CON 598 Heavy Construction Estimating

Arizona State University | Del E. Webb School of Construction
Course Syllabus

COURSE INFORMATION

Semester: Fall 2024
Time/Location: M, W 7:30 am – 8:45 am / USE104
Class #: 29697
Website: Canvas (https://myasucourses.asu.edu)

INSTRUCTOR INFORMATION

Instructor: Aaron Cohen, MS, CPC, Jake Bottcher
Email: aaron.cohen@asu.edu, jakob.bottcher@asu.edu
Office Hours: CAVC547, by appointment

Aaron Cohen is the Director of Estimating Products for InEight, Inc where he oversees product development of estimating software solutions, providing best in class products exceeding today's market demands. Aaron also teaches courses at Arizona State University in Estimating and Project Controls. He holds a Bachelor of Science degree from Arizona State University as well as a Master of Science degree from DePaul University and is a Certified Professional Constructor.

Prior to joining ASU, Aaron served for 10 years as the President and Owner of Apollo Trenchless, Inc., an engineering and construction services provider specializing in the application of trenchless technologies for municipal construction projects. He has over 15 years of experience in the business as a Project Manager and Estimator for various infrastructure and utility construction projects.

OVERALL PROGRAM GOALS

Construction management professionals combine knowledge of innovative technologies, construction principles and business management to lead a wide variety of construction projects from residential and commercial buildings to infrastructure projects. The DEWSC program goals are to teach students how to become responsible leaders in the construction industry through organization, leadership, and current/innovative management techniques.

The American Council for Construction Education (ACCE) states that it is essential that every Constructor be capable of effectively managing personnel, materials, equipment, costs, and time. The Constructor must be able to effectively communicate and understand their role as a member of a multi-disciplinary team, the assessment of project risk, and the alternate methods that can be used to structure the owner-designer-constructor team.

COURSE DESCRIPTION

Methods, analysis and cost estimating for construction of highways, bridges, tunnels, dams, and other engineering works.

ENROLLMENT REQUIREMENTS

Prerequisite(s): Construction BS major; CON 383 with C or better OR Construction Engineering BSE major OR Visiting University Student

COURSE OBJECTIVES

To acquaint students with the science and art of heavy construction estimating. To provide a forum for learning and "real world" guidance on specification and plan review, preliminary project evaluation, jobsite investigation, risk allocation, takeoff analysis, bid pricing, estimating software applications, bid day activities, post bid activities, and collaboration.

COURSE LEARNING OUTCOMES

Students will be able to:

1. Interpret heavy construction plans and specifications for the purpose of preparing an estimate.
2. Perform a specification review for the purpose of determining whether or not to pursue a bid opportunity.

3. Identify components of a jobsite investigation.
4. Recognize common labor and equipment types appropriate to the Heavy/Civil projects
5. Differentiate between direct costs, indirect costs and markup to cover contractors overhead and profit.
6. Utilize Estimating Software in developing a cost estimate and preparing a bid proposal
7. Quantify various elements of work for a Heavy/Civil construction project.
8. Create a Work Breakdown structure for various components of work commonly found in Heavy/Civil projects
9. Analyze productivity to determine the time required for a construction activity given project conditions.
10. Prepare a preliminary project schedule and derive various indirect project costs.
11. Compare and select Subcontractor and Supplier proposals.
12. Analyze project risk and appropriately quantify them to derive a contingency amount.
13. Summarize the estimate for the purpose of reviewing the bid with a company's upper management.
14. Distribute indirect costs and markup to bid items in a Unit Price bid form.
15. Determine a bid price for a project based upon a schedule of bid items.

ABET Applied and Natural Science Commission (EAC) Student Outcomes:

This course covers the following ABET ANSAC Student Outcomes:
NA

American Council for Construction Education (ACCE) Student Learning Outcomes:

This course can satisfy the following ACCE SLO:
4. Create a construction Project Cost Estimates. (CLO 13)

TEXTBOOKS AND REFERENCE MATERIAL

Estimating Construction Costs, 6th Edition
By Robert Peurifoy and Garold Oberlender
ISBN: 9781307605112 (E-Book: 9781307605105)
You can download the text from https://create.mheducation.com/shop/

Estimating and Bidding for Heavy Construction (supplemental)
By Stuart H. Bartholomew
ISBN: 0-13-598327-4

GRADING POLICY

The following criteria, weights, and grading scale will be used to calculate the Final Grade. Grades are based on the original work of the student, however open discussion is authorized and encouraged on all graded homework. ***Work completed for grade must be the students own work.***

Assignment	Weight
Attendance/Participation	15%
Homework	25%
Quizzes	15%
Estimating Project	30%
Final Exam	15%

Letter Grade	Scale
A+	97% - 100%
A	90% - 97%
B+	87% - 90%
B	80% - 87%
C+	77% - 80%
C	70% - 77%
D	60% - 70%
E	< 60%

COURSE POLICIES, PROCEDURES, AND REQUIREMENTS

Note: University policies may change over time; these requirements may change to match and complement new requirements from the university, college, and school.

