



Catalog Description: (3 units) Develop an enhanced understanding of quantity take-off and cost estimating of construction resources including materials, labor, and equipment. Skills and knowledge of cost estimating will provide preparation for builders and designers to contribute to construction firms, project management consultants, and owners upon graduation. Topics include: types of cost estimates; budget estimates; preconstruction services estimates; quantity take-off; self-performed work estimates; subcontractor work estimates; and bid preparation.

Prerequisite(s): Advanced Standing in Engineering; MATH 129 or MATH 250B; CE381 or equivalent experience; or with consent of instructor.

Learning outcomes:

Students should be able to:

1. Describe the types of cost estimates and their uses.
2. Prepare budget estimates at various stages of a project.
3. Describe preconstruction services.
4. Demonstrate skills necessary for cost estimating including: analyze construction processes; read specifications and drawings; perform quantity take-off; estimate with lump sum and resource enumeration.
5. Describe the steps in the bidding process.
6. Describe cost elements included in general conditions.
7. Describe the steps in preparing a bid.
8. Describe components of a bid summary, including: overhead, prime work, sub work, labor burden, contingency, taxes, insurance, and fee.
9. Prepare for the cost estimating portion of the FE and PE exams.

Graduates students should also be able to:

10. Integrate the impact of multiple variables into estimates; evaluate risk and quantify risk for incorporation into estimates; develop a construction management plan consistent with an estimate.

Learning outcomes support ABET program outcomes:

Primary

- A. Apply mathematics, science and engineering principles
- K. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
- M. Be proficient in the major areas of civil engineering.

Secondary

- E. Ability to identify, formulate, and solve engineering problems
- F. Understanding of professional and ethical responsibility
- G. Ability to communicate effectively
- L. Pass the FE exam as the first step towards professional registration.

Instructor: Dean Papajohn
Class time & place: TUTH 8:00-9:15 @ Civil Engineering, Room 201
Office Hours: TUTH 9:15-10:00 and by appointment
Office: CE 214B
e-mail: dpapajohn@email.arizona.edu

Require textbook:

- Estimating in Building Construction, by Steven J. Person & Frank R. Dagostino. Pearson, 2015, 8th Edition. (ISBN-13 978-0-13-343110-0)

Other optional resources:

- Construction cost estimating, by Len Holm, John E Schaufelberger, Dennis Griffin, and Thomas Cole. Pearson/Prentice Hall, 2005. (ISBN 0-13-049665-0).
- How to estimate with RS Means data, by Saleh Mubarak. John Wiley and Sons, 2012. (ISBN 978-1-118-02528-4).
- Other materials will be supplied through the course D2L website.

Evaluation for CE483

Homework, quizzes, and participation	30%
Interview project-with construction professional	15%
11 th Hour Bid Simulation	10%
Tests (2)	30%
Final Exam	15%

Evaluation for CE583

Homework, quizzes, and participation	10%
Project	15%
11 th Hour Bid Simulation	10%
Research paper	20%
Tests (2)	30%
Final Exam	15%

Graduate students will be expected to complete additional or alternate problems throughout the semester and present content and problem solutions in class.

These percentages are approximate and may be adjusted during the semester. Homework assignments will be announced in class and must be submitted **at the start of class** on the assigned due date unless otherwise noted. No late assignments will be accepted, including assignments turned in during or at the end of the class, unless special arrangements have been made. Percentage for each category may change depending on assignments.

Your semester grade will be determined as follows:

90-100% = A; 80-89% = B; 70-79% = C; 60-69% = D; 0-59% = E.

Attendance

Students are expected to attend all class meetings and site visits. If a late arrival or an early departure is anticipated, check with the instructor to be sure that it is done without disturbing

the class. The instructor, at his discretion, may decide to consider late arrivals or early departures as full absences. A two week absence may result in administrative withdrawal. If a student misses a class, he/she is responsible for all announcements and subjects covered in that class. If in doubt, contact the instructor.

- All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion,
- Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored.

ADA compliance

The University of Arizona strives to comply with the provisions of the Americans with Disabilities Act and Section 504 of the Rehabilitation Act. Students with disabilities must notify the instructor at the beginning of the semester and must contact the Disability Resource Center.

Academic Integrity

Principle Integrity and ethical behavior are expected of every student in all academic work. This Academic Integrity principle stands for honesty in all class work, and ethical conduct in all labs and clinical assignments. This principle is furthered by the student Code of Conduct and disciplinary procedures established by ABOR Policies 5-308 through 5-404, all provisions of which apply to all University of Arizona students.

This Code of Academic Integrity (hereinafter "this Code") is intended to fulfill the requirement imposed by ABOR Policy 5-403.A.4 and otherwise to supplement the Student Code of Conduct as permitted by ABOR Policy 5-308.C.1.

Failure to follow this code of academic integrity will result in failing the course and be reported to the Dean of Students' office.

Prohibited Conduct

Conduct prohibited by this Code consists of all forms of academic dishonesty, including, but not limited to:

1. Cheating, fabrication, facilitating academic dishonesty, and plagiarism as set out and defined in the Student Code of Conduct, ABOR Policy 5-308-E.6, E.10, and F.1
2. Submitting an item of academic work that has previously been submitted without fair citation of the original work or authorization by the faculty member supervising the work.
3. Violating required professional ethics rules contained or referenced in the student handbooks (hardcopy or online) of undergraduate or graduate programs, or professional colleges.
4. Violating health, safety or ethical requirements to gain any unfair advantage in lab(s) or clinical assignments.
5. Failing to observe rules of academic integrity established by a faculty member for a particular course.
6. Attempting to commit an act prohibited by this Code. Any attempt to commit an act prohibited by these rules shall be subject to sanctions to the same extent as completed acts.

