

## Construction Management

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## Master of Science in Construction Management

The master's degree is rapidly becoming the entry level requirement for middle and upper level managerial positions in the construction industry. The primary goal of this program is to provide the knowledge and advanced skills essential for success in these positions. The program is flexible enough to accommodate graduates from other disciplines who may lack an undergraduate background in construction management.

Students who hold four year undergraduate degrees in construction management may complete the masters degree in one academic year as full-time students. Equivalent degree related fields would include studies in construction drawings, construction materials and methods, construction accounting and finance, economic planning, structures, site work, legal aspects of construction, cost estimating, construction scheduling and business management/finance. Students with deficiencies in these fields may need longer residence for the master's degree, as they will be required to take specified basic undergraduate courses.

### Admission Application

Students desiring to enter the Construction Management graduate program must formally apply to the University for acceptance at <http://gradschool.fiu.edu>. Students can also send their application material to:

Florida International University  
College of Engineering  
Dean's Office  
Admissions Coordinator  
10555 West Flagler Street  
Miami, FL 33174  
Email: [grad\\_eng@fiu.edu](mailto:grad_eng@fiu.edu)  
Fax: (305) 348-6142

See the graduate admission section in this catalog for graduate application instructions.

### Admission Requirements

In order to be admitted, applicants should hold a Bachelor's Degree in Construction, Construction Management, Architecture, Engineering, Business or equivalent related fields. Students with baccalaureate degrees other than Construction Science, Construction Management, or Construction Engineering may be accepted with the understanding that they will be required to take specified basic undergraduate courses as

determined by the Graduate Program Director, to provide an adequate background for more advanced courses. In addition, applicants must have earned a minimum grade point average (GPA) of 3.0 in the upper division course work related to their undergraduate degree.

Eligibility for admission for those students whose upper division undergraduate GPA is less than 3.0 (on a 4.0 scale) may be evaluated on the basis of one or more of the following:

- Letters of reference
- Work experience
- GRE or GMAT scores
- Other relevant factors, including but not limited to, awards, recognitions, published journal articles, conference presentations, etc.

Applicants who do not satisfy the GPA requirement will be evaluated by the Department's Graduate Program Director based on the factors identified earlier, and may be recommended for admission on a provisional/conditional status.

### TOEFL

In addition to the above criteria, international graduate student applicants whose native language is not English are required to submit a score for the Test of English as a Foreign Language (TOEFL) or for the International English Language Testing System (IELTS). A total score of 80 on the iBT TOEFL or 6.5 overall on the IELTS is required.

### Curriculum

Students seeking to obtain a Master of Science in Construction Management have a choice of either a thesis or a non-thesis option. Students have to complete 30-36 semester hours including thesis. Students with a Bachelor of Science (BS) degree in Construction Management, Construction Science, or Construction Engineering must complete at least 30 semester hours to graduate. Students with a BS degree in Engineering or a BA degree in Architecture must complete at least 33 semester hours to graduate. All other students with undergraduate degrees in disciplines such as business, accounting, finance, etc. must complete at least 36 semester hours to graduate. The thesis option consists of a minimum of 24-30 semester hours of course work and 6 semester hours of thesis. The non-thesis option consists of 30-36 semester hours of course work and may include up to 6 semester hours of independent studies. A student shall not register for masters thesis without first having received the approval from his/her thesis supervisor and the Chairperson of the Department. A student may not register for independent studies without the approval of his/her advisor, and the Chairperson of the Department.

### Course Requirements

Graduate credit is awarded for courses numbered 5000 and above. The work in the major field must be in courses numbered 5000 or above. For work outside the major, up to two courses numbered 4000-4999 may be taken provided they are part of a plan of study approved by the student's supervisory committee or the Department Graduate Committee, whichever is applicable, and prior approval is obtained from the Chairperson of the Department. Approval must be obtained in writing prior to the student registering for such a course.

Students with deficiencies in the areas designated as equivalent related fields will be required to take 3000 and 4000 level courses in Construction Management in order to provide the proper foundation for advanced courses. Students required to take these prerequisite courses are advised to register them for the 'P' or 'F' (Pass or Fail) grade. All grades other than "P" grades (regardless of course level) will be counted when calculating the student's graduate grade point average.

