Engineering Faculty Document No. 63-07

August 20, 2008

To: The Faculty of the College of Engineering

From: Division of Construction Engineering and Management

Subject: New Course

The Faculty of the Division of Construction Engineering and Management (CEM) has approved the following new course listed below. This action is now submitted to the Engineering Faculty with recommendation for approval.

CEM 22100 Plans & Estimates
Sem. 1 & 2 Class 3, cr.3.
Prerequisite: CGT 16400 Graphics for Civil Engineering and Construction
CEM 19100 – Construction Internship I
CEM 22000 – Construction Management

Course Description: An investigation of the methods used to develop construction project estimates, with primary emphasis on quantity takeoffs. This course offers a basic introduction to construction contracts, plus detailed investigations of the interpretation of construction plans and specifications.

Reason: This course will be taught by the same instructor of the existing CE 22100 Construction Plans & Estimates course in fulfillment of the Construction Engineering (CNE) degree requirements. The syllabus of the existing course is attached. This course will be co-listed and continue to be offered in both the Spring and Fall semesters. CEM majors must enroll in this course to fulfill degree requirements.

Makarand Hastak August 20, 2008
Professor and Head

CE 221 - Construction Plans and Estimates: Course Description

CE 221: CONSTRUCTION PLANS AND ESTIMATES

Professor: Do Hyoung Shin, Ph.D. CIVL 1233 Phone: (765) 494-0642
Email: doland@purdue.edu
Office Hours: Mon: 3:00 - 4:00 p.m.

Teaching Assistants: Nader Naderpajouh CIVL 1255 Phone: (765) 494-0696
(Lab Section – Wed: 2:30 – 5:20 p.m.)
Email: nnp@purdue.edu
Office Hours: Mon: 3:30pm – 5:30pm.

Eun Ho (Daniel) Oh CIVL 1255 Phone: (765) 494-0696
(Lab Section – Fri: 2:30 – 5:20 p.m.)
Email: ohe@purdue.edu
Office Hours: Tue: 1:30pm – 2:30pm.
Thu: 1:30pm – 2:30pm.

TIME/	Spring Semester 2008		
VENUE:	Mondays and Wednesdays:	12:30 a.m..- 1:20 p.m. (lectures)	CIVL 1144
	Wednesday/Friday	2:30 p.m - 5:20 p.m. (Lab sections 1&2)	CIVL 3153

SUMMARY
The course provides an investigation into the principal methods, tools and techniques used to develop building construction project estimates, with primary emphasis on estimate planning and organization, quantity takeoffs and pricing. It also includes a basic introduction to construction contracts, estimate types and factors associated with determining costs of constructing projects. A series of individual and group graded laboratories on specific topics, and a comprehensive group project to develop the complete cost estimate for a real facility as a competitive bid will be required.

COURSE PREREQUISITES
CGT 155 or 170.
CE 220 – highly recommended prerequisite

TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIAL

Textbooks/required material:

1. Dagostino, F. R. and Feigenbaum, L. *Estimating in Building Construction* (6th Edition). Prentice Hall, New Jersey, 2003.
2. One complete set of plans and specifications ("package") for the group project. This "package" will be issued to each of the teams, and its cost will be assessed and distributed among the members of each team at that time.

3. Richardson Engineering Services, Inc. General Construction Estimating Standards (Volumes 1, 2 & 3). Richardson Engineering Services, Inc., Mesa, Arizona.
   This set of reference books will be issued to each project team on a loan basis for the duration of the project. The team will be responsible for maintaining the original issue condition.

References:

1. Daniel. W. Halpin and Ronald W. Woodhead . *Construction Management* (3rd Edition). John Wiley & Sons, New York.

OBJECTIVES OF THE COURSE

By the end of this course, the student will be able to:

- Identify and distinguish the different types of building construction project estimates and the role they play in the facility development process.
- Identify and use principal methods, tools, and techniques used to develop building construction project estimates.
- Demonstrate specific skills in the interpretation of construction plans and specifications, estimate planning and organization, quantity takeoffs and pricing, construction contracts, labor and equipment productivity, conceptual estimating, bidding strategies, and overhead costs.
- Design construction estimates for commercial building projects.
- Identify links with other courses in the construction-engineering curriculum that will provide a comprehensive view of the construction engineering profession.

