Units
Major	70
Support	75
General Education	44
<b>Additional Safety Minor Courses</b>	<b>18</b>
<b>TOTAL:</b>	<b>207</b>

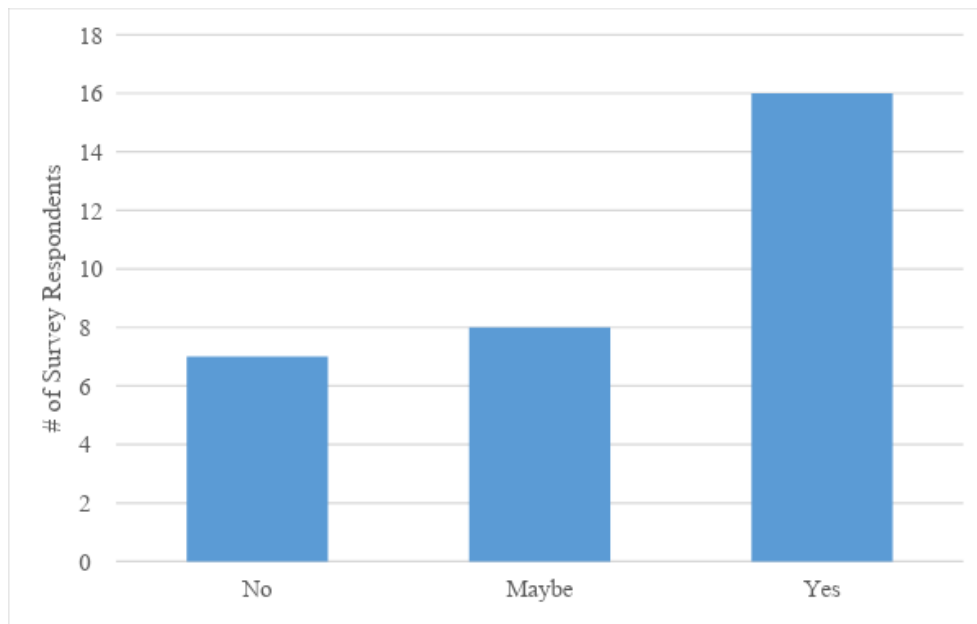
Figure 1: Construction Management Major Overview.

Lower Division Courses			
	Course Name	Number of Days Met (Per Week)	Number of Units
1	Fundamentals of Safety and Health	2 x 1 Hours	2
2	Cause and Control of Occupational Loss	2 x 1 Hours	2
3	Environment and the Law	2 x 1 Hours	2
Upper Division Courses			
	Course Name	Number of Days Met (Per Week)	Number of Units
4	Occupational Health	2 x 2 Hours	4
5	Occupational Safety	2 x 2 Hours	4
6	Occupational Health and Safety Laws and Regulations	2 x 2 Hours	4
<b>TOTAL UNITS:</b>			<b>18</b>

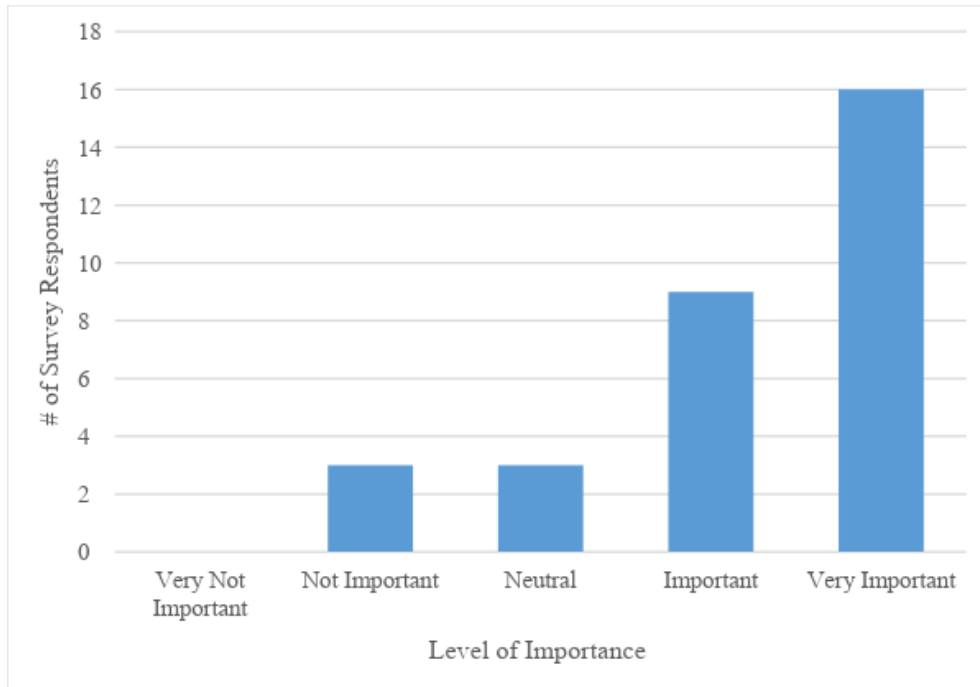
Figure 2: Sacramento State's courses to be used in Cal Poly's safety minor.