The program of course work for a masters degree must be approved by the student's advisor, supervisory committee (if thesis option), and Department Chairperson. No more than six credits from a previous masters degree program may be applied toward a second masters degree. These credits are applied only with the written approval of the Department Chairperson and the Dean of the College of Engineering and Computing.

### **Transfer of Credit**

Only graduate (5000 - 7999) level work to the extent of two courses, totaling not more than six semester hours, earned with a grade of 'B' or better may be transferred from another institution, or from post-baccalaureate work at the University except as noted otherwise in this catalog. Credits transferred from other universities may be applied toward meeting the degree requirements but the grades earned will not be computed in the student's grade point average. Acceptance of transfer of credit requires approval of the student's advisor and the Department Chairperson. Petitions for transfer of credit for a masters degree should be made during the student's first term of enrollment in the masters program.

### **Supervisory Committee**

Students who choose the thesis option should request the appointment of a supervisory committee as soon as possible after admission into the program, but in no case later than the second semester of graduate study. Supervisory committees for graduate degree programs are nominated by the student's graduate advisor and approved by the Department Chairperson, College Dean, and the Dean of the University Graduate School. The student's proposed plan of study must be approved, in writing, by the student's graduate advisor, the supervisory committee and the Department Chairperson.

### **Masters Thesis**

A student choosing the thesis option must, as part of his/her plan of study, prepare a written proposal of the thesis work planned. This proposal must adhere to all University and Department regulations concerning format and content. Once this proposal is approved, in writing, by the student's graduate advisor, his/her supervisory committee, the Department Chairperson, and the College Dean, the student will be permitted to register for masters thesis. The student must be enrolled in at least one thesis credit hour the semester the proposal is submitted to the University Graduate School.

### **Examination**

A final oral examination, which is primarily a defense of the thesis research, is required for thesis masters candidates. A passing grade must be obtained in order to qualify for graduation. The examination will be administered by his/her supervisory committee.

### **Special Student**

Students wishing to enroll in courses during the application process may do so as a special student (non degree seeking). No more than 12 semester credits of work taken as a special student can be applied towards graduation. Students taking courses under the special student designation should consult other sections of this catalog for pertinent regulations covering the special student status.

### **General Regulations**

#### **Grades**

The Department of Construction Management requires a minimum cumulative grade point average of 3.0 in all courses taken towards a masters degree. The minimum acceptable grade for any work attempted as a graduate student is a "C."

#### **Grade of Incomplete**

A grade of "I" (Incomplete) may be granted, at the option of the Instructor, to a student who, due to serious, documented, and verifiable extenuating circumstances beyond his/her control is unable to complete the work required to obtain a grade for a course.

A student granted a grade of "I" must complete the work deemed necessary by the instructor as quickly as possible. Work must be completed within two semesters after the grade was assigned to the student, or the grade will automatically revert to a grade of "F" (failing grade).

#### **Graduation**

In order to be eligible to graduate the student must have successfully completed his/her plan of study as established with the student's graduate advisor, his/her supervisory committee (if applicable), and the Department Chairperson. This includes completion of all applicable graduate course work with an overall minimum grade point average of 3.0. A student choosing the thesis option must also have submitted a complete masters thesis, whose format, content, and presentation must be acceptable to and approved by his/her graduate advisor, supervisory committee, Department Chairperson, College Dean, and the Dean of the University Graduate School.

Students should contact an advisor at least one semester prior to their projected graduation and request a review of their file. At the start of the final semester the student is required to complete an Application for Graduation. If for any reason a student fails to graduate in the semester after applying for graduation, the student must reapply for graduation and enroll for at least one graduate credit.

It is the student's responsibility to ascertain that all requirements for graduation, as stated in the University Catalog and in the Department Program sheets, have been met.

#### **Foundation Courses**

Students (CM majors) requiring 30 credit hours to graduate cannot take any of the foundation courses. Students requiring 33 credit hours to graduate must take at least three courses (9 credits) from the foundation courses listed below – unless exempted by the Graduate Program Director. Students requiring 36 credits to graduate must take at least four courses (12 credits) from

the list of foundation courses given below – unless exempted by the Graduate Program Director. The foundation courses, whether three or four, must be taken with the approval of the Graduate Program Director.