Topics covered

Role of estimating in construction, Estimating fundamentals, Blueprint reading, Equipment use and productivity calculations, Labor and material costs, Sitework and excavation quantity takeoffs, Concrete construction, Masonry construction, Steel construction and structural steel estimating, Estimating general condition, Carpentry, Thermal and moisture protection, Electrical construction, Mechanical and plumbing construction, Calculating indirect costs, Subcontractor quote analysis, Advanced estimating methods, Linking estimating and scheduling, Computerized estimating.

ATTENDANCE

In accordance with University Regulations, Part 2, Section VI A, effective Fall Semester 1999, " ... Students are expected to be present for every meeting of classes they are enrolled. ...All matters relative to attendance, including the make-up of missed work, are to be arranged between the student and the instructor involved." Thus, a class sign-up sheet will be passed each lecture and each lab, and will become the record of the student's attendance during the semester. Any anticipated absences must be cleared with the instructors, in advance if possible, with a typewritten or word-processed memorandum stating the date and the reason for the absence or the absence will be considered unexcused. A student may have no more than two **(2)** unexcused absences. In addition, for seniors only, up to a total of three **(3)** plant trips will be considered excused absences.

> *Three unexcused absences will result in a **grade reduction of 5% points from the overall student score.** Any subsequent unexcused absence (beyond three) will result in an **additional grade reduction of 2% points per absence from the overall student score.***

Failure to be present at any class does not relieve the student of his/her obligations for the materials covered or assigned in class.

LECTURES AND ASSIGNED READINGS

The detailed list of lecture topics and assigned readings is contained in the Course Schedule. The lectures provide the conceptual framework for the course and supplement (i.e., not replace) the assigned readings. The student is expected to have a good understanding of the lecture and reading materials, whether they are present in the class or not.

QUIZZES

There will be a quiz about every two weeks, covering the course material for that period. Quizzes missed as a result of an "unexcused" absence CANNOT be made up.

LABORATORY REPORTS

Laboratory reports will be due at the beginning of the laboratory period after the period in which it was assigned until stated otherwise. Please refer to Special Policy-1. Laboratory reports should be turned in word-processed format or handwritten on engineering paper. Only one side of the paper should be used. Laboratory reports that deviate from these instructions will not be accepted. **Laboratory reports should be turned in with team member names, course number, and report number on the cover sheet. Pages should be numbered.** Professional presentation, good organization, and proper documentation are very important components of the laboratory report grade. The labs will generally be developed, collected and graded by the teaching assistant. Any questions regarding lab assignments should be directed to the teaching assistant before involving the instructor. The overall lab grade of each student will be adjusted based on his/her peer evaluation of the students' work within the team for the overall lab assignments (Special Policy 2).

TERM PROJECT

There is one (1) term project that will be completed during the second half of the semester. The term project tests the students' understanding of the principal concepts covered in the course within the context of a comprehensive "real-world" problem. In the group project, teams will prepare a complete bid using a complete set of plans and specifications for a real facility. **This "Bid Package" will be issued to each group during one of the laboratory sessions, and its cost will be assessed and distributed among the members of each group at that time.** The term project has **one (1) Final Bid Submittal**. This submittal will receive a single group grade. However, the individual grade of each student depends on his/her peer evaluation of the student's work within the team for the submittal (Special Policy 3). The term project is considered a bid, i.e., it has to be turned in on the date and time it is due or it will not receive any credit at all.

EXAMS

There are **three (3) exams** in the course. The exams will test the individual student's understanding of some of the principal concepts covered in the course. The exams cover material discussed in the lectures and labs or included in the assigned readings up to the time of the exam. Each exam will include two sections (a) a closed book section, and (b) an open-book section. **No absences will be excused on the days of exams.**

GRADING

*	Quizzes	20%
*	Laboratories	30%
*	Group Project	20%
*	Exams (equal weights)	30%
	Total	**100%**

There will be no curve for the final grade. The minimum cutoff for an A is 90%; for a B is 80%; for a C is 70%; and for a D is 60%. Anything below 60% is considered an F.

