

Request for Authorization to Establish

Master of Science in
Construction and Facilities Management

November 2009



UNC CHARLOTTE

Lee College of Engineering
Department of Engineering Technology

**THE UNIVERSITY OF NORTH CAROLINA
Request for Authorization to Establish a New Degree Program**

INSTRUCTIONS: Please submit five copies of the proposal to the Senior Vice President for Academic Affairs, UNC Office of the President. Each proposal should include a 2-3 page executive summary. The signature of the Chancellor is required.

Date November 17, 2009

Constituent Institution: The University of North Carolina at Charlotte

CIP Discipline Specialty Title: Construction Management

CIP Discipline Specialty Number: 15.9999 Level: B M 1st Prof D

Exact Title of Proposed Program: Master of Science in Construction & Facilities Management

Exact Degree Abbreviation (e.g. B.S., B.A., M.A., M.S., Ed.D., Ph.D.): M.S.C.F.M.

Does the proposed program constitute a substantive change as defined by SACS? Yes No

a) Is it at a more advanced level than those previously authorized? Yes No

b) Is the proposed program in a new discipline division? Yes No

Proposed date to establish degree program (allow at least 3-6 months for proposal review):

month August year 2010

Do you plan to offer the proposed program away from campus *during the first year of operation?*

Yes No

If so, complete the form to be used to request establishment of a distance learning program and submit it along with this request.

TABLE OF CONTENTS

Title Page	1
Table of Contents	2
Executive Summary	3
I. Description of the Program	6
II. Justification for the Program.....	9
III. Program Requirements and Curriculum	25
IV. Faculty.....	31
V. Library.....	32
VI. Facilities and Equipment.....	33
VII. Administration	34
VIII. Accreditation.....	35
IX. Supporting Fields	35
X. Additional Information	36
<u>Construction & Facilities Management (CFM) Fellows Program</u>	36
XI. Budget.....	37
XII. Evaluation Plans.....	38
XIII. Reporting Requirements	40

Appendices:

Appendix A: Budget projections for the first three years of program operation

Appendix B: Faculty Curriculum Vitas

Appendix C: Supporting Letters

Executive Summary

Construction Management is a program that prepares individuals to manage, coordinate, and supervise the construction process from concept development through project completion on timely and economic bases. Such programs include instruction in commercial, residential, mechanical, highway/heavy civil, electrical, environmental, industrial, and specialty construction; **facilities management**; project planning; budgeting and cost control; logistics and materials management; personnel management and labor relations; site safety; construction contracting; construction processes and techniques; organization and scheduling; and applicable codes and regulations [U.S. Dept. of Education's NCES CIP-2000].

Facility management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology. The body of knowledge required for facility management degree programs includes facility function (professional practice), human and environmental factors, planning and project management, finance, operation and maintenance, real estate, written and oral communication, information technology, quality management and assessment procedures (research and analytical methods), and integrative and problem solving skills [IFMA Standards for Recognized Programs]. **Construction management** was listed as a job responsibility by 71 percent of facility managers in an industry-wide survey [IFMA.org, Facilities Industry Survey, 2004]. As can be seen, there is a considerable overlap between the construction management and facility management professions.

More corporations, industries, and owners are demanding more full-service, turn-key procurement of their physical infrastructure and associated operations and maintenance. As a result, more construction industry professionals are being asked to manage and deliver design, construction, and facility operations and maintenance services. Keeping abreast of the ever increasing and expanding knowledge of materials, methods, and technology in this broad field requires advanced training and education beyond the baccalaureate degree level.

To fill this need, the Department of Engineering Technology proposes the creation of a Master of Science in Construction and Facilities Management (MSCFM) degree program. The MSCFM degree program will build off the body of knowledge required by the American Council for Construction Education (ACCE) for the existing construction management undergraduate degree program and will incorporate areas of knowledge required by the International Facility Management Association (IFMA). The proposed model curriculum is a 30 semester-hour program and consists of an 18-credit hour common core, a 6-credit hour elective core in either construction management or facility management, and a capstone experience including either a sequence of 6-credit hours of major electives or a formal 6-credit hour graduate research thesis. The program will be offered through both on-campus and online delivery. Online delivery is expected to begin during year two or three. It is anticipated that the program will have 20 graduates per year when fully established.

The proposed new degree program is unique in that it will be the first integrated construction and facility management graduate degree program in the University of North Carolina system. Currently, there are two institutions with master degree programs in construction management

(ECU and WCU) and no schools with facility management master's degree programs. The proposed MSCFM program differs from the other construction management graduate programs because of its increased facility management focus and because it is designed to serve students and industry within the Charlotte metropolitan area of the State. With the proposed MSCFM program, UNC Charlotte will also be one of only five schools in the nation to host a facility management graduate degree program joining the ranks of such prestigious institutions as Cornell University, Georgia Institute of Technology, and the University of Florida.

The Bureau of Labor Statistics' 2007-08 Edition of the Occupational Outlook Handbook [OOH] indicates that construction managers held 487,000 jobs in 2006 and employment has been projected to increase by 16 percent during the 2006-16 decade, faster than the average for all occupations, because the number of job openings exceeds the number of qualified individuals seeking to enter the occupation. Although the recession has curtailed current demand, the longer term need for highly educated construction managers remains. There were an estimated 2,190 construction managers in the Charlotte Metropolitan Region earning a mean annual salary of \$81,830 according to the 2006 Metropolitan Area Occupational Employment and Wage Estimates [MAOEWE] for the metropolitan area of Charlotte-Gastonia-Rock Hill, NC-SC.

About 60 colleges and universities offer a master's degree program in construction management or construction science. Master's degree recipients, especially those with work experience in construction, typically become construction managers in very large construction or construction management companies. Often, individuals who hold a bachelor's degree in an unrelated field seek a master's degree in construction management or construction science to work in the construction industry [OOH]. The MSCFM program will assist working professionals in obtaining this additional education.

Similarly, the job outlook for facility managers is also good. The number of jobs for administrative services managers, of which facility managers are a subset, is projected to grow 12 percent over the 2006-16 decade, about as fast as the average for all occupations. The recession has affected the market for facilities managers, but longer term remains attractive as issues of sustainability, building efficiency, automated systems, and facility security will demand more and more highly educated professionals. Currently, there are an estimated 1,180 administrative services managers in the Charlotte Metropolitan Region earning a mean annual salary of \$67,130 [MAOEWE].

Most facility managers have an undergraduate or graduate degree in engineering, architecture, construction management, business administration, or facility management. Many have a background in real estate, construction, or interior design, in addition to managerial experience. Advancement of facility managers is based on the practices and size of individual companies. Completion of the competency-based professional Certified Facility Manager (CFM) certification program offered by the International Facility Management Association can give prospective candidates an advantage. In order to qualify for this designation, applicants must meet certain educational and experience requirements [OOH]. The MSCFM program will assist working professionals in attaining the additional educational knowledge required for the CFM certification.

