

Certificate in Capital Project Management

Handbook



Department of Civil Engineering

Clemson University

Overview

Today's dynamic, competitive market provides little margin for error when planning and managing capital projects. But the successful completion of capital projects requires the integrated efforts of team members from a wide variety of backgrounds: business, multiple engineering disciplines (civil, electrical, mechanical, etc.), general and specialty construction, supply chain, and others. Many of these team members understand their portion of the project, but do not have a strategic perspective of a capital project and their role in making the project as a whole successful. They have had little or no formal training in the techniques and tools that provide them with the best opportunities for successful capital projects. To address this need, the Clemson University Department of Civil Engineering offers a Certificate in Capital Project Management (CPM).

Certificate Program Objectives

The objective of the Certificate program is to provide current and future capital project team members with an understanding of the primary concepts, principles, and issues associated with planning and managing capital projects in an active, flexible learning environment. The CPM program:

- Addresses the entire life cycle of a capital project, from project selection through operation and warranty management
- Considers all types of capital projects (industrial, public, commercial, etc.)
- Is applicable to all key participants (owners, designers, constructors, subcontractors, and major suppliers) who need an overall perspective of the capital project process

Why a Certificate?

Although numerous project management training opportunities are currently available, the Capital Project Management Certificate Program offers the best value to help working professionals meet their career goals.

1. The certificate is specific to capital project management, not generic project management. Capital project team members will be able to understand and identify with the principles and make direct application to current job challenges.
2. The certificate program provides a systematic approach to learning about capital project management. Rather than taking a series of disjointed training courses covering a hodge-podge of topics, the certificate program integrates all aspects of capital project management into a logical, sequenced approach.
3. The courses may count for graduate credit.
4. Since the courses are taken for graduate credit, most companies have funding available through existing education programs. This saves training budgets for other needs.
5. Multiple participants for a company can complete the program together, which helps them share company-specific ideas and improvements together.

Delivery method

The Capital Project Management Certificate Program (CPMCP) includes a series of three, three-hour graduate level courses that cover the primary concepts

associated with planning and managing capital projects.

To meet the needs of working professionals who do not have the time to attend on-campus classes, all courses will be offered on-line in an asynchronous mode. Students can take the courses from any location with internet access, based on their schedule, without interfering with their current job.

Coursework will consist of viewing the on-line recordings presented by industry experts, completing assigned readings and homework, and demonstrating the appropriate application of the concepts to specific situations.

The program faculty will actively evaluate all student work and provide feedback to company points of contact about student progress and performance.

Companies are encouraged to form company study teams to complete the program together. Members of the company study teams will share thoughts, ideas, and company-specific applications through the assignments and discussion board topics.

Who Can Participate?

Two options are offered for course participation:

1. Participants with a bachelor degree who do not desire to immediately pursue a Masters degree may register for the courses as Non-degree Seeking Graduate Students. As Non-degree Seeking Graduate Students, they are not required to go through the normal graduate school application process. These students will receive graduate level credit for the courses, and a

Capital Project Management Certificate from the Clemson University Department of Civil Engineering.

If these students, at some point in the future, decide to pursue a graduate degree, the three certificate courses may be used for graduate credit (if applicable to the degree sought). However, the students would be required to complete the standard graduate application process to be accepted into the graduate program.

2. Degree-seeking graduate students may register to take the courses for graduate credit if the courses are acceptable to their course of study.

Fees

Non-degree students: \$750 per semester hour (\$6750 for all three courses)
Degree-seeking students: normal tuition

Curriculum

The curriculum incorporates best practices and principles from leading organizations, such as the Construction Industry Institute (CII), the Project Management Institute (PMI), the Association for the Advancement of Cost Engineering-International (AACE), the Lean Construction Institute (LCI), and the latest research results.

Two cohorts will be formed each year. One cohort will start in January and will cover the three courses in the spring, summer, and fall semesters. The second cohort will start in the fall and will cover

the three courses in the fall, spring, and summer semesters. Each semester is approximately 15 weeks long. Students are encouraged to complete the coursework with their cohort, but will be allowed to take up to two years to complete the three courses.

The Capital Project Management Certificate Program (CPMCP) includes a series of three, three-hour graduate level courses that cover the primary concepts associated with planning and managing capital projects. The courses are:

CE 832 Capital Project Management Fundamentals - Fundamental concepts of designing and constructing capital projects - what they are, why they are done, who is involved, and how to best design and build them; phases of a capital project; variations of organizational and contractual structures used for capital projects. Prerequisites: Consent of the instructor.

Objectives: Students will develop an understanding of the fundamentals of capital projects. To achieve this goal, students must demonstrate the ability to:

- State the factors that contribute to success in planning and managing the design and construction of capital projects
- Analyze their company's capital project design and construction process against the model to identify strengths and weaknesses
- Analyze the organizational and contractual structures of a capital project and identify their impacts on how the project is planned and managed

- Develop key components of a capital project design and construction management plan
- Determine career opportunities in planning and managing capital projects within their organization and industry

CE 833 Capital Projects Controls - Principles and best practices of project controls for capital construction projects, including conceptual and detail estimating, scheduling, and earned value management (EVM); development of project baseline incorporating scope, schedule, and budget; use of baseline to monitor and manage cost and schedule performance; and shortcomings of EVM. Prerequisites: CE 832 and consent of the instructor.