BCN 5618	Fundamentals of Construction Estimating	3
BCN 5645	Construction Economic Analysis	3
BCN 5728	Principles of Construction Scheduling	3
BCN 5766	Codes and Regulations	3
BCN 5746	Construction Legal Environment	3
BCN 5406	Principles of Building Structures for Construction Management	3

### Construction Management Electives

Depending on the academic background of the student, the balance of 30-36 credits is to be taken from the list below. Thesis students may take up to 6 credits of BCN 6971, and all students may take up to 6 credits of BCN 5905 (see note below).

BCN 5022	Housing for Developing Countries	3
BCN 5588	Vulnerability Analysis	3
BCN 5589	Hazard Mitigation	3
BCN 5626	Construction Cost Analysis & Control	3
BCN 5706	Interdisciplinary Aspects of Housing	3
BCN 5716	Productivity in Construction	3
BCN 5735	Hazardous Materials & Waste in Construction	3
BCN 5738	Construction Safety Management	3
BCN 5747	Construction Law Case Studies	3
BCN 5749	Advanced Construction Documentation	3
BCN 5755	Construction Financial Management	3
BCN 5771	Management & Marketing of Const. Services	3
BCN 5772	Management of Construction	3
BCN 5784	Organizations Construction Information Systems <sup>1</sup>	3
BCN 5792	Total Quality Management and Planning in Construction	3
BCN 5905	Directed Independent Studies <sup>1</sup>	1-3
BCN 5906	Special Topics	3
BCN 5949	Graduate Construction Management Internship	1
BCN 6473	Systems Approach for Housing Planning	3
BCN 6642	Value Engineering in Construction	3
BCN 6775	Decision & Risk Analysis in Construction	3
BCN 6785	Advanced Estimating and Bidding Strategy	3
BCN 6788	Artificial Intelligence in Construction Management	3
BCN 6910	Supervised Research <sup>1</sup>	1-3
BCN 6916	Developments in Construction Technologies	3
BCN 6935	Graduate Seminar	3
BCN 6971	Thesis <sup>1</sup>	3

(Total of 6 credit hours spread over at least two consecutive terms with 3 credit hour in each)

<sup>1</sup>Note: A student shall not register for BCN 5905 or BCN 6971, without the approval of his/her advisor, and the Department Chairperson. Not more than 3 credit hours of BCN 5905 or BCN 6971 may be taken in any one semester.

## Graduate Certificate in Construction Engineering & Management (CEM)

This certificate program is open to students with a Bachelor's Degree in civil engineering, construction management, construction engineering, architecture, architectural engineering and other closely related fields of study from an accredited institution. The **CEM** program develops construction management techniques related to the technological environment of the construction industry. The program blends a carefully chosen mix of civil engineering and construction management courses designed to provide specialization opportunities in Construction Engineering & Construction Management. The skills, concepts and techniques learned will be related to, but not dependent upon knowledge of construction and engineering with an emphasis on construction management and organizational skills appropriate for the professional construction manager.

Applicants for the program will be required to meet the same entrance standards as those applying to the Master of Science program. Credits earned in the program with a BCN prefix and up to 3 courses with a CCE or CGN prefix with a grade of "B" or better are fully transferable towards a Masters of Science in Construction Management.

To earn a Graduate Certificate in **CEM**, the students must successfully complete the program's core and elective courses with a minimum grade point average of 3.0, and have no grade lower than "C". The program consists of 18 credit hours – 6 courses (3 core courses + 3 electives) of 3 credit hours each. These courses cover functional areas of construction management and specialized technical and engineering functions.

### Required CEM Courses:

BCN 5645	Construction Economic Analysis
CCE 5035	Construction Engineering Management
BCN 5728	Principles of Construction Scheduling

### Electives CEM Courses:

BCN 5626	Construction Cost Analysis & Control
BCN 6775	Decision & Risk Analysis in Construction
BCN 6916	Developments in Construction Technology
BCN 5774	Topics in International Construction
CCE 5505	Computer Integrated Construction
CGN 5315	Civil Engineering Systems
BCN 5716	Productivity in Construction

Additional information about this program can be found at:

URL: [www.cm.fiu.edu](http://www.cm.fiu.edu)

E-mail: [cminfo@eng.fiu.edu](mailto:cminfo@eng.fiu.edu)

Tel: (305) 348-3172

Fax: (305) 348-6255

## Course Descriptions

### Definition of Prefixes

BCN-Building Construction

*Student programs of study in the graduate level program are carefully designed and sequenced following consultation with a graduate faculty advisor. Appropriate prerequisite course work is assigned on the basis of individual needs.*

**BCN 5022 Housing for Developing Countries (3).**  
Problems faced by developing countries in housing their

population. Political, economic, social, and technical considerations in decision process.

**BCN 5406 Principles of Building Structures for Construction Management (3).** Applications of the principles of mechanics to engineering problems of equilibrium, strength, and stiffness. Topics include equilibrium of forces, stress, strain, torsion, beams, and columns.

**BCN 5585 Sustainable Construction (3).** Study of the concepts and techniques of sustainable construction, in depth review of sustainable materials and construction techniques. Prerequisite: Permission of the instructor.

**BCN 5588 Vulnerability Analysis (3).** Assessment of risk and potential for damage to a community or facility from the impact of natural or anthropogenic hazards. Physical and construction related issues.

**BCN 5589 Hazard Mitigation (3).** Reducing potential damage to the built environment from natural hazards, including hurricanes, floods, earthquakes, explosions. Benefit-cost analysis. Regulatory problems.

**BCN 5618 Fundamentals of Construction Estimating (3).** Principles and practices of estimating, providing application, and drill in surveying quantities of labor and materials for general construction projects: excavation, concrete and formwork, carpentry, masonry, structural steel, lath and plaster, interior finishes.

**BCN 5622 Advance Planning and Simulation for Construction (3).** The application of advanced planning, scheduling, and simulation techniques and concepts to construction processes and operations.

**BCN 5626 Construction Cost Analysis and Control (3).** Description of different types of estimating techniques in relation to different stages in a construction project. Productivity analysis, measurement of progress, and techniques of cost control are covered.

**BCN 5645 Construction Economic Analysis (3).** Nature of construction costs, funding sources and arrangements, capital requirements, bonding, insurance, risk and contingency evaluation, general office operations, and bidding procedures.

**BCN 5706 Interdisciplinary Aspects of Housing (3).** Recognition and definition of those factors which affect the planning, financing, and construction of housing projects. The operations and responsibilities of a multidisciplinary team dealing with decision process. This course takes a critical look at the housing delivery system to include: how the housing industry operates, various technologies prevalent in housing construction, and constraints to housing. The course will also look at the future, examining problems and forces that will shape opportunities.

**BCN 5716 Productivity in Construction (3).** An in-depth study of common issues relating to productivity improvements in construction.

**BCN 5728 Principles of Construction Scheduling (3).** The application of the Critical Path Method and Program Evaluation Review Technique to construction planning, scheduling vs. actual job expenditures. Cost forecasting development of unit prices from field data. Laboratory is included which consists of computer applications.

**BCN 5735 Hazardous Materials and Waste in Construction (3).** Discussion of the common hazardous materials and waste regulations found in construction activities.

**BCN 5738 Construction Safety Management (3).** Introduce the graduate student in Construction Management to the important elements essential in managing the safety function of a construction company.

**BCN 5741 Construction Claims (3).** Construction claims, administration, and avoidance. Covers the importance of construction contract errors, unforeseen and changed conditions, disruptions, acceleration, termination, and proving of claims.

**BCN 5746 Construction Legal Environment (3).** Legal and business aspects of engineering contracts and specifications in the construction industry. Analysis, study of precedents, and application of contract clauses, including changes, changed conditions, termination, disputes, payments, risk and insurance, inspection, liquidated damages, and technical requirements.

**BCN 5747 Construction Law Case Studies (3).** Case study and analysis of reported appellate decisions on common construction law issues; licensing; bid disputes; contract issues; construction lien law; surety problems; and unresolved claims.

**BCN 5749 Advanced Construction Documentation (3).** Construction related documentation requirements for avoidance of litigation before, during, and after completion of construction projects; dispute resolution processes for construction operations. Prerequisite: BCN 5746.