SPECIAL POLICY-1

POLICY FOR LATE SUBMISSION OF LABORATORY REPORTS (ALL LABORATORY REPORTS MUST BE SUBMITTED)

- If the laboratory report is *submitted after the specified time but on the same day*: **25% deduction from the total score obtained;**
- If the laboratory report is *submitted one day after the specified deadline*: **50% deduction from the total score obtained;**
- If the laboratory report is *submitted two days after the specified deadline*: **75% deduction from the total score obtained;**
- If the laboratory report is *submitted more than two days after the specified deadline*: **0 point (i.e., 100% deduction).**

SPECIAL POLICY 2: PEER EVALUATION FOR THE LAB ASSIGNMENTS

The overall grade of each student for the laboratory assignments will depend on the evaluations of his or her work by his/her peers within the team. Thus, each student should include a special peer evaluation form with the final lab report according to the following instructions:

a. Each person in the group should receive what you perceive is the person's overall contribution to the lab assignments. Allocate a total of 100 points among the group members (i.e., do not include yourself). In allocating points, please use whole numbers, (i.e., no fractions). Enter all supporting comments on the evaluation form.

b. Peer evaluations will be treated strictly confidential.

c. Please include this evaluation form in a sealed envelope with the final lab report. If you do not turn in a form, the other members of your group will receive an **EQUAL DISTRIBUTION** as your default evaluation.

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Name: _____

Assignment: __Lab Assignments (Overall)__

Date: _____

PEER EVALUATION	POINTS ASSIGNED
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____

Comments:

_____

_____

_____

SPECIAL POLICY 3: PEER EVALUATION FOR THE GROUP PROJECT

The individual grade of each student for the term project will depend on the evaluations of his or her work by his/her peers within the team. Thus, each student should include a special peer evaluation form with the Final Bid Submittal according to the following instructions:

a. Each person in the group should receive what you perceive is the person's overall contribution to the group project. Allocate a total of 100 points among the group members (i.e., do not include yourself). In allocating points, please use whole numbers, (i.e., no fractions). Enter all supporting comments on the evaluation form.

b. Peer evaluations will be treated strictly confidential.

c. Please include this evaluation form in a sealed envelope with the Final Bid Submittal. If you do not turn in a form, the other members of your group will receive an **EQUAL DISTRIBUTION** as your default evaluation.

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Name: _____

Assignment: ____Group Term Project_____

Date: _____

PEER EVALUATION	POINTS ASSIGNED
1. _____	_____
2. _____	_____
5. _____	_____
6. _____	_____

Comments:

_____

_____

_____

COURSE SCHEDULE

CE 221 – Construction Plans and Estimates

Date	Lecture Topic	Assigned Readings	Individual Assignments
WEEK 1			
Monday 01/07	Introduction/Course Requirements	Review Course Syllabus	—
Wednesday 01/09	Role of Estimating in Construction	Dagostino: 1, 2 Halpin: 2, 3, 4	—
WEEK 2			
Monday 01/14	Role of Estimating in Construction	Dagostino: 3,4	—
Wednesday 01/16	Estimating Fundamentals	Dagostino: 4	Quiz 1
WEEK 3			
Monday 01/21	**HOLIDAY: MLK Day**	—	—
Wednesday 01/23	Sitework	Dagostino: 8	—
WEEK 4			
Monday 01/28	Sitework	Dagostino: 8	—
Wednesday 01/30	Concrete Construction	Dagostino: 9	Quiz 2
WEEK 5			
Monday 02/04	Concrete Quantity Takeoffs	Dagostino: 9	—
Wednesday 02/06	**FIRST-EXAM-PART-I**	—	—
WEEK 6			
Monday 02/11	**FIRST-EXAM-PART-II**	—	—
Wednesday 02/13	Masonry Construction	Dagostino: 10	—
WEEK 7			
Monday 02/18	Masonry Quantity Takeoff and Pricing	Dagostino: 10	—
Wednesday 02/20	Steel Construction and Structural Steel Estimating	Dagostino: 11	—
WEEK 8			
Monday 02/25	Steel Quantity Takeoff and Pricing	Dagostino: 11	Quiz 3
Wednesday 02/27	Labor and Material Costs	Dagostino: 6	—

