ITT Technical Institute

CM490T

Capstone Project

Onsite Course

SYLLABUS

Credit hours: 4

Contact/Instructional hours: 60 (36 Theory Hours, 24 Lab Hours)

Prerequisite(s) and/or Corequisite(s):

Prerequisites: Completion of a minimum of 164 credits earned in the program of study including CM440T Construction Project Scheduling or equivalent and CM450T Cost Estimating and Analysis or equivalent

Course Description:

Students will apply the effective use of estimation and management processes contained in the program in the completion of a simulated construction project.

Syllabus: Capstone Project

Instructor:	_____
Office hours:	_____
Class hours:	_____

Major Instructional Areas

1. Competitive bidding for a construction project
2. Management planning for a construction project
3. Applying basic construction management skills

Course Objectives

1. Respond to a public bid announcement for a construction project with a realistic project plan.
2. Describe the advantages of using computer software and Web resources for construction managers.
3. Create a bid in response to a public bid announcement for a construction project.
4. Prepare a presentation describing the key aspects mentioned in a bid.

SCANS Objectives

SCANS is an acronym for Secretary's Commission on Achieving Necessary Skills. The committee, created by the National Secretary of Labor in the early 1990s, created a list of skills and competencies that the committee feels are necessary for employees to function in a high-tech job market.

1. Acquire and evaluate information.
2. Employ computers to acquire, organize, analyze, and communicate information.
3. Demonstrate competence in selecting technology to achieve desired outcomes.

Course Outline

Note: All graded activities, except the Project, are listed below in the pattern of <Unit Number>.<Assignment Number>. For example, Analysis 3.1 refers to the 1st analysis activity in Unit 3.

Unit	Activities
1—Introduction and Bid Announcement	• Content Covered: *Construction Project Management: A Practical Guide to Field Construction Management*: ο Chapter 1, "Construction Practices" ο Chapter 2, "Management System," pp. 17-25 ITT Tech Virtual Library> Periodicals> ProQuest (all) ο "15 keys for successful construction, estimating, and bidding" Joseph A Brown. *AACE International Transactions*. Morgantown: 1998. pg. ES30, 3 pgs • Project 1: Start
2—Project 1: Small Single-Family Residential Project	• Read from *Construction Project Management: A Practical Guide to Field Construction Management*: ο Chapter 3, "Project Cost Estimating," pp. 31-34 and pp. 44-56 ο Chapter 4, "Project Planning," pp. 68-74 ο Chapter 5, "Project Scheduling," pp. 121-126 • Read from ITT Tech Virtual Library> Periodicals> EbscoHost Business Source Premier ο "Drivers for Cost Estimating in Early Design: Case Study of Residential Construction." By: Stoy, Christian; Pollalis, Spiro; Schalcher, Hans-Rudolf. *Journal of Construction Engineering & Management*, Jan2008, Vol. 134 Issue 1, p32-39, 8p, 2 Diagrams, 5 Charts, 7 Graphs; DOI: 10.1061/(ASCE)0733-9364(2008)134:1(32) ο "Estimating Performance Time for Construction Projects." By: Hoffman, Greg J.; Thal Jr., Alfred E.; Webb, Timothy S.; Weir, Jeffery D.. *Journal of Management in Engineering*, Oct2007, Vol. 23 Issue 4, p193-199, 7p, 1 Diagram, 4 Charts, 1 Graph; DOI: 10.1061/(ASCE)0742-597X(2007)23:4(193) • Project 1: Continue
3—Project 1: "Public" Bid Opening	• Read from *Construction Project Management: A Practical Guide to Field Construction Management*: o Chapter 6, "Production Planning" o Chapter 11, "Project Financial Management" • Project 1: Submit • Analyses: 3.1
4—Project 1: Bid Analysis	• Read from ITT Tech Virtual Library> Periodicals> ProQuest (all) o "Computers for Construction 2002 Announces Keynote: Technology to the Bottom Line." *Business Wire*. New York: Sep 24, 2002. p. 1 • Analyses: 4.1
5—Computers in Construction	• Analyses: 5.1
6—Project 2: Design-Bid-Build	• Read from *Construction Project Management: A Practical Guide to Field Construction Management*:

