Office of the Registrar
FORM 40 REV. 11/09

**PURDUE UNIVERSITY**
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

EFD 42-09

DEPARTMENT: Division of Construction Engineering and Management
EFFECTIVE SESSION: Spring 2011 (201020)

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

- [x] 1. New course with supporting documents
- [ ] 2. Add existing course offered at another campus
- [ ] 3. Expiration of a course
- [ ] 4. Change in course number
- [ ] 5. Change in course title
- [ ] 6. Change in course credit/type
- [ ] 7. Change in course attributes (department head signature only)
- [ ] 8. Change in instructional hours
- [ ] 9. Change in course description
- [ ] 10. Change in course requisites
- [ ] 11. Change in semesters offered (department head signature only)
- [ ] 12. Transfer from one department to another

| PROPOSED: | | EXISTING: | |
|---|---|---|---|
| Subject Abbreviation | CEM | Subject Abbreviation | |
| Course Number | 30200 | Course Number | |
| Long Title | Practical Applications for Construction Engineering | | |
| Short Title | Practical Appl for Constr Engr | | |

Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

TERMS OFFERED
Check All That Apply:
[ ] Summer [ ] Fall [x] Spring

CAMPUS(ES) INVOLVED
[ ] Calumet [ ] N. Central
[ ] Cont Ed [ ] Tech Statewide
[ ] Ft. Wayne [x] W. Lafayette
[ ] Indianapolis

CREDIT TYPE
1. Fixed Credit: Cr. Hrs. 3.0
2. Variable Credit Range:
Minimum Cr. Hrs
(Check One) To [ ] Or [ ]
Maximum Cr. Hrs
3. Equivalent Credit: Yes [ ] No [x]

COURSE ATTRIBUTES: Check All That Apply
1. Pass/Not Pass Only [ ]
2. Satisfactory/Unsatisfactory Only [ ]
3. Repeatable [ ]
Maximum Repeatable Credit: [ ]
4. Credit by Examination [ ]
5. Special Fees [ ]
6 Registration Approval Type
Department [x] Instructor [ ]
7 Variable Title [ ]
8 Honors [ ]
9 Full Time Privilege [ ]
10 Off Campus Experience [ ]

| Schedule Type | Minutes Per Mtg | Meetings Per Week | Weeks Offered | % of Credit Allocated |
|---|---|---|---|---|
| Lecture | 50 | 3 | 16 | 100 |
| Recitation | | | | |
| Presentation | | | | |
| Laboratory | | | | |
| Lab Prep | | | | |
| Studio | | | | |
| Distance | | | | |
| Clinic | | | | |
| Experiential | | | | |
| Research | | | | |
| Ind. Study | | | | |
| Pract/Observ | | | | |

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

Prerequisite: CEM 30100 Project Control & Life Cycle Execution of Constructed Facilities
Scheduling utilizing industry software such as: Project Planning and Scheduling techniques, Resource Management and Project Monitoring. Reading and Interpreting Contract Plans, Estimating and Contract Bidding, Development and exploration of various elements of Project Cost, Cash Flow and Risk Management will also be studied.

*COURSE LEARNING OUTCOMES

At the conclusion of this course, the students should demonstrate proficiency in Reading and Interpreting Contract Plans, Estimating and Contract Bidding, Development and exploration of various elements of Project Scheduling utilizing industry software such as: Project Planning and Scheduling techniques, Resource Management and Project Monitoring.

| | Date | | Date |
|---|---|---|---|
| Calumet Department Head | | Calumet School Dean | |
| Fort Wayne Department Head | | Fort Wayne School Dean | |
| Indianapolis Department Head | | Indianapolis School Dean | |
| North Central School Dean | | North Central Vice Chancellor for Academic Affairs | |
| West Lafayette Department Head | 3/24/10 | West Lafayette College/School Dean | 5/24/2010 |
| West Lafayette Registrar | 9/2/10 | | |

OFFICE OF THE REGISTRAR

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EFD 4209

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| Lab Prep | | | | |
| Studio | | | | |
| Distance | | | | |
| Clinic | | | | |
| Experiential | | | | |
| Research | | | | |
| Ind. Study | | | | |
| Pract/Observ | | | | |

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

Prerequisite: CEM 30100 Project Control & Life Cycle Execution of Constructed Facilities
Scheduling utilizing industry software such as: Project Planning and Scheduling techniques, Resource Management and Project Monitoring. Reading and Interpreting Contract Plans, Estimating and Contract Bidding, Development and exploration of various elements of Project Cost, Cash Flow and Risk Management will also be studied.