Objectives: Students will develop an understanding of the principles of capital construction projects controls. To achieve this goal, students must demonstrate the ability to:

- Select the appropriate estimating technique based on project characteristics and available information,
- Develop a conceptual estimate for a capital construction project,
- Analyze their organizations' estimating processes and identify opportunities for improvement,
- Develop a resource-loaded schedule,
- Use a schedule to track actual vs. planned performance,

- Analyze their organizations' scheduling processes and identify opportunities for improvement,
- Develop a project baseline integrating scope, budget and schedule,
- Perform and explain EVM calculations,
- Analyze project results using EVM tools and information,
- Analyze their organizations' EVM processes and identify opportunities for improvement.

CE 834 Key Topics in Capital Project Management - An investigation of key topics associated with planning and managing capital construction projects, how these topics are integrated into a capital construction project management plan that achieves business and project objectives, and how the project team uses the project management plan to successfully complete the construction project. Prerequisites: CE 832 and consent of the instructor.

Objectives: Students will develop an understanding of the principal topics associated with planning and managing capital construction projects. To achieve this goal, students must demonstrate the ability to:

- Develop key portions of a capital construction project risk management plan,
- Conduct key portions of a capital construction project constructability study,

- Analyze key portions of their organizations' capital construction project supply chain and make recommendations for improvement,
- Develop key portions of a capital construction project quality management plan,
- Explain the key contract terms and conditions that impact a capital construction project,
- Develop key portions of a capital construction project safety management plan,
- Develop key portions of a capital construction project document management plan,
- Develop key portions of a capital construction project productivity analysis plan,
- Analyze key portions of their organizations' change management process and make recommendations for improvement,
- Describe the advantages and disadvantages of various dispute resolution techniques.

Graduation Requirements

Program participants must maintain an overall minimum grade-point ratio of 3.0 in the certificate program. Certificate courses must be completed within a span of three years.

A graduate certificate in Capital Project Management will be awarded upon completion of 9 credit hours of study, as outlined below, and submission of a Certificate Portfolio which will consist of

a compilation of the cumulative coursework accomplished in the program.

Admission Requirements

Admission will be based on an assessment of the applicant's educational needs and career objectives.

Minimum Requirements

Applicants must hold a bachelor's degree and should have earned an overall 3.0 grade-point ratio in undergraduate studies or must have at least 5 years of experience in a relevant capacity.

Application Material

Each applicant must submit an application, transcripts, statement of career objectives, and a résumé. Each applicant must furnish a letter of recommendation.

Students from any department or discipline may elect to complete the certificate program. Students who are already enrolled in a graduate degree program must also submit a written approval from their graduate programs/advisors.

International Applicants:

In addition to the above, international applicants are required to demonstrate that they satisfy the University's minimum English language proficiency requirements or equivalent.

Application Review

Review of applications will be made by the faculty of Civil Engineering. A Committee of three faculty members composed of the Program Director, the Graduate Program Coordinator, and one

additional faculty from the Civil Engineering Department will be the application review committee.

The Department

Civil engineering has been taught at Clemson since the University was founded in 1889. Civil engineering became a department in 1932 at the same time the Engineering Department became the School of Engineering.

Today, the Department of Civil Engineering (www.clemson.edu/ce) offers undergraduate course work in all major fields of civil engineering. Current enrollments are about 500 undergraduate and 110 graduate students.

The department offers graduate degree programs leading to the Master of Science and Doctor of Philosophy degrees. The graduate student to faculty ratio is about 5 to 1. Typical size of graduate courses is about 25 students in introductory graduate courses and about 15 in upper level technical courses.

Within the graduate degree programs offered by the department, there are six primary emphasis areas:

1. Applied Fluid Mechanics,
2. Construction Materials,
3. Geotechnical Engineering, Construction Engineering and Management,
4. Structural Engineering, and
5. Transportation Engineering.

The faculty in these emphasis areas work closely together to form thrust areas of research in Resilient and Sustainable Infrastructure

The graduate degree programs offered by the Civil Engineering Department prepare students work at high levels within the engineering profession. The degree programs emphasize engineering practice and the advancement of engineering knowledge through research. Because technical advances implemented through business and industry require direction by individuals possessing a strong technical background, graduates are prepared to move quickly into positions of leadership and responsibility.

Contacts

Dr. Nadim M. Aziz, Chair
Civil Engineering Department
112 Lowry Hall – Box 340911
Clemson, SC 29634
aziz@clemson.edu
864-656-3002

Dr. Ronald D. Andrus, Graduate Program Coordinator
Civil Engineering Department
200 Lowry Hall – Box 340911
Clemson, SC 29634
randrus@clemson.edu
864-656-0488

Mrs. Kristi Baker, Student Services Program Coordinator
Civil Engineering Department
200 Lowry Hall – Box 340911
Clemson, SC 29634
kristi@clemson.edu
864-656-3001

Updated March 15, 2011