Unit	Activities
Project	○ Chapter 12, "Scheduling Applications" • Read from ITT Tech Virtual Library> Periodicals> EbscoHost Business Source Premier ○ "DESIGN-BUILD vs. Design-Bid-Build." By: Ellis, Rebecca. *Engineered Systems*, May2008, Vol. 25 Issue 5, p28-28, 1p • Project 2: Start • Analyses: 6.1
7—Project 2: Value Engineering and Teamwork and Open Lab: Bid Preparation	• Read from ITT Tech Virtual Library> Periodicals> EbscoHost MasterFile Premier ○ "Supportive Network." By: Le Beau, Christina. *FamilyPC*, Oct2000, Vol. 7 Issue 10, p42, 1p, 1 Color Photograph; Reading Level (Lexile): 1210 • Project 2: Continue
8—Project 2: Scheduling and Safety	• Project 2: Continue
9—Project 2: "Public" Bid Opening	• Project 2: Submit • Analyses: 9.1
10—Project 2: Oral Presentation	• Analyses: 10.1
11—Final Analysis and Review	• Course Review

Instructional Methods

This course will provide you an opportunity to apply the various construction management concepts and techniques to a real scenario. You will complete two projects, covering residential and commercial building construction, and analyses assignments.

The course will start with a quick review of previous ITT program material and expectations for this class. Then, the instructor will issue bid instructions for the first project, which is about a simple wood-frame structure. The goal of the first project is to review construction formats, perform some quick quantitative calculations, and understand standard practices used to evaluate and compare competitive performance.

Computers in construction will be covered in Unit 5. Critical to this overview is the introduction of evolving Web and Internet technologies that you will be constantly exposed to during your careers.

The second project is a design-bid-build project for the configuration and placement of the shell of a commercial building at a small site with specific square footage and parking requirements. You will be expected to evaluate alternate framing systems and propose what you see as the most competitive approach to the design and construction of the project.

Instructional Materials and References

Student Textbook Package
Sears, S. Keoki, Glenn A. Sears, and Richard H. Clough. *Construction Project Management: A Practical Guide to Field Construction Management*. 5th ed. New Jersey: John Wiley & Sons, Inc., 2008.

Equipment and Tools

- Microsoft Project
- AutoCAD

References

ITT Tech Virtual Library

Log on to the ITT Tech Virtual Library at http://www.library.itt-tech.edu/ to access online books, journals, and other reference resources selected to support ITT Tech curricula.

Books

You may click "Books" or use the "Search" function on the home page to find the following books.

NetLibrary

- Benator, Barry, and Albert Thumann. *Project Management and Leadership Skills for Engineering and Construction Projects*. GA: The Fairmont Press, 2003.
- Brook, Martin. *Estimating and Tendering for Construction Work*. 3rd ed. MA: Elsevier Butterworth-Heinemann, 2004.
- Merritt, Frederick S., and Jonathan T. Ricketts. *Building Design and Construction Handbook*. 6th ed. New York: McGraw-Hill Professional, 2000.

School Of Study

You may click "School Of Study" or use the "Search" function on the home page to find the following resources.

School of Drafting and Design> Recommended Links

- McGraw-Hill Construction
- RSMeans QuickCost Estimator

Other References

The following resources may be found **outside** of the ITT Tech Virtual Library, whether online or in hard copy.

Web site

- RSMeans: Reed Construction Data
  This Web site provides information about construction cost information for both new building construction as well as renovation projects.
http://rsmeans.reedconstructiondata.com/ (accessed October 5, 2010).

All links to Web references outside of the ITT Tech Virtual Library are always subject to change without prior notice.

Course Evaluation and Grading

Evaluation Criteria Table

The final grades will be based on the following categories:

CATEGORY	WEIGHT
Project 1	35%
Project 2	35%

CATEGORY	WEIGHT
Analyses	30%
Total	**100%**

Note: Students are responsible for abiding by the Plagiarism Policy.