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| | | | |
|---|---|---|---|
| Calumet Department Head | Date | Calumet School Dean | Date |
| Fort Wayne Department Head | Date | Fort Wayne School Dean | Date |
| Indianapolis Department Head | Date | Indianapolis School Dean | Date |
| North Central School Dean | Date | North Central Vice Chancellor for Academic Affairs | Date |
| West Lafayette Department Head | Date | West Lafayette College/School Dean | Date |
| | | West Lafayette Registrar | Date |

3/24/10 5/24/2010

OFFICE OF THE REGISTRAR

**TO:** The Faculty of the College of Engineering

**FROM:** Division of Construction Engineering and Management

**RE:** New Undergraduate Course CEM 30200
Practical Applications for Construction Engineering

The faculty of the Division of Construction Engineering and Management has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

**CEM 30200 Practical Applications for Construction Engineering**
Sem. 2, Lecture 3, cr.3.
Prerequisite: CEM 30100 - Project Control & Life Cycle Execution of Constructed Facilities

**Description:** This course teaches practical applications of the theories, tools and skills taught in CEM 201 and CEM 301. Construction processes will be studied through hands on exercises working with actual contract plans and specifications and computerized project scheduling of the sample project that is the focus of the class. Topics that will be explored are Contract Format, Understanding Contract Specifications.

**Reason:** This course will be taught in fulfillment of the Construction Engineering (CNE) degree requirements. The syllabus of the course is attached. This course will be offered in the Spring semester. CEM majors must enroll in this course to fulfill degree requirements.

Makarand Hastak, Professor and Head
Division of Construction Engineering and Management

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

ECC Minutes #21

Date 3/30/10

Chairman ECC R. Cipra

# *CEM 497-005 PRACTICAL APPLICATIONS FOR CONSTRUCTION ENGINEERING*

**Professor:** Victor Gervais CIVL 1233 Phone: (765) 494-0642

Email: vgervais@purdue.edu

Office Hours: Mon: 2:00 - 3:00 p.m.

**Teaching Assistant:** Nader Naderpajouh CIVL 1255 Phone: (765) 494-0696

Email: nnp@purdue.edu

Office Hours: Tues: 4:15 – 5:15 p.m.

Thurs: 4:15 – 6:15 p.m.

**TIME:** Spring Semester 2010

**VENUE:** MWF: 2:30 p.m. - 3:20 p.m. CIVL 2118

## SUMMARY

This course teaches practical applications of the theories, tools and skills taught in perquisite courses. Construction processes will be studied through hands on exercises working with actual contract plans and specifications and computerized project scheduling of the sample project that is the focus of the class. Topics that will be explored will be Contract Format, Understanding Contract Specifications, Reading and Interpreting Contract Plans, Estimating and Contract Bidding, Development and exploration of various elements of Project Scheduling utilizing industry software such as: Project Planning and Scheduling techniques, Resource Management and Project Monitoring. Cost, Cash Flow and Risk Management will also be studied. Course includes individual and group graded assignments on specific topics, and a comprehensive group project to develop the complete cost estimate and a detailed project schedule for a real facility. A comprehensive bid package including project schedule will be required.

## COURSE PREREQUISITES

CEM 497-003 Engineering Management of Constructed Facilities Life

CEM 497-004 Project Control Life Cycle Constructed Facilities

## 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. Newitt, Jay, S. *Construction Scheduling* (2nd Edition). Prentice Hall, New Jersey, 2009.
3. *Pearson Construction Technology*, Purdue University, CEM302, Pearson, 2009.

   This is a custom textbook which includes 1. and 2. in their entirety. ISBN10: 0558457797
4. One complete set of plans and specifications ("package") for the group project. This "package" will be issued to each of the teams.
5. RS Means Building Construction Data

*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.
2. Hinze, Jimmie (2008). *Construction Planning and Scheduling*, 3rd edition, Prentice Hall, Upper Saddle River, New Jersey.
3. Henry Naylor (1995). *Construction Project Management: Planning and Scheduling*, Delmar Publishers.