UNC Charlotte sits in a unique place from geographic, demographic, and business perspectives for a construction and facilities management program. The institution provides educational opportunities to residents of the largest metropolitan area in North Carolina. Charlotte has been home to one of the most robust construction climates in North America and that is expected to return as the economy recovers. In addition to its large construction industry, Mecklenburg County and the surrounding metropolitan area are home to eight of the Fortune 500 companies. In 2006, these headquarters represented more than \$267.3 billion in revenue. More importantly, 328 of the Fortune 500 companies have made a commitment to the city by placing one or more of their facilities within the county [Charlotte Chamber of Commerce].

These 328 Fortune 500 companies represent a diverse range of industries such as energy, commercial banking, automotive retailing, steel fabrication, electronics, aerospace and defense, general merchandisers, and specialty retailers. Each of these companies maintains and operates numerous facilities that require experienced and trained facility management professionals. In addition, there are numerous smaller companies and industries within the region that also require facility management services.

Although recent events have tempered the robustness of the economic climate for construction and business services in the Charlotte region temporarily, the regional construction industry is already showing signs of rebounding. The emerging economic climate for green construction, sustainable facility management, energy infrastructure and related business services in the Charlotte region make UNC Charlotte an ideal fit for a Master of Science in Construction and Facilities Management degree program. Our Department has provided quality technical education for more than 30 years. Our programs have met rigorous standards for specialized accreditation, and we have a long history of working with the Charlotte area construction industry to supply graduates for the greater Charlotte region and throughout North Carolina. This proposed program will only enhance the Department's outreach and integration with the community, enlarge its scholarly research capacity, and produce much needed graduates for the construction, facility management, energy infrastructure, and related business entities of Charlotte, the state and nation.

The MS in Construction and Facilities Management promises to be a key player in the renewal and expansion of the new energy economy in North Carolina as a major contributor to the Energy Production and Infrastructure Center (EPIC) initiative. UNC Charlotte proposed to create EPIC in response to a projected 30 percent increase in the demand for energy in the U.S. by 2030. Industry leaders are looking toward UNC Charlotte to help address a critical shortage in the intellectual capital necessary to modernize current energy production operations and infrastructure, and to facilitate the development of alternative energy sources. The North Carolina General Assembly has funded a new 200,000 square foot EPIC building and provided funding to hire faculty and staff. This program will have a special relationship with and focus on sustainability and energy infrastructure as part of the Energy Production and Infrastructure Center (EPIC) and Innovative Design, Engineering and Sustainability (IDEAS) Center initiatives at UNC Charlotte.

I. DESCRIPTION OF THE PROGRAM

A. Describe the proposed degree program (i.e., its nature, scope, and intended audience).

Construction Management is a program that prepares individuals to manage, coordinate, and supervise the construction process from concept development through project completion on timely and economic bases. Such programs include instruction in commercial, residential, mechanical, highway/heavy civil, electrical, environmental, industrial, and specialty construction; *facilities management*; project planning; budgeting and cost control; logistics and materials management; personnel management and labor relations; site safety; construction contracting; construction processes and techniques; organization and scheduling; and applicable codes and regulations [U.S. Dept. of Education's NCES CIP-2000].

Facility management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology. The body of knowledge required for facility management degree programs includes facility function (professional practice), human and environmental factors, planning and project management, finance, operation and maintenance, real estate, written and oral communication, information technology, quality management and assessment procedures (research and analytical methods), and integrative and problem solving skills [IFMA Standards for Recognized Programs]. *Construction management* was listed as a job responsibility by 71 percent of facility managers in an industry-wide survey [IFMA.org, Facilities Industry Survey, 2004]. As can be seen, there is a considerable overlap between the construction management and facility management professions.

More corporations, industries, and owners are demanding more full-service, turn-key procurement of their physical infrastructure and associated operations and maintenance. As a result, more construction industry professionals are being asked to manage and deliver design, construction, and facility operations and maintenance services. In order to keep abreast of the ever increasing and expanding knowledge of materials, methods, and technology in this broad field requires advance training and education beyond the baccalaureate degree level.

To fill this need, the Department of Engineering Technology proposes the creation of a Master of Science in Construction and Facilities Management (MSCFM) degree program. The MSCFM degree program will build off the body of knowledge required by the American Council for Construction Education (ACCE) for the existing construction management undergraduate degree program and will incorporate areas of knowledge required by the International Facility Management Association (IFMA). The proposed model curriculum is a 30 semester-hour program and consists of an 18-credit hour common core, a 6-credit hour elective core in either construction management or facility management, and a capstone experience including either a sequence of 6-credit hours of major electives or a formal 6-credit hour graduate research thesis. The program will be offered through both on-campus and online delivery. Online offerings will commence in year two or three.

Construction and facility management professionals work with owners, engineers, architects, specialty and sub-contractors, government agencies, and others to deliver, operate and maintain constructed projects and facilities. This program will provide ready access to construction and facility management education and careers for the citizens of the Greater Charlotte region and beyond.

The proposed program is designed to provide the advanced professional development and graduate education necessary for construction and facility management professionals to work in the increasing high tech, rapidly changing construction industry and related careers such as real estate and land development, infrastructure development, code enforcement, and insurance. This program will have a special relationship with and focus on sustainability and energy infrastructure as part of the Energy Production and Infrastructure Center (EPIC) and Innovative Design, Engineering and Sustainability (IDEAS) Center initiatives at UNC Charlotte.

B. List the education objectives of the program.

Program Educational Objectives: These are statements that describe the expected accomplishments of MSCFM graduates during the first few years after graduation.

The Department of Engineering Technology at UNC Charlotte is committed to providing the environment and expertise to ensure that its graduates make substantive contributions in their professional endeavors after graduation, both in the areas of technical proficiency and community involvement. Accordingly, the MSCFM program alumni will contribute to society as productive construction and facility managers and engaged citizens by:

1. Applying general and discipline-specific concepts and methodologies to identify, analyze, and solve technical problems in a sustainable manner.
2. Articulating technical material in a professional manner to potentially diverse audiences and in a variety of circumstances, employing effective oral and written strategies and techniques.
3. Contributing within team environments, demonstrating ethical, respectful and professional behavior in all associations.
4. Recognizing and appreciating the environmental, societal and fiscal impact of the technical professions in a local, national and global context.
5. Demonstrating an individual desire and commitment to pursue continuous self-improvement and lifelong learning.

Program Outcomes: These are statements that describe what students are expected to know and able to do by the time of graduation. Graduates with a Master of Science in Construction and Facilities Management (MSCFM) degree from UNC Charlotte will be able to:

1. Develop solutions to construction and facilities management problems to achieve performance goals related to safety, schedule, quality, sustainability, and economics.