Grade Conversion Table

The final grades will be calculated from the percentages earned in the course, as follows:

A	90–100%	4.0
B+	85–89%	3.5
B	80–84%	3.0
C+	75–79%	2.5
C	70–74%	2.0
D+	65–69%	1.5
D	60–64%	1.0
F	<60%	0.0

CM490 COURSE SNAPSHOT

Grading Category	Grade Book Category Weight (% of Course Total)	Unit	Activity/Graded Deliverable	Grade Allocation (% of Course Total)	Measuring Rubric	Rubric Alias
A. Project 1	35%	2-5	Bid Announcement, Single Family Residential, Bid Opening and Analysis	7%	A-1-1	Sustainable Practices
				7%	A-2-1	Analytical Thinking
				7%	A-3-1	Construction Requirements
				7%	A-4-1	Software applications
				7%	A-5-1	Construction Management
B. Project 2	35%	6-10	Design-Bid-Build Project	7%	B-1-1	Sustainable Practices
				7%	B-2-1	Analytical Thinking
				7%	B-3-1	Construction Requirements
				7%	B-4-1	Software applications
				7%	B-5-1	Construction Management
C. Analysis	30%	9-11	Final Documents	6%	C-1-1	Sustainable Practices
				6%	C-2-1	Analytical Thinking
				6%	C-3-1	Construction Requirements
				6%	C-4-1	Software applications
				6%	C-5-1	Construction Management
Total	100%			100%		

COURSE GRADING RUBRIC
==CM490==—Capstone Project (Construction Management)

Campus: _____
Faculty Name: _____
Student Name: _____
<u>**Directions:**</u> **Please assign a percentage grade on the line for each subcategory.**

A. Project 1 (35% of total grade)

Units 2-5—Bid announcement, single family residential, bid opening and analysis
_____ *A-1-1 Sustainable Practices*:

- <u>90-100%:</u> Accurate and concise message effectively delivered through writing and/or speech with clarity, logical organization of thoughts and appropriate format/style for expected understanding by targeted audience. Student went beyond expectations in displaying a consistent knowledge of sustainable building practices, construction techniques or state and local building codes.
- <u>80-89%:</u> Accurate message delivered through writing and/or speech with appropriate format/style for expected understanding by the target audience and a consistent knowledge of sustainable building practices, construction techniques or state and local building codes.
- <u>70-79%:</u> Intended message gets across to the target audience in writing or speech with necessary modification and/or polishing. For the most part student displayed a consistent knowledge of sustainable building practices, construction techniques or state and local building codes.
- <u>60-69%:</u> Most of the intended message gets across to the audience in writing and/or speech with some degree of knowledge of sustainable building practices, construction techniques or state and local building codes.
- <u>Below 60%:</u> Disorganized thoughts with little evidence of knowledge of sustainable building practices, construction techniques or state and local building codes.

_____ *A-2-1 Analytical Thinking*:

- <u>90-100%:</u> Effective decision making based on qualitative and quantitative analysis of data and convincing reasoning; evidence of original creativity in providing solutions for challenging qualitative and quantitative problems
- <u>80-89%:</u> Making decisions based on adequate research and reasoning that require a fair amount of analytical reading and critical thinking; capable of solving qualitative and quantitative problems
- <u>70-79%:</u> Evidence of making decisions based on some research and analysis; able to solve normal qualitative and quantitative problems
- <u>60-69%:</u> Making decisions by following the status quo; lack of evidence in strenuous research, analysis and reasoning in making a decision or solving qualitative and quantitative problems
- <u>Below 60%:</u> No evidence of making any decision based on analysis; incapable of solving specific qualitative and quantitative problems

_____ *A-3-1 Construction Requirements*:

- 90-100%: Excellent execution of research, design, and planning that clearly defined the project plan. The student clearly articulates a comprehensive understanding of the major functions involved in a construction project.
- 80-89%: Student demonstrated an effective understanding of standards and "best practices" in the development of a construction project plan.
- 70-79%: Student provided a project plan that meets minimum requirements. Student displayed evidence of basic understanding of construction requirements and practices as they relate to the building industry.
- 60-69%: Student uses some criteria as a basis for developing a construction project plan. The student provided only a minimal understanding of standards and "best practices" as they relate to the building industry.
- Below 60%: Student provided disorganized research, design, and planning materials that did not meet minimum requirements for construction practices. The student could not articulate an understanding of the construction requirements and practices as they relate to the building industry.