Date	Lecture Topic	Assigned Readings	Individual Assignments
WEEK 9			
Monday 03/03	Labor Burden	Dagostino: 6	—
Wednesday 03/05	Wood Construction	Dagostino: 12	—
WEEK 10			
Monday 03/10	**SPRING BREAK**		
Wednesday 03/12	**SPRING BREAK**		
WEEK 11			
Monday 03/17	Wood Construction	Dagostino: 12	—
Wednesday 03/19	Quantity Takeoff and Pricing	Dagostino: 12	Quiz 4
WEEK 12			
Monday 03/24	**SECOND-EXAM-PART-I**	—	—
Wednesday 03/26	**SECOND-EXAM-PART-II**	—	—
WEEK 13			
Monday 03/31	Thermal and Moisture Protection And Finishes	Dagostino: 13,14,15	—
Wednesday 04/02	Subcontractor Quote Analysis	Dagostino: 4,5	Sub Contractor Quotes
WEEK 14			
Monday 04/07	Equipment Use and Productivity Calculations	Dagostino: 7	—
Wednesday 04/09	Equipment Use and Productivity Calculations	Dagostino: 7	—
WEEK 15			
Monday 04/14	Estimating General Conditions	Dagostino: 4,5	—
Wednesday 04/16	Cntracts/AIA Document A201	Dagostino: 1,2,3	Quiz 5
WEEK 16			
Monday 04/21	Advanced Topics	—	Class Evaluations
Wednesday 04/23	**BID OPENING –2:30-5:30 pm**	**LAB SESSION**	**BIDS DUE BY 5:00 PM**
Friday 04/25	**BID OPENING –2:30-5:30 pm**	**LAB SESSION**	**BIDS DUE BY 5:00 PM**
WEEK 17			
Mon - Fri 04/28 – 05/02	**FINAL EXAM WEEK**	—	—

LAB SCHEDULE

CE 221 –Construction Plans & Estimates

Date	Lab Topic	Assigned Readings	Group Assignments
WEEK 1 (Jan 7-11)	**Development of Site Investigation Report**	Chapter 1 & 2	Due week 2
WEEK 2 (Jan 14-18)	**Blueprint Reading I**	Chapters 3	Due week 3
WEEK 3 (Jan 21-25)	**Blueprint Reading II/Sitework**	Chapter 4	Due week 4
WEEK 4 (Jan 28-Feb 1)	**Sitework Quantities & Pricing**	Chapter 9	Due week 5
WEEK 5 (Feb 4-8)	**Calculation of Concrete Quantities**	Chapter 9	Due week 8
WEEK 6 (Feb 11-15)	**Calculation of Concrete Quantities**	Chapter 9	Due week 8
WEEK 7 (Feb 18-22)	**Calculation of Concrete Quantities**	Chapter 10	Due week 8
WEEK 8 (Feb 25-29)	**Masonry Quantities & Pricing**	Chapter 10	Due week 10
WEEK 9 (Mar 3-7)	**Masonry Quantities & Pricing**	Chapter 11	Due week 10
WEEK 10 (Mar 10-14)	**Spring Break**		
WEEK 11 (Mar 17-21)	**Structural Steel Quantities & Pricing**	Chapter 12	Due week 11
WEEK 12 (Mar 24-28)	**Carpentry Quantities**	Chapter 13	Due week 12
WEEK 13 (Mar 31-Apr 4)	**Thermal and Moisture Protection**	Chapter 14,15,16	Due week 13
WEEK 14 (Apr 7-11)	**Estimation Software**	Appendix-G	Due week 15
WEEK 15 (Apr 14-18)	**Final Bid Project Preparation**		
WEEK 16 (Apr 21-25)	**Dead Week** **BID OPENING (2:30 – 3:00 PM)**	LAB SESSION	**BIDS DUE BY 3:00 PM** **Lab Evaluations**