2. Analyze, develop, and articulate open-ended construction and facilities management problems with specific applications to sustainable energy infrastructure.
3. Function as an effective leader of an interdisciplinary team within the construction and facilities management industries.
4. Apply research-based methodologies to solve unique construction and facilities management issues in a sustainable manner.

C. Describe the relationship of the program to other programs currently offered at the proposing institution, including the common use of: (1) courses, (2) faculty, (3) facilities, and (4) other resources.

1) Courses: This program is a new program which includes development of new courses and the proposed core curriculum includes no common courses with other programs. However, as the program develops, additional major elective graduate courses will be identified from other programs such as the Engineering Management program or others.

Graduate level courses developed as part of the MSCFM program will be available and may be applicable to students studying in the following colleges and departments, subject to internal acceptance by those departments and colleges:

- A. College of Engineering
 - i. Civil and Environmental Engineering
 - ii. Mechanical Engineering
 - iii. Engineering Management
 - iv. Fire Protection
- B. College of Business
 - i. Management
 - ii. Business Information Systems and Operations Management
- C. School of Architecture

2) Faculty Resources: This program will share faculty resources with the existing BSCM in Construction Management and existing BSET in Civil Engineering Technology programs. As of fall 2009, thirteen (13) full-time and two (2) part-time faculty members deliver the Construction Management and Civil ET courses. In total, thirty-two (32) faculty members deliver courses which support these programs within the interdisciplinary Department. Members of the Graduate School Faculty currently teaching in those programs will deliver courses in the proposed MSCFM program. These programs will efficiently serve the spectrum of civil and construction technology through shared faculty and vertically integrated coursework, thus providing additional synergy and optimizing the use of resources.

3) Facilities: With the move by Electrical and Computer Engineering (ECE), Mechanical Engineering and Engineering Sciences, and Civil and Environmental Engineering to new

facilities in 2006, ample space is now available in the Smith Building to move forward with this program. Office space for new faculty members is available, as is construction project space for graduate student projects and research activity. Existing laboratories and offices in Smith which now support the Construction Management (CM) and Civil Engineering Technology (CIET) programs will be utilized by the MSCFM program and are adequate to deliver the programs. Those laboratories include the following instructional laboratories: 1) Construction Materials; 2) Construction Practices; 3) Hydraulics & Hydrology; 4) Soil Mechanics; 5) Asphalt; 6) Senior Design; 7) Stress Analysis; 8) Building Systems; 9) multiple computer/CAD laboratories; and various additional research laboratories.

4) Other resources: Other resources such as Engineering Computing and Library resources are available for use by the MSCFM program. Computing applications such as computer-aided drafting and design, cost estimating, project scheduling, electronic Internet plan room, hydraulics and hydrology are in place for existing programs and will be utilized by the MSCFM program. Library resources for the existing BS programs will also be utilized by the MSCFM program.

D. Describe any explorations of collaborative offering of this program and the results of those explorations.

The proposed new degree program is unique in that it will be the first integrated construction and facility management graduate degree program in the University of North Carolina system. Furthermore, the program will take on a sustainable energy infrastructure focus both in the curriculum and in research as part of the Innovative Design, Engineering and Sustainability (IDEAS) Center and Energy Production and Infrastructure Center (EPIC) initiatives at UNC Charlotte. After initial review of curriculum and conversation with other institutions, it became apparent that due to the unique focus of this program, collaboration with other institutions was not immediately viable. However, it is anticipated that the program will be offered online beginning in year two or three and be available to students at other institutions in the UNC system.

II. JUSTIFICATION FOR THE PROGRAM

A. Describe the proposed program as it relates to:

1. The institutional mission and strategic plan and response to UNC Tomorrow

The proposed graduate program meshes nicely with the institutional mission and strategic plan. It fits the University themes of Applied Sciences and Technologies and Urban and Regional Development. As the first graduate level program to be located within the Department of Engineering Technology, the program will allow the ET Department and its faculty to become active participants in the institutional goal of raising the University's graduate research and scholarly profile. This program was specifically targeted in UNC Charlotte's response to UNC Tomorrow to increase the intellectual and research capacity of

the University. Specifically, this program is one of the desired deliverables in response to the Energy Production and Infrastructure Center (EPIC) initiative at UNC Charlotte.

The Department mission statement indicates that our programs exist to serve business and industry in this region by supplying highly competent construction management and engineering technology graduates (technologists). With the increasing urbanization and associated transportation and infrastructure challenges, the resultant exploding demand for construction professionals and the associated demand for facility managers across the nation and particularly in North Carolina and the Charlotte region become ever more acute. This proposed program is positioned in support of the Department, College and University missions to provide intellectual capital and to educate North Carolina citizens to meet the challenges of the region and state.

The proposal contributes to Goals 1, 2, 3, 4, 5 and 6 of the Department's 2005-2010 Strategic Plan as listed below. In particular, the proposal contributes to Goal 1 of the Department's strategic plan which is the planned development of a School of Technology with graduate level programs.

GOAL #1: Establish the School.

GOAL #2: Increase the quality, diversity, and number of students in Engineering Technology and Construction Management while maintaining and continuously improving quality educational experience.

GOAL #3: Add new and expand existing programs in niche areas in Engineering Technology, Construction & Facilities Management and Fire Protection to serve the Greater Charlotte region, the state of North Carolina and the United States.

Initiatives for the Five-Year Period

1. BS in Construction Management (completed 2006)
2. Multi-Disciplinary BS in Facilities & Plant Engineering Technology
3. Industrial Safety or Fire Protection track in BS Fire Safety ET program
4. **MS in Construction & Facilities Management (2009)**
5. Plan/Add MS in Fire Protection & Administration (2009)
6. Plan/Add distance education in Mechanical Engineering Technology (2010)
7. Plan/Add distance education in Civil/Construction Engineering Technology (2010)

GOAL #4: Provide adequate facilities to support expanding program offerings and facilitate applied research and outreach missions of the School.

1. Modify/Renovate Smith Building to provide adequate support for current and planned programs (2005-2010)
2. Plan new facility to support growing School of Engineering Technology as part of Construction Institute on CRI Campus (in concert with CE and others) (2007-2009)

GOAL #5: Participate in and contribute to Centers of Excellence

GOAL #6: Partner to Establish an Industrial Solutions Center

Additionally, as shown above, Goal 3 of the Department's strategic plan is to add new and/or expand existing programs in specific niche areas. Among the alternatives considered as part of this effort, the M.S. in Construction and Facilities Management is the Department's first priority for its initial graduate level program. The nature and sophistication of construction management and facilities management functions have evolved over the past two decades to the point where an advanced degree has become necessary to adequately function at the highest levels in these fields. Advances and emerging awareness of green initiatives, environmental and sustainability issues, energy management, security, and integrated facility management needs have all evolved to require a more sophisticated professional who can apply state-of-the-art tools such as Building Information Modeling (BIM), "smart controls", LEED, etc. This evolutionary trend in the use of sophisticated tools and analysis techniques has driven the need for advanced study at the Master's level.