_____ *A-4-1 Software Applications*:
- 90-100%: Student has a comprehensive understanding of the functions and capabilities of various software applications and equipment for planning construction projects. Student shows skill in choosing the best software for their project and makes recommendations that are supported by the data and show an understanding of the reliability of their conclusions.
- 80-89%: Student makes the proper decisions on which software and tools to use. The student provided an adequate set of construction scheduling and material "take off' documents required for the building industry
- 70-79%: Student has a basic understanding of the processes and functions of the software and equipment needed to develop a comprehensive capstone project. The student provided a minimum set of construction scheduling and material "take off' documents required for the building industry
- 60-69%: Student does not demonstrate a complete understanding of the software and equipment needed to develop the comprehensive project plan.   The student cannot define the functions of the various software applications for construction scheduling and material "take off' required in the building industry.
- Below 60%: Student has not indicated the nature of the processes and functions of the software and equipment needed to develop a comprehensive construction project. The student cannot define the function of the application and did not utilize the proper software nor developed their construction project plan.

_____ *A-5-1 Construction Management*:
- 90-100%: Student has a complete understanding of the processes and skills needed to successfully plan and schedule a construction

project. The student has an exceptional understanding of the functions of project management, material takeoffs, and indicates manpower requirements, cost data, LEEDS data, project milestones or critical path functions.

- 80-89%: Student has an above-average understanding of the processes and skills needed to successfully plan and schedule a construction project. The student has an acceptable understanding of the functions of project management, develops material takeoffs, and indicates manpower requirements, cost data, project milestones or critical path functions.
- 70-79%: Student has a basic understanding of the processes and skills needed to successfully plan and schedule a construction project. The student has an acceptable understanding of the functions of project management, develops material takeoffs, and indicates manpower requirements, cost data, project milestones or critical path functions.
- 60-69%: Student does not demonstrate a complete understanding of the processes and skills needed to successfully plan and schedule a construction project. The student has minimum understanding of the functions of project management, developed incomplete material takeoffs, and did not clearly indicate manpower requirements, project milestones or critical path functions.
- Below 60%: Student has not indicated the nature of the construction processes and skills needed to successfully plan and schedule a construction project. The student cannot define the functions of project management, did not develop material takeoffs, manpower requirements, project milestones or critical path functions.

B. Project 2 (35% of total grade)

Units 6-10—Design-Bid-Build Project

_____ **B-*1-1 Sustainable Practices**:
- 90-100%: Accurate and concise message effectively delivered through writing and/or speech with clarity, logical organization of thoughts and appropriate format/style for expected understanding by targeted audience. Student went beyond expectations in displaying a consistent knowledge of sustainable building practices, construction techniques or state and local building codes.
- 80-89%: Accurate message delivered through writing and/or speech with appropriate format/style for expected understanding by the target audience and a consistent knowledge of sustainable building practices, construction techniques or state and local building codes.
- 70-79%: Intended message gets across to the target audience in writing or speech with necessary modification and/or polishing. For the most part student displayed a consistent knowledge of sustainable building practices, construction techniques or state and local building codes.
- 60-69%: Most of the intended message gets across to the audience in writing and/or speech with some degree of knowledge of sustainable

building practices, construction techniques or state and local building codes.

- <u>Below 60%:</u> Disorganized thoughts with little evidence of knowledge of sustainable building practices, construction techniques or state and local building codes.

_____ ***B-2-1 Analytical Thinking***:
- <u>90-100%:</u> Effective decision making based on qualitative and quantitative analysis of data and convincing reasoning; evidence of original creativity in providing solutions for challenging qualitative and quantitative problems
- <u>80-89%:</u> Making decisions based on adequate research and reasoning that require a fair amount of analytical reading and critical thinking; capable of solving qualitative and quantitative problems
- <u>70-79%:</u> Evidence of making decisions based on some research and analysis; able to solve normal qualitative and quantitative problems
- <u>60-69%:</u> Making decisions by following the status quo; lack of evidence in strenuous research, analysis and reasoning in making a decision or solving qualitative and quantitative problems
- <u>Below 60%:</u> No evidence of making any decision based on analysis; incapable of solving specific qualitative and quantitative problems