Student Responsibility

Students engaging in academic dishonesty diminish their education and bring discredit to the academic community. Students shall not violate the Code of Academic Integrity and shall avoid situations likely to compromise academic integrity. Students shall observe the generally applicable provisions of this Code whether or not faculty members establish special rules of academic integrity for particular classes. Students are not excused from complying with this Code because of faculty members' failure to prevent cheating.

Prohibited Behavior

A. Threatening Behavior is Prohibited. "Threatening behavior" means any statement communication, conduct or gesture, including those in written form, directed toward any member of the University community that causes a reasonable apprehension of physical harm to a person or property. A student can be guilty of threatening behavior even if the person who is the object of the threat does not observe or receive it, so long as a reasonable person would interpret the maker's statement, communication, conduct or gesture as a serious expression of intent to physically harm.

B. Procedures for Mandatory Reporting of Threatening Behavior If threatened by any student's conduct to the point of reasonable fear of immediate physical harm to self, others or property:

1. Leave the area immediately.
2. Call the Police by dialing 9-1-1 to request that an officer come to the location. Inform the Police if it is a repeat occurrence.
3. Anyone who observes what appears to be threatening behavior must report it to The Dean of Students Office and in the appropriate case file a Student Code of Conduct Complaint (see ABOR 5-403).

TENTATIVE SCHEDULE

(The instructor may change this schedule to accommodate class needs.)

Date	Topics	Readings due (from Estimating in Bldg. Constr. unless otherwise noted)	Homework due
8/22/17	Introduction to Estimating;	Ch.1	Obtain textbook
8/24/17	Estimating Methods	Ch.21	1.12
8/29/17	Labor	Ch. 7	
8/31/17	Equipment	Ch. 8	21.3, 21.4, 21.5(Residential Bldg Project, A4, Detail 1), 21.7, 21.10(Small Commercial Bldg, S8.1, Detail 13), 21.11 7.2, 7.5, 7.7(discuss two alternatives), 7.8, 7.14, 7.15, 7.16, 7.18, 7.22, 7.24, 7.27
9/4/17	Monday-Labor Day		
9/5/17	Contracts, Bonds, Insurance	Ch. 2	Ch.2 quiz in class
9/7/17	Project Manual	Ch. 3	3.13
9/12/17	Review for Exam 1		
9/14/17	Exam 1		
9/19/17	Excavation, Arnold Neave & Rob Presuhn, Granite , https://www.graniteconstruction.com/	Ch. 9	
9/21/17	Excavation, Arnold Neave & Rob Presuhn, Granite	Ch. 9	Site investigation
9/26/17	Excavation	Ch. 9	
9/28/17	Excavation		9.1, 9.7, 9.14, 9.16, 9.18, 9.20, 9.27, 9.28, 9.31, 9.32, 9.35, 9.36, 9.43
10/3/17	Concrete, Bob Carlson, Hunter Contracting Company, http://www.huntercontracting.com/	Ch. 10	
10/5/17	Concrete	Ch. 10	
10/10/17	Concrete	Ch. 10	10.2, 10.3, 10.4, 10.7, 10.9, 10.12, 10.16, 10.21, 10.22, 10.23, 10.27, 10.28,

10/12/17	Overhead and contingencies	Ch. 6	10.61 (Commercial building) 10.62
10/17/17	Masonry, Wayne Coalter, A Bid Helper, LLC	Ch. 11	Ch. 11 Quiz on D2L
10/19/17	Masonry	Ch. 11	
10/24/17	Review for Exam 2		HW 11.13-16, 11.19
10/26/17	ATB-Southern Arizona Construction Career Days (volunteers needed) http://www.saccd.org/ No class		
10/31/17	Exam 2		
11/2/17	Earthwork and heavy civil construction, Anthony Heim, Rummel Construction, Inc., https://www.rummelconstruction.com/		
11/4/17 Saturday (Required)	11 th Hour Bid Simulation (Saturday, 8:00-1:00), ASPE http://www.aspenational.org/		
11/7/17	Wood	Ch. 13	
11/9/17	DBIA in Philly – No Class		
11/10/17	Veteran’s Day – No Class		
11/14/17	Wood	Ch. 13	13.2, 13.3, 13.5, 13.6, 13.7, 13.11, 13.13, 13.14, 13.15
11/16/17	Construction site visit at Raytheon Trey Beckham, Brasfield & Gorrie https://www.brasfieldgorrie.com/		
11/21/17	Structural Steel, Chris DeYoung, JB Steel, http://www.jbsteel.net/	Ch. 12	Ch. 12 Quiz on D2L
11/23/17	Thanksgiving - No Class		
11/28/17	Steel		
11/30/17	Controls, Mike Goodwin, Climatec, http://www.climatec.com/	Ch. 17	Ch. 17 Quiz on D2L
12/5/17	Review for Final Exam		
12/7/17	Reading Day		
12/14/17 10:00- 12:00 PM	Final Exam		