*Figure 3: Construction Management student perception of preparation regarding safety in the construction field.*



*Figure 4: Construction Management student interest in obtaining a safety minor at Cal Poly.*



*Figure 5: Construction Management student perception of importance of safety in construction.*

## Results

Figure 1 displays the Construction Management overview of the amount of units to expect should an Occupational Safety and Health minor be offered at Cal Poly. Without any minor, Construction Management students are required to fulfill 189 units. With the added Occupational Safety and Health minor, students are expected to acquire an additional 18 units, equaling 207 units to complete upon graduation.

Figure 2 displays the designed courses to be offered to obtain an Occupational Safety and Health minor. The following list is shortened course descriptions of each class, which courses offered at Sacramento State that can be utilized in Cal Poly's program.

- **Fundamentals of Safety and Health:** In this course, students will examine concepts and principles that closely relate to the causation, control, and prevention of unintended injuries and illnesses (California State University, Sacramento, 2018).
- **Cause and Control of Occupational Loss:** This course investigates injuries and outcomes regarding occupational loss and its effect on the work environment (California State University, Sacramento, 2018).
- **Environment and the Law:** Introduction to environmental law to understand the legal process regarding the environment (California State University, Sacramento, 2018).
- **Occupational Health:** Concepts of occupational health in relation to potential health hazards, which include disease, biological, chemical, and physical contact (California State University, Sacramento, 2018).
- **Occupational Safety:** Analyzes typical hazards and issues that are faced in daily life at work, which includes the control and prevention of hazards which pose imminent danger. (California State University, Sacramento, 2018).
- **Occupational Health and Safety Laws and Regulations:** Summary of agencies that are involved in the issuance of set regulations regarding health and safety, specifically Cal/OSHA. This course also focuses on compliance of workers (California State University, Sacramento, 2018).

In conducting a survey, 31 Cal Poly Construction Management students responded. Students currently third-year and above were permitted to take the survey. The intention behind only allowing third-years and above was to prevent skewed data from underclassmen who are not yet experienced in the construction industry. Another goal was to survey individuals who have had construction internships.

Overall, Construction Management student respondents showed that not only do they perceive to be ill prepared regarding safety for the construction industry, but also express high interest in learning more about it through the Occupational Safety and Health minor, which is shown in both Figures 2 and 3 respectively. In Figure 5, the respondents note their perception of the importance of safety in the construction industry. Another survey question (not shown above) requested the respondents to indicate which Construction major courses educated them on safety; almost all of the respondents only stated one class, Jobsite Management. Over 40 percent of respondents perceive to not be prepared regarding safety. Upon asking the respondents whether they think safety is important or not, approximately 29 percent said it is important and approximately 52 percent said it is very important. Approximately 26 percent of the respondents are potentially interested in obtaining a safety minor if it is offered, and approximately 52 percent are definitely interested.

### *Analysis*

The data shows developing a safety minor is feasible. The Occupational Safety and Health minor only being 18 units makes it possible to execute while still graduation in a reasonable time. With the help of other successful Occupational Safety and Health majors, one day it will be possible to derive Cal Poly's authentically-made program.

The data collected shows that upperclassmen Construction Management students who are somewhat experienced value safety and understand its importance. Before understanding the full benefits of obtaining a safety minor along with their degree in Construction Management, the respondents showed a significant interest in there being an Occupational Safety and Health minor at Cal Poly. With 40 percent of respondents perceiving to not be prepared regarding safety implies that even though Cal Poly's Construction Management program mentions safety in their courses, this does not suffice in the eyes' of the students.

Fully analyzing the data collected, the culmination of the feasibility of only 18 added units and the desire to obtain this minor from Construction Management students demonstrates the need for this to become a reality.

### **Conclusion**

Safety is a rising topic in the construction industry, acquiring constantly increasing recognition by the industry as a whole. Since projects are becoming so large in size, this poses unforeseen dangers to individuals that are exposed to these projects. Because of this, there is a high demand for more safety professionals. By establishing Occupational Safety and Health as a minor at California Polytechnic State University, San Luis Obispo, the high demand for individuals with knowledge and education on safety is met. Establishing this minor would prove our students, especially when compared to those from other universities, are more determined, intuitive, reliable, and prepared to be involved in the industry. Benefits of the newly established minor include improved schedule issues, increased productivity, higher quality projects, lower costs, and an overall safer environment. Despite the adversities present with developing this minor, like lack of classrooms and budget, Cal Poly plans to solve these issues in the near future.

With the help of Sacramento State's major on Health Sciences, and Alex Kumar, adopting similar classes listed will help cultivate the minor into an 18-unit, authentic program. Cal Poly students are also interested, while also acknowledging the importance of safety; respondents to the survey perceive to not be prepared in safety, but minor in Occupational Safety and Health will change that. In doing this, the journey towards eliminating the Fatal Four commences.

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