_____ ***B-3-1 Construction Requirements***:
- <u>90-100%:</u> Excellent execution of research, design, and planning that clearly defined the project plan. The student clearly articulates a comprehensive understanding of the major functions involved in a construction project.
- <u>80-89%:</u> Student demonstrated an effective understanding of standards and "best practices" in the development of a construction project plan.
- <u>70-79%:</u> Student provided a project plan that meets minimum requirements. Student displayed evidence of basic understanding of construction requirements and practices as they relate to the building industry.
- <u>60-69%:</u> Student uses some criteria as a basis for developing a construction project plan. The student provided only a minimal understanding of standards and "best practices" as they relate to the building industry.
- <u>Below 60%:</u> Student provided disorganized research, design, and planning materials that did not meet minimum requirements for construction practices. The student could not articulate an understanding of the construction requirements and practices as they relate to the building industry.

_____ ***B-4-1 Software Applications***:
- <u>90-100%:</u> Student has a comprehensive understanding of the functions and capabilities of various software applications and equipment for planning construction projects. Student shows skill in choosing the best software for their project and makes recommendations that are supported by the data and show an understanding of the reliability of their conclusions.

- 80-89%: Student makes the proper decisions on which software and tools to use. The student provided an adequate set of construction scheduling and material "take off' documents required for the building industry
- 70-79%: Student has a basic understanding of the processes and functions of the software and equipment needed to develop a comprehensive capstone project. The student provided a minimum set of construction scheduling and material "take off' documents required for the building industry
- 60-69%: Student does not demonstrate a complete understanding of the software and equipment needed to develop the comprehensive project plan.   The student cannot define the functions of the various software applications for construction scheduling and material "take off' required in the building industry.
- Below 60%: Student has not indicated the nature of the processes and functions of the software and equipment needed to develop a comprehensive construction project. The student cannot define the function of the application and did not utilize the proper software nor developed their construction project plan.

_____ *B-5-1 Construction Management*:
- 90-100%: Student has a complete understanding of the processes and skills needed to successfully plan and schedule a construction project. The student has an exceptional understanding of the functions of project management, material takeoffs, and indicates manpower requirements, cost data, LEEDS data, project milestones or critical path functions.
- 80-89%: Student has an above-average understanding of the processes and skills needed to successfully plan and schedule a construction project. The student has an acceptable understanding of the functions of project management, develops material takeoffs, and indicates manpower requirements, cost data, project milestones or critical path functions.
- 70-79%: Student has a basic understanding of the processes and skills needed to successfully plan and schedule a construction project. The student has an acceptable understanding of the functions of project management, develops material takeoffs, and indicates manpower requirements, cost data, project milestones or critical path functions.
- 60-69%: Student does not demonstrate a complete understanding of the processes and skills needed to successfully plan and schedule a construction project. The student has minimum understanding of the functions of project management, developed incomplete material takeoffs, and did not clearly indicate manpower requirements, project milestones or critical path functions.
- Below 60%: Student has not indicated the nature of the construction processes and skills needed to successfully plan and schedule a construction project. The student cannot define the functions of project management, did not develop material takeoffs, manpower requirements, project milestones or critical path functions.

C. Project 1 (30% of total grade)

Units 9-11—Final Documents

_____ *C-1-1 Sustainable Practices*:

- <u>90-100%:</u> Accurate and concise message effectively delivered through writing and/or speech with clarity, logical organization of thoughts and appropriate format/style for expected understanding by targeted audience. Student went beyond expectations in displaying a consistent knowledge of sustainable building practices, construction techniques or state and local building codes.
- <u>80-89%:</u> Accurate message delivered through writing and/or speech with appropriate format/style for expected understanding by the target audience and a consistent knowledge of sustainable building practices, construction techniques or state and local building codes.
- <u>70-79%:</u> Intended message gets across to the target audience in writing or speech with necessary modification and/or polishing. For the most part student displayed a consistent knowledge of sustainable building practices, construction techniques or state and local building codes.
- <u>60-69%:</u> Most of the intended message gets across to the audience in writing and/or speech with some degree of knowledge of sustainable building practices, construction techniques or state and local building codes.
- <u>Below 60%:</u> Disorganized thoughts with little evidence of knowledge of sustainable building practices, construction techniques or state and local building codes.