This plan has been reviewed at various stages of development and endorsed by our stakeholders.

This proposal is aligned with UNC Charlotte's response to UNC Tomorrow; specifically, this program is in direct response to the Energy Production and Infrastructure Center (EPIC) initiative at UNC Charlotte and is specifically listed in UNC Charlotte's response to UNC Tomorrow. Faculty members of the Department are participating in the Innovative Design, Engineering and Sustainability (IDEAS) Center as part of the EPIC umbrella. Graduates of this program will contribute to the construction and management of energy infrastructure and to the research mission associated with development of new technologies in energy production and management and facilities operation in the new energy economy.

2. Student demand

Conservatively, it is estimated that initial enrollments will range from five to ten students depending upon timing of approval and subsequent recruiting efforts. With reasonable marketing and brand development, enrollments are expected to increase to 35 full-time students and another 30 part-time students within a few years. Recently established graduate level construction management programs at East Carolina University and Western Carolina University have enrollments below and above this range, respectively. However, neither of these programs is located in a metropolitan area of 1.5 million people as is the proposed UNC Charlotte program. The infrastructure and building needs in the Charlotte metropolitan area, coupled with the large construction industry located here provide unique opportunities for a Master of Science in Construction and Facility Management program, including outreach and collaboration with the Charlotte construction community. Student interest within the Department for graduate study is high. The Department's Fall 2009 undergraduate enrollment is 826 students. In fact, the Department is, by a large margin, the largest at UNC Charlotte without a graduate program. Currently, no graduate programs exist within the Department to support research of the faculty or provide

opportunities for advanced study to our students. In the absence of graduate programs, many students who might pursue graduate study leave UNC Charlotte to pursue other options.

3. Societal need (For graduate, first professional, and baccalaureate professional programs, cite manpower needs in North Carolina and elsewhere.)

Of approximately 116 million workers in the U.S., just over five percent or six million people are employed in the construction industry. Discounting the U.S. Government, which includes the Armed Forces, the construction industry is the largest employer in the nation. Projections for needed construction and related services are estimated at \$3.3 trillion over the next 10 years. The following are just a few examples of work that will be needed over the next ten years:

- Replace 375,000 bridges as part of \$360 billion spent on roadwork.
- Mass transit will need \$72 billion worth of construction.
- Repair or renovate one out of every three existing schools at a cost of \$60 billion.

Trained construction and facility managers will be required to successfully accomplish this work. Data taken from the Bureau of Labor Statistics' 2007-08 Edition of the Occupational Outlook Handbook [OOH] and 2006 Metropolitan Area Occupational Employment and Wage Estimates [MAOEWE] for the metropolitan area of Charlotte-Gastonia-Rock Hill, NC-SC illustrates the robust employment environment of the industry and the subsequent demand for construction and facility management professionals.

Construction managers held 487,000 jobs in 2006. About 57 percent were self-employed, many as owners of general or specialty trade construction firms. Most salaried construction managers were employed in the construction industry, 13 percent by specialty trade contractor businesses—for example, plumbing, heating, air-conditioning, and electrical contractors—nine percent in residential building construction; and nine percent in nonresidential building construction. Others were employed by architectural, engineering, and related services firms and by local governments [OOH].

Employment of construction managers is projected to increase by 16 percent during the 2006-16 decade, faster than the average for all occupations, because the number of job openings exceeds the number of qualified individuals seeking to enter the occupation [OOH]. This equates to a total of 77,000 new jobs over the decade. This situation is expected to continue even as college construction management programs expand to meet the current high demand for graduates. Currently, there are an estimated 2,190 construction managers in the Charlotte Metropolitan Region earning a mean annual salary of \$81,830 [MAOEWE].

More construction managers will be needed as the level of construction activity returns. Population and business growth will result in more construction of residential homes, office buildings, shopping malls, hospitals, schools, restaurants, and other structures that require construction managers [OOH].

The increasing complexity of construction projects will also boost demand for specialized management-level personnel within the construction industry. Sophisticated technology and the proliferation of laws setting standards for buildings and construction materials, worker safety, energy efficiency, environmental protection, and the potential for adverse litigation have further complicated the construction process. Advances in building materials and construction methods; the need to replace portions of the Nation's infrastructure; and the growing number of multipurpose buildings and energy-efficient structures will further add to the demand for more construction managers [OOH].

In addition to job openings arising from employment growth, many additional openings should result annually from the need to replace workers who transfer to other occupations or leave the labor force for other reasons. A substantial number of seasoned managers are also expected to retire over the next decade, likely resulting in a large number of openings [OOH].

About 60 colleges and universities offer a master's degree program in construction management or construction science. Master's degree recipients, especially those with work experience in construction, typically become construction managers in very large construction or construction management companies. Often, individuals who hold a bachelor's degree in an unrelated field seek a master's degree in construction management or construction science to work in the construction industry [OOH]. The MSCFM program will assist working professionals in obtaining this additional education.

Similarly, the job outlook for facility managers is also good. The number of jobs for administrative services managers, of which facility managers are a subset, is projected to grow 12 percent over the 2006-16 decade, about as fast as the average for all occupations. However, demand should be stronger for facility managers because businesses increasingly realize the importance of maintaining, securing, and efficiently operating their facilities, which are very large investments for most organizations [OOH]. Currently, there are an estimated 1,180 administrative services managers in the Charlotte Metropolitan Region earning a mean annual salary of \$67,130 [MAOEWE].

Cost-cutting measures to improve profitability, streamline operations, and compete globally will continue to be addressed by many public and private organizations, resulting in more firms outsourcing facility management services or hiring qualified facility managers who are capable of achieving these goals in-house. The proliferation of facility management outsourcing should result in employment growth in facilities management firms as companies increasingly look to outside specialists to handle the myriad of tasks that have become increasingly complex and expensive [OOH].

Most facility managers have an undergraduate or graduate degree in engineering, architecture, construction management, business administration, or facility management. Many have a background in real estate, construction, or interior design, in addition to managerial experience. Advancement of facility managers is based on the practices and size

of individual companies. Completion of the competency-based professional Certified Facility Manager (CFM) certification program offered by the International Facility Management Association can give prospective candidates an advantage. In order to qualify for this designation, applicants must meet certain educational and experience requirements [OOH].

The MSCFM program will assist working professionals in attaining the additional educational knowledge required for the CFM certification.

UNC Charlotte sits in a unique place from geographic, demographic, and business perspectives for a construction and facilities management program. The institution provides educational opportunities to residents of the largest metropolitan area in North Carolina. Charlotte has been home to one of the most robust construction climates in North America. The attraction of the area is apparent in the numbers. In 2006, Charlotte awarded 24,250 building permits representing over \$4 billion of new construction and the industry has shown continued growth over the last ten years as shown in Table 1 [Charlotte Chamber of Commerce].