**OBJECTIVES OF THE COURSE**

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

- Ability to read, comprehend and interpret construction contract plans and specifications. Through hands on use of plans and specifications from an actual project, they will be taken through the process of using and understanding the various sections of the contract documents.
- Identify and distinguish the different types of building construction project estimates and the role they play in the facility development process.
- 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.
- Ability to develop and utilize a computerized network schedule for the example construction project. Scheduling will address logic flow and contract status through data analysis of activities updates including resource and dollar loading.
- Identify and use principal methods, tools, and techniques used to develop building construction project estimates and project schedules.

***TOPICS COVERED***

Topics that will be explored will be Contract Format, Understanding Contract Specifications, Reading and Interpreting Contract Plans, Estimating and Contract Bidding, Development and exploration of various elements of Project Scheduling utilizing industry software such as: Project Planning and Scheduling techniques, Resource Management and Project Monitoring. Cost, Cash Flow and Risk Management will also be studied.

*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 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.

### *PRACTICAL Project Reports*

Practical project reports will be due at the beginning of the lecture period after the period in which it was assigned until stated otherwise. Project reports should be turned in word-processed format or handwritten on engineering paper. Only one side of the paper should be used. Project reports that deviate from these instructions will not be accepted. **Project 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 report grade. The reports will generally be developed, collected and graded by the teaching assistant. Any questions regarding project assignments should be directed to the teaching assistant before involving the instructor.

### *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 including network schedule using a complete set of plans and specifications for a real facility. The term project has **one (1) Final Bid Submittal.** This submittal will receive a single group grade. 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. **Set of plans** must be returned along with the **Final Bid Submittal.**

*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 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% |
| * | Practical Projects | 30% |
| * | Team 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.

## PROCEDURE IN THE EVENT OF A MAJOR CAMPUS EMERGENCY

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Here are ways to get information about changes in this course. Blackboard Vista web page, my email address: vgervais@purdue.edu, and my office phone: 494-0642.

| WEEK | LECTURE TOPIC | ASSIGNED READINGS/ IMPORTANT DATES |
|---|---|---|
| 1 | Contract - Bidding, Plans, Specs<br>Role of Estimating in Construction | Chapter 1 - 2 |
| 2 | Discuss Project Drawings<br><br>Study Project Pics – Excavation, Piling, Shoring<br>Project Site Visit | Mackey Renovation Contract<br>**Memorandum regarding term project** |
| 3 | Sitework /Shoring<br>Sitework | Chapter 8<br>**Quiz 1** |
| 4 | Concrete - Piles, Footings, Foundations, Slabs<br>Concrete | Chapter 9 |
| 5 | Concrete – Rebar<br>Concrete/Rebar | Chapter 9<br>**Quiz 2** |
| 6 | Structural Steel Estimating<br>Steel | Chapter 11<br>**EXAM 1** |
| 7 | Masonry<br>Masonry | Chapter 10 |
| 8 | Wood Construction<br>Wood | Chapter 12<br>**Quiz 3** |
| 9 | Labor Costs<br>Equipment Use and Productivity | Chapter 6 - 7 |
| 10 | Bar Chart Schedules<br>Introduction to CPM Scheduling | Chapter 29 - 30 |
| 11 | Creating the Network Logic Diagram<br>Determining Durations | Chapter 31 - 33<br>**Quiz 4** |
| 12 | Calculating Float<br>Reviewing and Analyzing the Schedule | Chapter 34 - 36<br>**EXAM 2** |
| 13 | Updating the Schedule<br>Using the Schedule to Forecast and Balance Resources | Chapter 39 - 40 |
| 14 | Cost Schedule Control System Criteria<br>Introduction to Computerized CPM Scheduling | Chapter 41,44<br>**Quiz 5** |
| 15 | Managing Projects - Primavera Project Planner (P3) | Chapter 45<br>**SUBMISSION OF TERM REPORTS** |
| 16 | Managing Projects Using SureTrak | Chapter 46 |
| | | |