**BCN 5755 Construction Financial Management (3).** Money management in construction operations: financing, funding, sources of money, cash flow, disbursement, liability and bonding, cost and managerial accounting, and profit analysis.

**BCN 5766 Codes and Regulations (3).** Study of building codes required by local, county, and state levels and their relation to quality control.

**BCN 5771 Management and Marketing of Construction Services (3).** Human effectiveness in marketing construction management services in the public and private sectors.

**BCN 5772 Management of Construction Organizations (3).** This course studies the management of a construction company. Topics included are: company organization, incorporation structures, policies and procedures, finance, accounting, information modeling, bidding strategies, and operation.

**BCN 5774 Topics in International Construction (3).** Introduction to procurement, financing and management of international construction projects with emphasis on international economics, contracts, trade agreements and specifications.

**BCN 5784 Construction Information Systems (3).** The application of information management techniques, including computer hardware and software systems, to the analysis and solution of typical problems in the practice of construction management.

**BCN 5792 Total Quality Management and Planning in Construction (3).** The application of TQM philosophy and

tools developed by Deming, Juran, Crosby and ISO 9000 standards to solving construction industry related problems will be discussed. Strategic planning as it relates to construction will also be covered in this course.

**BCN 5905 Directed Independent Studies (1-3).** Individual studies under supervision of faculty, tutor, or advisor. Requires prior approval of advisor and Chairperson.

**BCN 5906 Special Topics (1-3).** Intensive study for small group of students in a particular topic, or a limited number of topics not otherwise offered in the curriculum.

**BCN 5949 Graduate Construction Management Internship (1).** Supervised work in construction management. Evaluation and reports required. Prerequisites: Consent of advisor and Department Chairperson.

**BCN 6473 Systems Approach for Housing Planning (3).** Discussions of basic concepts of systems analysis and systems approach to the field of housing planning. The advantage of systems approach. Case studies.

**BCN 6642 Value Engineering in Construction (3).** Relationship of costs to time and life cycle of construction projects, and methods to improve the economic value of construction projects.

**BCN 6775 Decision and Risk Analysis in Construction (3).** Techniques of decision analysis for the medium to top level management personnel in the construction industry. Typical construction related problems that involve risk and uncertainty are studied.

**BCN 6785 Advanced Estimating and Bidding Strategy (3).** Application of computer software to rigorous exercises in construction estimating. Cost information related to construction with applications in current practice.

**BCN 6788 Artificial Intelligence Applications in Construction Management (3).** The course presents a study of the concepts, techniques, and applications of AI technology in the construction management domain.

**BCN 6795 Automation in Construction (3).** In depth introduction and analysis of automation technologies in construction, covering issues related to the application, implementation and evaluation of automation technologies throughout the lifecycle of a construction process for smart jobsites. Prerequisite: Permission of the instructor.

**BCN 6796 Construction Failures (3).** Discussion of issues and presentation of case studies related to failures of construction projects. Prerequisite: Permission of the instructor.

**BCN 6910 Supervised Research (1-6).** Graduate level research carried out under the supervision of a faculty member.

**BCN 6912 Project in Construction Engineering and Management (3).** Independent research work culminating in a professional practice oriented report for the requirements of the project-option of the Masters degree in construction engineering of construction management. Prerequisites: Fifteen graduate credits and approved project plan.

**BCN 6916 Developments in Construction Technologies (3).** Study of advanced field techniques and

emerging uses worldwide. Information flow and creativity are highlighted as crucial elements which stimulate new developments. This course prepares the students to understand and deal with concepts of change. Prerequisite: BCN 5716.

**BCN 6935 Seminar on Construction Management (3).** Advanced study of problems, trends, and issues in a time of rapid change in building and management technology. Topics selected or developed by class.

**BCN 6971 Thesis (3).** (Total of 6 credit hours spread over at least two consecutive terms with 3 credit hours in each must be completed.) Students develop a thesis under the direction of a senior faculty mentor, and their supervisory committee, and advance and defend their propositions before an audience of peers, scholars, and their supervisory committee. Requires approval of advisor, supervisory committee, and Department Chairperson.