Classroom Procedures – Please ensure cell phones are silent or off prior to attending class so as not to disturb any other students. The use of electronic devices is permitted so long as it supports or enhances the course

material and must NOT be a disturbance or nuisance to anyone else in the class. Students are expected to have read the chapters prior to the lecture. Students are also expected to bring their text, the presentation if posted on Blackboard, a calculator, and appropriate writing materials to every class.

General Responsibilities – The responsibility for learning rests with each student. The professor or lecturer will assist by making the classroom environment one conducive to learning but your preparation is essential. The student is responsible for completing all reading assignments and assigned homework problems, and seeking assistance if needed. Students are expected to bring relevant texts, readings, required notes and handouts, appropriate writing materials, and a willingness to engage to every class.

Attendance and Participation – Class attendance is mandatory. Students will receive 1 point for each class. Students are required to sign-in on the attendance sheet in order to receive credit for attending the class. Students arriving late to class or failing to sign the sign-in sheet will not be eligible to receive attendance points for that class. Participation is highly encouraged and will be considered, along with attendance, as part of your grade.

Make-Up Policy – Prior notice will be given to the instructor when a class will be missed. It is the student's responsibility to obtain notes, supplemental material, and assignments from fellow classmates. Only under the most extreme circumstances, supported by written documentation, will a make-up quiz or test be given. The final decision rests with the instructor.

Exams/Quizzes – Quizzes may be given throughout the semester and may not necessarily be announced in advance. Missed quizzes cannot be made up. Sharing calculators or other course materials is not permitted. Exams and quizzes are closed book, closed notes, closed neighbor.
It is possible that some of the Exams/Quizzes will be administered online through Canvas. Students are expected to adhere to the requirements of this syllabus as well as the requirements of the Academic Integrity Policy (see below). It is the student's responsibility to acquire access to a computer meeting the minimum system requirements found at https://community.canvaslms.com/t5/Canvas-Basics-Guide/What-are-the-browser-and-computer-requirements-for-Instructure/ta-p/66
Retaking of a Quiz or Exam due to technical difficulties shall NOT be permitted. Special circumstances may warrant a retake of the exam only when the student can prove the failed computing environment met or exceeded the above requirements at the time of the exam and only at the discretion of the instructor. It is the student's responsibility to ensure a stable and functioning computing environment prior to taking the exam or quiz.
Additionally, students should follow the protocol below when taking an online quiz or exam.

- Ensure you are in a location where you won't be interrupted
- Turn off all mobile devices, phones, etc.
- Do not reference any external materials unless specifically permitted to do so. Such materials include books, papers, websites, other computers, or devices.
- Do not permit others to be in the room while the Quiz/Exam is in progress.
- Log into your course, select the exam, and follow the online instructions.
- Do not exit the exam until all questions are completed and submitted for grading.

Assignments – Assignments must be turned in prior to the beginning of class on the assigned due date. Assignments are to be submitted electronically through Canvas unless otherwise specified in the homework details. All assignments are to be submitted as file attachments. Do *NOT* copy and paste or type your answers directly into the Assignment Submission textbox on Canvas. Assignments submitted in this manner will be considered late.
Late assignments will be penalized 50%. If student is not present for the class, submissions may be considered late. Assignments more than 48 hours late or turned in after an answer key is posted will result in no credit being awarded for the assignment.
If you have questions on homework, I will attempt to help but should not be your first resort – read the book and participate in class. If you do need to reach me, please email me and be sure to include the course number in the subject line.
All questions about scores or grades on specific assignments must be brought to the attention of the instructor within one week of the return of the assignment. Questions on grading must be written on your assignment and resubmitted for review.

Official E-mail – An official ASU e-mail is established for each student, faculty member, and staff member. All university communications sent via e-mail will be sent to this ASU e-mail address. You are required to check your e-mail daily.

Professional Work – Assignments must be submitted in a professional format. Questions must be in the proper order. Answers must be neat, complete, and free of all spelling and grammatical errors. Be sure to show your work, partial credit may be given but will only be considered if it is possible for me to determine how you arrived at your answer. No credit will be allowed for assignments submitted after an answer key is posted or discussed in class.

UNIVERSITY POLICIES

Academic Integrity - Students in this class must adhere to ASU's academic integrity policy, which can be found at https://provost.asu.edu/academic-integrity/policy). Students are responsible for reviewing this policy and understanding each of the areas in which academic dishonesty can occur. All engineering students are expected to adhere to the ASU Academic Integrity Honor Code.

All work submitted for the course cannot have been submitted for any other course or any previous section of this same course. Student academic integrity violations are reported to the Fulton Schools of Engineering Academic Integrity Office (AIO). Withdrawing from this course will not absolve you of responsibility for an academic integrity violation and any sanctions that are applied. The AIO maintains a record of all violations and has access to academic integrity violations committed in all other ASU college/schools.

Unless explicitly allowed by your instructor, the use of generative AI tools on any course assignment or exam will be considered academic dishonesty and a violation of the ASU Academic Integrity Policy. Students confirmed to be engaging in non-allowable use of generative AI will be sanctioned according to the academic integrity policy and FSE sanctioning guidelines.

Student Code of Conduct - The Student Code of Conduct sets forth the standards of conduct expected of students who choose to join the university community. Students who violate these standards will be subject to disciplinary sanctions (http://students.asu.edu/srr/code).

Expected Student Behavior – Students in this class are expected to acknowledge and embrace the FSE student professionalism expectation located at: https://engineering.asu.edu/professionalism/.

Absence & Make-Up - Excused absences for classes will be given without penalty to the grade in the case of (1) a university-sanctioned event [ACD 304-02] ;(2) religious holidays [ACD 304-04]; a list of religious holidays can be found here https://eoss.asu.edu/cora/holidays; (3) work performed in the line-of-duty according [SSM 201-18]. Students who request an excused absences must follow the policy/procedure guidelines. Excused absences do not relieve students of responsibility for any part of the course work required during the period of absence

Disability Accommodations - Suitable accommodations are made for students having disabilities. Students needing accommodations must register with the ASU Student Accessibility and Inclusive Learning Services office and provide documentation of that registration to the instructor. Students should communicate the need for an accommodation in enough time for it to be properly arranged. See ACD 304-08 Classroom and Testing Accommodations for Students with Disabilities

Harassment and Sexual Discrimination - Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling is available if you wish to discuss any concerns confidentially and privately. ASU online students may access 360 Life Services, https://goto.asuonline.asu.edu/success/online-resources.html.

Academic Calendar - The academic calendar (https://students.asu.edu/academic-calendar) contains important dates that students should be aware of, including: the first and last day of class, drop/add deadlines, withdrawal deadlines, and observed holidays.

Copyright Protection – The contents of this course, including lectures and other instructional materials, are copyrighted materials. Students may not share outside the class, including uploading, selling, or distributing course content or notes taken during the conduct of the course. Any recording of class sessions by students is prohibited, except as part of an accommodation approved by the Disability Resource Center (See ACD 304-06, "Commercial Note Taking Services" and ABOR Policy 5-308 F.14 for more information).

Threatening Behavior - Students, faculty, staff, and other individuals do not have an unqualified right of access to university grounds, property, or services (see SSM 104-02). Interfering with the peaceful conduct of university-related business or activities or remaining on campus grounds after a request to leave may be considered a crime. All incidents and allegations of violent or threatening conduct by an ASU student (whether on-or off-campus) must be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students.

Photo Requirement – Arizona State University requires each enrolled student and university employee to have on file with ASU a current photo that meets ASU's requirements (your "Photo"). ASU uses your Photo to identify you, as necessary, to provide you educational and related services as an enrolled student at ASU. If you do not have an acceptable Photo on file with ASU, or if you do not consent to the use of your Photo, your access to ASU resources, including access to classes (online or in person) may be negatively affected or denied.

Syllabus Changes - Any information in this syllabus may be subject to change with reasonable advance notice.

DETAILED CLASS SCHEDULE

Class sessions will be in accordance with the attached schedule. The instructor reserves the right to modify and/or adjust the schedule.

Week	Date	Module/Topic
Week 1	1/8/2024	Welcome – Introductions, syllabus, course overview
	1/10/2024	Module 1 – Introduction to heavy construction estimating
Week 2	*1/15/2024*	*NO CLASS (MLK)*
	1/17/2024	Module 2 – Project cost categories
Week 3	1/22/2024	Module 2 – Project cost categories
	1/24/2024	Module 3 – Direct costs, indirect costs and markup
Week 4	1/29/2024	Module 4 – Estimating software
	1/31/2024	Module 4 – Estimating software
Week 5	2/5/2024	Module 5 – Quantity takeoff
	2/7/2024	Module 5 – Quantity takeoff
Week 6	2/12/2024	Module 5 – Quantity takeoff
	2/14/2024	Module 6 –Drill & blast operations
Week 7	2/19/2024	Module 6 –Drill & blast operations
	2/21/2024	Module 7 – Clearing & demolition
Week 8	2/26/2024	Module 7 – Clearing & demolition
	2/28/2024	Module 7 – Clearing & demolition
Week 9	*3/4/2024*	*NO CLASS (SPRING BREAK)*
	3/6/2024	*NO CLASS (SPRING BREAK)*
Week 10	3/11/2024	Module 8 – Highways & pavements
	3/13/2024	Module 8 – Highways & pavements
Week 11	3/18/2024	Module 8 – Highways & pavements
	3/20/2024	Module 9 – Bulk material handling
Week 12	3/25/2024	Module 10 – Underground utilities
	3/27/2024	Module 10 – Underground utilities
Week 13	4/1/2024	Module 11 – Indirect project costs
	4/3/2024	Module 11 – Indirect project costs
Week 14	4/8/2024	Module 12 – Subcontractor/Supplier selection
	4/10/2024	Module 13 – Project risk and contingency
Week 15	4/15/2024	Module 14 –Reviewing the estimate and pricing the bid
	4/17/2024	Module 14 –Reviewing the estimate and pricing the bid
Week 16	4/22/2024	Project presentations
	4/24/2024	Project presentations
Week 17	4/29/2024	**Final Exam (7:30 am - 9:20 am)**