Table 1: Charlotte-Mecklenburg 10-Year Construction Summary 1997 - 2006

Year	Permits	Value Residential (millions)	Value Non-Residential (millions)	Value Total (millions)
2006	24,250	\$2,709.5	\$1,560.9	\$4,270.4
2005	22,037	2,063.2	1,297.6	3,360.7
2004	19,243	1,730.8	1,326.0	3,056.8
2003	18,984	1,600.8	905.7	2,506.5
2002	19,770	1,564.1	814.4	2,378.5
2001	19,174	1,640.2	1,117.5	2,757.7
2000	18,937	1,641.0	1,670.6	3,311.6
1999	19,323	1,313.7	1,044.2	2,357.9
1998	17,845	1,362.5	1,005.3	2,367.8
1997	15,635	1,036.1	836.2	1,872.3
Totals	195,198	\$16,661.9	\$11,578.4	\$28,240.2

The growth of Charlotte has been a magnet for construction companies. Low costs, high construction activity levels, and convenient access to both materials and skilled labor provide the reasons that over 4,700 construction firms employ 48,273 qualified workers in the metro area. These companies come in a wide variety of sizes, from a number of small, more personal operations to at least 65 firms each employing more than 100 people [Charlotte Chamber of Commerce].

In addition to its large construction industry, Mecklenburg County and the surrounding metropolitan area are home to eight of the Fortune 500 companies, as listed in Table 2. This ranks Charlotte 7th nationally in number of Fortune 500 companies headquartered within the

county. These headquarters represent more than \$267.3 billion in revenue for 2006. More importantly, 325 of the Fortune 500 companies have made a commitment to the city by placing one or more of their facilities within the county [Charlotte Chamber of Commerce].

Table 2: Charlotte Area's Fortune 500 Headquarters (as of April 2008)

Name	Revenue	Rank
Bank of America (Banking)	\$113.1 billion	9
Lowe's (Retail)	\$48.2 billion	48
Nucor (Metals)	\$23.7 billion	106
Duke Energy (Utilities)	\$13.2 billion	204
Sonic Automotive (Automotive Retailing)	\$7.5 billion	337
Family Dollar (Retail)	\$7.0 billion	359
Goodrich Corp. (Aerospace and Defense)	\$7.1 billion	354
SPX (Electronics)	\$6.1 billion	402

These 325 Fortune 500 companies represent a diverse range of industries such as energy, commercial banking, automotive retailing, steel fabrication, electronics, aerospace and defense, general merchandisers, and specialty retailers. Each of these companies maintains and operates numerous facilities that require experienced and trained facility management professionals. In addition, there are numerous smaller companies and industries within the region that also require facility management services.

This economic climate for construction and business services in the Charlotte region make UNC Charlotte an ideal fit for a Master of Science in Construction and Facilities Management degree program. In addition, UNC Charlotte would be only one of a few select institutions in the entire country with a facility management related graduate degree program. Institutions with IFMA acknowledged graduate programs include Arizona State University, Cornell University, Georgia Institute of Technology, and the University of Florida.

UNC Charlotte's Department of Engineering Technology has provided quality technical education for more than 30 years. Our programs have met rigorous standards for specialized accreditation, and we have a long history of working with the Charlotte area construction industry to supply graduates for the greater Charlotte region and throughout North Carolina. This proposed program will only enhance the Department's outreach and integration with the community, enlarge its scholarly research capacity, and produce much needed graduates for the Charlotte construction and business community.

The following data from the Employment Security Commission of North Carolina shows specific employment projections through 2016 in the Construction Management and Facilities Management areas.

Job Category	Region	2006 Employment	2016 Employment	Annual Growth Rate (%)	Average Annual Opening (including replacements)
CM	US	487,000	564,000	1.57	152,000
CM	NC	21,320	27,180	2.46	920
CM	Charlotte	3,320	4,520	3.14	170
FM*	US	247,000	276,000	1.17	94,000
FM*	NC	3,700	4,390	1.73	100
FM*	Charlotte	530	650	2.03	10

Notes: *Administrative Services Managers of which facility management is a subset.

It should be noted that there are no facilities management programs in North Carolina, so the employees for those positions are either being imported from outside North Carolina or the positions are being filled by people without facilities management educational credentials. The number of BSCM degrees awarded annually in North Carolina is less than 150 so North Carolina is also importing construction managers. Assuming a modest three percent of 2016 Charlotte region construction management workforce in these areas seek graduate degrees to upgrade skills or qualify for positions of leadership in the industry, that would equate to 135 CM students. Assuming three percent of the 2016 North Carolina facilities management workforce seeks this degree to upgrade skills, another 132 students could be served.

4. Impact on existing undergraduate and/or graduate academic programs of your institution. (e.g., Will the proposed program strengthen other programs? Will it stretch existing resources? How many of your programs at this level currently fail to meet Board of Governors’ productivity criteria? Is there a danger of proliferation of low-productivity degree programs at the institution?)

This MSCFM program will strengthen the existing degree programs in the Department of Engineering Technology. Academic infrastructure is in place to support laboratory experiences and computing needs of the program. The existing construction management (BSCM) and engineering technology programs (BSET) are growing quickly (Fall 2009 enrollment shows 826 students in the Department) and will benefit from the synergy of the proposed MSCFM program. The program will enlarge the scholarly and research capacity of the faculty. As the Department’s programs represent popular and lucrative career opportunities which are technologically-based and appeal to today’s college-bound population, data indicate that this proposed program and all existing engineering technology programs will continue to grow at UNC Charlotte.

B. Discuss potential program duplication and program competitiveness

- 1. Identify similar programs offered elsewhere in North Carolina. Indicate the location and distance from the proposing institution. Include a) public and b) private institutions of higher education.**

a) public institutions

Two master's level programs in Construction Management exist in the UNC system, namely:

- East Carolina University – CIP 15.1001 - Master in Construction Management (MCM) - 240 miles (4+ hours) from UNC Charlotte
- Western Carolina University – CIP 15.1001 - Master in Construction Management (MCM) – 190 miles (3+ hours) from UNC Charlotte

The programs at ECU and WCU are approved for both on-campus and online delivery. Both programs are being offered online only according to their most current web postings.

Currently, there are no graduate level facility management programs within the University of North Carolina system.

b) private institutions

None.

- 2. Indicate how the proposed new degree program differs from other programs like it in the University. If the program duplicates other UNC programs, explain a) why is it necessary or justified and b) why demand (if limited) might not be met through a collaborative arrangement (perhaps using distance education). If the program is a first professional or doctoral degree, compare it with other similar programs in public and private universities in North Carolina, in the region, and in the nation.**

The proposed new degree program is unique in that it will be the first integrated construction and facility management graduate degree program in the University of North Carolina system. Currently, there are two other schools with master degree programs in construction management (MCM) and no schools with facility management master's degree programs. The focus of the existing MCM programs at ECU and WCU is on employed professionals who are pursuing the degree part-time. The proposed MSCFM program differs from the other construction management graduate programs because of its facility management focus, its ties to the energy sector and emphasis on energy infrastructure, its strong research component, and because it is designed specifically to serve the students and energy industry of the Greater Charlotte Metropolitan area. The existing programs in the state are focused on general project management and management of general commercial or residential construction. This program is clearly

aligned with the **Energy Production & Infrastructure Center (EPIC)** and **Innovative Design, Engineering and Sustainability (IDEAS) Center** initiatives at UNC Charlotte. Those initiatives are described in significant detail in the ensuing pages of this document. With the proposed MSCFM program, UNC Charlotte will also be one of only five schools in the nation to host a facility management graduate degree program joining the ranks of such prestigious institutions as Cornell University, Georgia Institute of Technology, and the University of Florida. No competing facility program exists in North Carolina.

Longer term, the program will be offered statewide via online delivery.

The following table highlights some, but not all, key differences in the proposed Master of Science in Construction and Facilities Management (MSCFM) program and the existing Master of Construction Management (MCM) programs at ECU and WCU.

Institution	Degree	Focus / advertised emphasis or uniqueness	Delivery Mode(s)	Research / Thesis Option	Target Population(s)	Entry Requirements
ECU	Master of Construction Management (MCM); non-thesis terminal degree	Management of Construction / "...collaborative network-based learning and offers its graduate program completely online. Graduates from this program are prepared to manage rapidly changing technologies and technical systems."	Approved as both on-campus / online; advertised and delivered online	Capstone research seminar (3 credits) required; thesis not required	Existing construction industry workers with BS degree and a minimum of management experience; w/o regional focus; advertised as completely online program w/collaborative network-based learning	Grad School Requirements plus BSCM or related degree w/3years construction experience at management level; or BS unrelated degree w/10 years of construction experience; require portfolio to demonstrate type and extent of construction experience; GRE or GMAT.
WCU	Master of Construction Management (MCM); non-thesis terminal degree	Project Management / "...fully online (MCM) Program is designed with you, the working professional, in mind. Delivered from WCU's main campus, this cohort-based program can be completed in two years."	Approved as both on-campus / online; advertised and delivered online	Research seminar (1 credit); No thesis option	Working professionals; general population w/o regional focus; advertised as designed for working professionals with experience managing projects; cohort-based two-year program w/fall semester entry only	Grad School Requirements plus BS degree w/ prerequisite of general business courses in accounting, business law, economics, and statistics; employment experience in managing projects; knowledge of word processing and commonly used business software applications; must have Internet access; GRE or GMAT.
UNC Charlotte	Master of Science in Construction & Facilities Management (MSCFM); thesis-based research	Sustainable Construction and Management of Facilities / emphasis on energy infrastructure with close curriculum and research relationship to the Energy Production & Infrastructure Center (EPIC) initiative at UNC Charlotte	On-campus initially; online to follow in year 2 or 3	Two Options: 1) Research & Analytical Methods, AND Research & Thesis (9 credits) OR 2) course- work only	NC population w/focus on Charlotte region; Construction & Facilities Management industry professionals plus 2000+ UNC Charlotte College of Engineering undergraduates interested in sustainable energy infrastructure	Grad School Requirements plus BS in Construction Management, Engineering Technology, Civil Engineering, Electrical Engineering, Mechanical Engineering, Systems Engineering, or related degree [early entry option to be added]; GRE or GMAT

A listing and comparison of required courses for each of the programs is shown in the following table. Distinct differences are evident in the facilities content and research focus of the proposed UNC Charlotte MS in Construction and Facilities Management (MSCFM) degree program. In addition, content in the construction portion of the curriculum is focused on energy infrastructure to service the Energy Production and Infrastructure Center (EPIC) and Innovative Design, Engineering and Sustainability (IDEAS) Center initiatives at UNC Charlotte.

UNC Charlotte		Western Carolina University		East Carolina University	
Master of Science in Construction & Facilities Management (MSCFM)	Credit Hours	Master of Construction Management (MCM)	Credit Hours	Master of Construction Management (MCM)	Credit Hours
*CMET 5240 - Safety & Risk Management	3	*CM 650 - Project Management Systems	6	*CMGT6660. Quality Control Systems	3
*CMET 5270 - Operation of Constructed Facilities	3	*CM 652 -Project Plan Development	6	*CMGT6610. Advanced Computer Applications in Construction	3
*CMET 6130 - Building Information Modeling	3	*CM 654 -Project Plan Analysis and Approval	6	*CMGT6620. Human Resources and Training	3
*CMET 6135 - Advanced Construction Planning & Management	3	*CM 657 -Construction Marketing and Development	6	*CMGT6664. Advanced Cost Estimating/Cost Analysis	3
*CMET 6140 - Building Energy Management	3	*CM 655 - Advanced Topics in Construction Management	6	*CMGT6640. Land Use Management and Development	3
*CMET 6160 - Research and Analytical Methods	3	*CM 659 -Advanced Legal Aspects in Construction	6	*CMGT6650. Global Management of Construction	3
Each Student Selects One Emphasis - **Facilities OR ***Construction				*CMGT6662. Legal Implications of Design and Construction	3
CMET 6145 - Facilities Management Financial Analysis (3) OR *CMET 6180 - Alternative Project Delivery Methods (3)	3			*CMGT6600. Critical Analysis and Evaluation of Construction Documentation	3
CMET 6250 - Asset Management for Facility Managers (3) OR *CMET 6285 - Quality Assurance in Construction (3)	3			*CMGT6630. Advanced Applications in Construction Scheduling	3
CMET 6900 - Master's Thesis & Research OR elective (E) courses for distance students	6	*CM 651 - Research in Construction (non-thesis)	1	*CMGT6700. Research Capstone Seminar (Non-thesis)	3
Total Credits Required for degree =	30	Total Credits Required for degree =	37	Total Credits Required for degree =	30
Notes:					
1) *Required Courses; 2) Each Student Selects One Emphasis - **Facilities OR ***Construction; 3) Non-thesis option requires two (E) Elective courses from the following list: CMET 6000 - Special Topics in Construction & Facility Management; CMET 6155 - Facility Instrumentation and Controls; CMET 6255 - Advanced Plant Layout and Design; CMET 6290 - Temporary Structures in Construction; CMET 6295 - Design & Improvement of Construction Operations; CMET 6800 - Independent Study in Construction & Facilities Management.					

The MS in Construction and Facilities Management promises to be a key player in the renewal and expansion of the new energy economy in North Carolina as a major contributor to the Energy Production and Infrastructure Center (EPIC) initiative. UNC Charlotte proposed to create EPIC in response to a projected 30 percent increase in the demand for energy in the U.S. by 2030. Industry leaders are looking toward UNC Charlotte to help address a critical shortage in the intellectual capital necessary to modernize current energy production operations and facilitate the development of alternative energy sources. A new, 200,000 square foot, EPIC building will be located on the Charlotte Research Institute's campus. The target date for completion is January 2012. The EPIC building will provide classroom, office and laboratory space to accommodate growth in energy infrastructure research and collaboration with industry partners, including Duke Energy, and construction partners like AREVA, Parsons, and Shaw Group.

Following is additional information, article excerpts, and quotes from several key participants of the EPIC initiative which is provided to provide some background and context for UNC Charlotte's EPIC initiative. "EPIC is about regional growth and advancement in the energy industry," said Dr. Steve Patterson, director of EPIC and a distinguished professor in the Lee College of Engineering. "Clearly one strength of EPIC is the outstanding energy engineering assets of the region in which we live." Regional energy corporations include AREVA, Duke Energy, the Electric Power Research Institute (EPRI), The Shaw Group, URS Washington Group, Westinghouse, Siemens and Metso Power. "Part of what we're doing is developing and implementing energy concentrations based on industry needs," Dr. Patterson adds. Industry involvement with EPIC is led through a board of advisors that oversees the center's strategy and helps build industry relations.

Keyes Niemer, a project manager for the Nuclear Division of The Shaw Group's Power Group, is a member of the implementation team and has been involved with EPIC since its inception three years ago. Shaw Group employs 27,000 people worldwide in energy engineering, procurement and construction work, 1,400 of those in Charlotte. Niemer notes, "What Shaw would like to see is a core curriculum of power engineering within UNC Charlotte's engineering program. Shaw needs graduates with strong project management, scheduling and budgeting skills." They also want students to see that there are good, exciting jobs building and upgrading power plants.

Dhiaa Jamil is Duke Energy's group executive and chief nuclear officer, and chairman of the EPIC advisory board. He is also a UNC Charlotte engineering alumnus. "EPIC will play a significant role in providing engineering students with the fundamentals for supporting power production and infrastructure design and maintenance," said Jamil. "Additionally, EPIC provides Duke Energy with a local partner for research opportunities. This can include solving technology problems, as well as developing and improving existing technology. EPIC will also have a key role in expanding emphasis on renewable technology and will serve as a hub for renewables research."

Jim Little, senior vice president of Nuclear Energy Programs with URS Washington Group, is a member of the EPIC board of advisors. He is with URS's Nuclear Center in Fort Mill, South Carolina, which provides engineering, procurement and construction services for the entire life cycle of nuclear facilities. "The U.S. will be rebuilding its energy infrastructure in the near future," Little concludes. "The pipeline of talent for this effort will come from our educational system. EPIC is a great opportunity for strengthening this educational system, and we're very interested in providing our support and guidance to make it successful." The EPIC board is working with the Lee College of Engineering to create programs that go beyond just technical skills. Little adds, "We need to emphasize skills outside of engineering, such as project management, collaborative teamwork, risk analysis and leadership. We want to see a balanced portfolio of skills."

This robust economic climate for green construction, sustainable facility management, energy infrastructure and related business services in the Charlotte region make UNC Charlotte an ideal fit for a Master of Science in Construction and Facilities Management degree program. The Department of Engineering Technology has provided quality technical education for over 30 years. Its programs have met rigorous standards for specialized accreditation, and the Department has a long history of working with the Charlotte area construction industry to supply graduates for the greater Charlotte region and throughout North Carolina. This proposed program will only enhance the Department's outreach and integration with the community, enlarge its scholarly research capacity, and produce much needed graduates for the construction, energy and business communities of Charlotte, the state, and nation.

C. Enrollment (baccalaureate programs should include only upper division majors, juniors, and seniors).

Headcount enrollment

Show a five-year history of enrollments and degrees awarded in similar programs offered at other UNC institutions (using the format below for each institution with a similar program); indicate which of these institutions you consulted regarding their experience with student demand and (in the case of professional programs) job placement. Indicate how their experiences influenced your enrollment projections.

Program Title: Construction Management, Master (MCM) programs

University	Data	Year				
		<u>2004-05</u>	<u>2005-06</u>	<u>2006-07</u>	<u>2007-08</u>	<u>2008-09</u>
East Carolina University (15.1001, Master of Construction Management; New program in Spring 2007)	Fall Enrollment	-	-	5	6	14
	Degrees awarded	-	-	0	0	Not yet posted
Western Carolina University (15.1001, Master of Construction Management; New program in Fall 2005)	Fall Enrollment	-	11	17	30	36
	Degrees awarded	-	-	0	4	Not yet posted

Contact was made with each institution above to gather information on program development and student demand. Based upon enrollment growth experiences of consulted programs, discussions with our construction advisory committee, and evaluation of demographic data the enrollment projections for the proposed program are deemed realistic. Given the geographic proximity of UNC Charlotte to the Greater Charlotte metro region, its rapidly growing population and construction industry, our consultants anticipate that this proposed program can reach enrollments of 50 to 70 students at steady state within the next decade.

Use the format in the chart below to project your enrollment in the proposed program for four years and explain the basis for the projections:

	Year 1: 2010-11	Year 2: 2011-12	Year 3: 2012-13	Year 4: 2013-14
Full-time	6	15	25	35
Part-time	8	16	24	30

Please indicate the anticipated steady-state headcount enrollment after four years:

Full-time: 35+

Part-time: 30+

Total: 65+

The Department conducted a study of all construction programs nationally, including those accredited by ABET, ACCE and NAIT. Enrollment projections are consistent with the average size of programs in the study. Obviously, UNC Charlotte's location and the expected renewal and expansion of the energy economy place us in a competitive

advantage over many of the programs in the study; therefore, it is a conservative estimate that the proposed program will achieve only average size.

SCH production. Use the format in the chart below to project the SCH production for four years. Explain how projections were derived from enrollment projections (see UNC website for a list of disciplines comprising each of the four categories).

Year 1: 2010-11	Student Credit Hours (SCH)		
Program Category	UG	Master's	Doctoral
Category I			
Category II			
Category III		180	
Category IV			

Year 2: 2011-12	Student Credit Hours (SCH)		
Program Category	UG	Master's	Doctoral
Category I			
Category II			
Category III		414	
Category IV			

Year 3: 2012-13	Student Credit Hours (SCH)		
Program Category	UG	Master's	Doctoral
Category I			
Category II			
Category III		666	
Category IV			

Year 4: 2013-14	Student Credit Hours (SCH)		
Program Category	UG	Master's	Doctoral
Category I			
Category II			
Category III		900	
Category IV			

Student credit hour projections were derived assuming that full-time students will enroll in 18 credits per year and that part-time students will average 9 credits per year.

III. Program Requirements and Curriculum

A. Program Planning

1. List the names of institutions with similar offerings regarded as high quality programs by the developers of the proposed program.

M.S. Construction Management or similar programs	
Arizona State University	AZ
Auburn University	AL
Clemson University	SC
Colorado State University	CO
Florida International University	FL
Georgia Institute of Technology	GA
Purdue University	IN
Southern Polytechnic State University	GA
Texas A&M University	TX
University of Cincinnati	OH
University of Florida	FL
Virginia Polytechnic Institute and State University	VA

M.S. Facilities Management or similar programs	
Arizona State University	AZ
Cornell University	NY
Georgia Institute of Technology	GA
University of Florida	FL

The Georgia Institute of Technology is currently the only school in the country that has an integrated construction and facility management graduate program similar to one being proposed at UNC Charlotte.

2. List other institutions visited or consulted in developing this proposal. Also list any consultants' reports, committee findings, and simulations (cost, enrollment shift, induced course load matrix, etc.) generated in planning the proposed program.

The following institutions were consulted in developing this proposal:

- Florida International University
- Georgia Institute of Technology
- Purdue University
- University of Florida

B. Admission. List the following:

1. Admissions requirements for proposed program (indicate minimum requirements and general requirements).

The minimum admission requirements for the program are:

- a. An earned undergraduate degree in construction management, facility management, engineering technology, engineering, architecture or a closely related field
- b. An undergraduate GPA of 2.75 or better
- c. Acceptable scores on the verbal, quantitative, and analytical sections of the GRE
- d. Positive letters of recommendation
- e. A combined TOEFL score of 220 (computer-based) or 557 (paper-based) is required if the previous degree was from a country where English is not the common language
- f. Integral and differential calculus (MATH 1120 or 1121 or ETGR 3171 at UNC Charlotte or equivalent from other institution).
- g. Statistics (STAT 1220 or STAT 3128 at UNC Charlotte or equivalent from other institution).
- h. Other credentials as required by the Graduate School

2. Documents to be submitted for admission (listing or sample).

- a. Official transcripts from all colleges and universities attended.
- b. Official GRE scores.
- c. Official TOEFL scores.
- d. The UNC Charlotte application for graduate admission form.
- e. Three letters of recommendation.

C. Degree requirements. List the following:

1. Total hours required. Major. Minor.

The proposed program leading to the Master of Science degree in Construction and Facilities Management is a 30 semester-hour program. The program would consist of an 18-credit hour common core, a 6-credit hour elective core in either construction management or facility management, and a capstone experience including either a sequence of 6-credit hours of major electives or a formal 6-credit hour graduate research thesis. The 30-credit hour degree program is outlined below:

Common Core Courses (18-credit hours)

CMET 5240 Safety & Risk Management	3 credit hours
CMET 5270 Operation of Constructed Facilities	3 credit hours
CMET 6130 Building Information Modeling	3 credit hours
CMET 6135 Advanced Construction Planning & Management	3 credit hours
CMET 6140 Building Energy Management	3 credit hours
CMET 6160 Research and Analytical Methods	3 credit hours

Students select one of the following technical cores:

Construction Management Core (6-credit hours)

CMET 6180	Alternative Project Delivery Methods	3 credit hours
CMET 6285	Quality Assurance in Construction	3 credit hours

Facilities Management Core (6-credit hours)

CMET 6145	Facilities Management Financial Analysis	3 credit hours
CMET 6250	Asset Management for Facility Managers	3 credit hours

Students select one of the following capstone options:

Non-Thesis Option (6-credit hours)

Major Elective	3 credit hours
Major Elective	3 credit hours

Thesis and Research Option (6-credit hours)

CMET 6900	Master's Thesis & Research	6 credit hours
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Major electives will be selected from the following:

CMET 6290	Temporary Structures in Construction	3 credit hours
CMET 6295	Design & Improvement of Construction Operations	3 credit hours
CMET 6000	Special Topics in Construction Facilities Management	3 credit hours
CMET 6800	Independent Study in Construction and Facilities Management	3 credit hours
CMET 6155	Facility Instrumentation and Controls	3 credit hours
CMET 6255	Advanced Plant Layout and Design	3 credit hours

Additional new major electives courses may be created based on industry needs and faculty research interest. In addition, appropriate existing graduate level courses will be identified from other programs such as the Engineering Management program or others.

2. Proportion of courses open only to graduate students to be required in program (graduate programs only).

At UNC Charlotte, courses having 5000 numbers are open to graduate students and advanced undergraduate students. Courses with 6000 are open to graduate students only. A minimum of 12 credit hours presented towards a Master of Science in Construction and Facilities Management degree must be numbered 6000 or higher. Twenty-four of thirty credits, or eighty percent, of required courses are at the 6000 level.

3. Grades required.

All candidates must earn an overall 3.0 to graduate. Accumulation of one U grade will result in the suspension of the student's enrollment in the program.

4. Amount of transfer credit accepted.

Up to six hours of approved coursework may be transferred from appropriately accredited master's and doctoral programs. Only courses in which the student earned a grade of B or better may be transferred.

5. Other requirements (e.g. residence, comprehensive exams, thesis, dissertation, clinical or field experience, second major, etc.)

The program will have both a thesis and non-thesis track. After admission to candidacy, thesis students will complete a comprehensive oral exam while non-thesis students will complete a comprehensive written exam. Residence will be per Graduate School rules.

6. Language and/or research requirements.

None.

7. Any time limits for completion.

While full-time students will typically take three semesters to complete the program, part-time students are expected to take no more than six years to complete the program as per Graduate School rules.

D. List existing courses by title and number and indicate (*) those that are required. Include an explanation of numbering system. List (under a heading marked "new") and describe new courses proposed.

Existing:

None

New:

*CMET 5240	Safety & Risk Management	3 credits
*CMET 5270	Operation of Constructed Facilities	3 credits
CMET 6000	Special Topics in Construction & Facility Management	3 credits
*CMET 6130	Building Information Modeling	3 credits
*CMET 6135	Advanced Construction Planning & Management	3 credits
*CMET 6140	Building Energy Management	3 credits
*CMET 6145	Facilities Management Financial Analysis	3 credits
CMET 6155	Facility Instrumentation and Controls	3 credits
*CMET 6160	Research and Analytical Methods	3 credits
*CMET 6180	Alternative Project Delivery Methods	3 credits
*CMET 6250	Asset Management for Facility Managers	3 credits

CMET 6255	Advanced Plant Layout and Design	3 credits
CMET 6285	Quality Assurance in Construction	3 credits
CMET 6290	Temporary Structures in Construction	3 credits
CMET 6295	Design & