

Advanced Concrete Course for the Cal Poly Construction Management Department

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This senior project provides a solution to the Construction Management Department at Cal Poly, San Luis Obispo whose curriculum lacks an individual Concrete course. With Concrete being one of the most used building material worldwide, this course will help immensely. The goal of this project is to fill the gap with an Advanced Concrete Course that is prepared and ready to be introduced to future students. The course has an emphasis on outside research learning – where the student gets to become the instructor. Carefully thought out and executed lecture materials are included in the course. Lecture slides give background information and a basis to begin on, and an outside project and presentation provides new knowledge into the class. The course covers several topics that any student that wants to be a part of the concrete industry, or just wants know about concrete can benefit from. This course is in supplement to a previous 2017 Cal Poly senior project that gauged interest in students wanting to acquire a Concrete Industry Management Minor. This class was created to supplement and compliment the current Cal Poly curriculum for Construction Management Majors.

Key Words: Concrete, Education, Curriculum, Construction Management

Introduction

Concrete is one of the oldest and also one most used construction materials in the world. Being such a versatile and common material it is concerning that the Cal Poly Construction Management Department does not offer any individual Concrete courses in its current curriculum. An internship with Webcor Concrete Group sparked a true interest in the building material, but also showed me how much I did not know about it. For a CM program that is so in depth and well regarded, this was a surprise to me. After seeing and experiencing this gap in the curriculum, I decided to create a course that would offer a solution and help fill this need.

Course Goal

When designing this course I had a few goals and objective that I wanted to achieve. The main was that I wanted to instill confidence in students that wanted to be involved in the Concrete Industry. When starting my internship I had little idea of what it takes to make a concrete pour happen. I knew how to estimate material and a few formwork assemblies but that was about it. So this course should give enough background information to prevent this type of situation. Another goal of mine was to spark outside research. A previous course taught by Michael Burns was designed so that a topic would be introduced by himself and then students would look farther into the topic and then present to the class about their findings. I really enjoyed and benefitted from this type of course structure, so I mimicked it in my own.

Course Structure

Cal Poly prides itself on its “Learn By Doing” motto and strives that all courses incorporates this into its curriculum. To best do this in a classroom setting, this course is designed so that the student is also the lecturer. First, the topic is introduced to the student through a more traditional lecture. The lecture provides basic knowledge and gives the student a baseline to begin further research. After the lecture, groups of students are given subtopics that they will

look further into and find new knowledge that was not presented to the class. The group will then create a short presentation that will be presented to the entire class. This style of learning will help instill the basic knowledge and spark outside research that the students find.

Course Topics

At Cal Poly's Construction Management program, courses are generally created with a large influence from the real world. An industry presence is seen during these course and taken very seriously. When creating this course I wanted to truly embody this industry presence as it is what makes the program so successful.

At the beginning of the process I struggled to see what would be needed and essential to the course. Concrete is used in so many ways and has so many "Accessories" that covering everything in a quarter would be near impossible. In true Cal Poly fashion, I reached to several Concrete industry professionals for insight on what they thought would be effective topics. I created a short survey that analyzed what the professionals thought of Cal Poly Alumni's experience with concrete and also what they thought students would benefit from learning in this course. See Figure 1 for a word cloud with the most used key words created from survey.

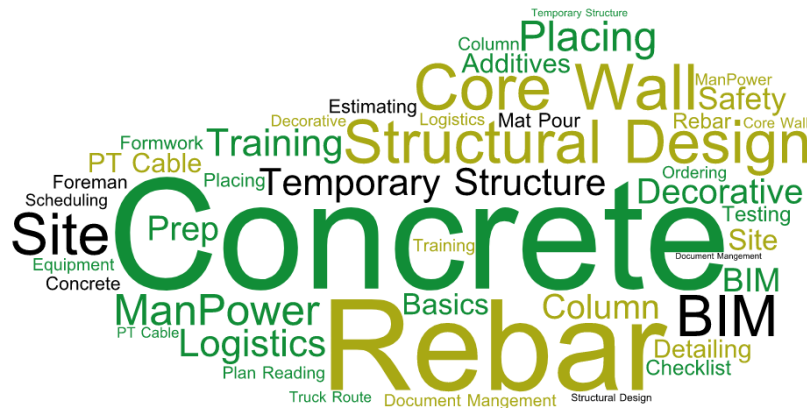


Figure 1: Word Cloud Generated from Most Used Phrases

From the survey I was able to narrow down course topics that I would include and create class material for. I believe that the courses that I selected will be able to allow a student to succeed in the industry. The topics that were chosen include:

- Components & Basics
- Site Logistics & Prep
- Equipment & Formwork
- Ordering & Testing
- Scheduling & Estimating
- Structural Concrete
- Mat Pours

Course Materials (Deliverables)

For this class, I created lecture slides and also assignment sheets that basically allow any faculty member the ability to start the class now with little effort. The lectures are well organized and provide an above basic level of the topic. The assignments sheets list topics that students can choose from to further research. The topics on the assignment sheets are related to the lecture topics and will allow a more in depth look from the lecture.

Comprehensive Final Project

The final project incorporates most topics of the course and is based on what an actual concrete pour may look like. The group will receive plans and specifications for a project and will have to do a series of tasks. The goal of this project is to allow the student to get hands on experience on what it takes to plan a concrete pour. The tasks include:

- Create a Schedule & Estimate
- Choose Equipment
- Choose Formwork
- Create a Site Logistics Plan
- Create a Safety & Health “One Sheet”
- Create a Truck Route
- Create an Ordering Dialogue

Conclusion

Creating this class has allowed me to learn and understand more than I have ever expected to. My knowledge of concrete means and methods has advanced greatly. I also learned what it is liked to be a professor and how you take your own real life experience and move it into a classroom setting. I think the hardest part of this project was taking a very physical topic and trying to make it an in-class learning objective. Overall, I think this course would be very effective as compliment to the current CM curriculum. I hope that this class gets picked up by a professor and that students will be able to grow as a result of my Senior Project.

Course Objective & Goal

A knowledge and understanding of Concrete means & methods can create graduates that are competent and confident in the Concrete industry. This course is designed allow a student learn a topic and the expand on the topic with outside research. The topics in the class have been chosen by members of the Concrete industry and are carefully constructed to provide a great amount of experience in just a quarter.

Topics Covered in the Course:

- Components & Basics
- Plan Reading & Detailing
- Equipment & Formwork
- Structural Concrete
- Mat Pours
- Safety & Health
- Site Logistics & Prep
- Plant Operations, Testing & Ordering
- Estimating & Scheduling

This Course will thrive with students conducting outside research and real life examples and case studies. Large scale concrete operations are hard to teach in a classroom setting, but this course is designed to inhibit the “Learn By Doing” motto.



Course Introduction

CM 4### - Advanced Concrete

CAL POLY
CONSTRUCTION MANAGEMENT

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