_____ *C-2-1 Analytical Thinking*:

- <u>90-100%:</u> Effective decision making based on qualitative and quantitative analysis of data and convincing reasoning; evidence of original creativity in providing solutions for challenging qualitative and quantitative problems
- <u>80-89%:</u> Making decisions based on adequate research and reasoning that require a fair amount of analytical reading and critical thinking; capable of solving qualitative and quantitative problems
- <u>70-79%:</u> Evidence of making decisions based on some research and analysis; able to solve normal qualitative and quantitative problems
- <u>60-69%:</u> Making decisions by following the status quo; lack of evidence in strenuous research, analysis and reasoning in making a decision or solving qualitative and quantitative problems
- <u>Below 60%:</u> No evidence of making any decision based on analysis; incapable of solving specific qualitative and quantitative problems

_____ *C-3-1 Construction Requirements*:

- <u>90-100%:</u> Excellent execution of research, design, and planning that clearly defined the project plan. The student clearly articulates a comprehensive understanding of the major functions involved in a construction project.
- <u>80-89%:</u> Student demonstrated an effective understanding of standards and "best practices" in the development of a construction project plan.

- <u>70-79%:</u> Student provided a project plan that meets minimum requirements. Student displayed evidence of basic understanding of construction requirements and practices as they relate to the building industry.
- <u>60-69%:</u> Student uses some criteria as a basis for developing a construction project plan. The student provided only a minimal understanding of standards and "best practices" as they relate to the building industry.
- <u>Below 60%:</u> Student provided disorganized research, design, and planning materials that did not meet minimum requirements for construction practices. The student could not articulate an understanding of the construction requirements and practices as they relate to the building industry.

_____ **C-*4-1 Software Applications***:
- <u>90-100%:</u> Student has a comprehensive understanding of the functions and capabilities of various software applications and equipment for planning construction projects. Student shows skill in choosing the best software for their project and makes recommendations that are supported by the data and show an understanding of the reliability of their conclusions.
- <u>80-89%:</u> Student makes the proper decisions on which software and tools to use. The student provided an adequate set of construction scheduling and material "take off' documents required for the building industry
- <u>70-79%:</u> Student has a basic understanding of the processes and functions of the software and equipment needed to develop a comprehensive capstone project. The student provided a minimum set of construction scheduling and material "take off' documents required for the building industry
- <u>60-69%:</u> Student does not demonstrate a complete understanding of the software and equipment needed to develop the comprehensive project plan.   The student cannot define the functions of the various software applications for construction scheduling and material "take off' required in the building industry.
- <u>Below 60%:</u> Student has not indicated the nature of the processes and functions of the software and equipment needed to develop a comprehensive construction project. The student cannot define the function of the application and did not utilize the proper software nor developed their construction project plan.

_____ **C-*5-1 Construction Management***:
- <u>90-100%:</u> Student has a complete understanding of the processes and skills needed to successfully plan and schedule a construction project. The student has an exceptional understanding of the functions of project management, material takeoffs, and indicates manpower requirements, cost data, LEEDS data, project milestones or critical path functions.
- <u>80-89%:</u> Student has an above-average understanding of the processes and skills needed to successfully plan and schedule a construction project. The student has an acceptable understanding of

the functions of project management, develops material takeoffs, and indicates manpower requirements, cost data, project milestones or critical path functions.

- <u>70-79%:</u> Student has a basic understanding of the processes and skills needed to successfully plan and schedule a construction project. The student has an acceptable understanding of the functions of project management, develops material takeoffs, and indicates manpower requirements, cost data, project milestones or critical path functions.
- <u>60-69%:</u> Student does not demonstrate a complete understanding of the processes and skills needed to successfully plan and schedule a construction project. The student has minimum understanding of the functions of project management, developed incomplete material takeoffs, and did not clearly indicate manpower requirements, project milestones or critical path functions.
- <u>Below 60%:</u> Student has not indicated the nature of the construction processes and skills needed to successfully plan and schedule a construction project. The student cannot define the functions of project management, did not develop material takeoffs, manpower requirements, project milestones or critical path functions.

(End of Syllabus)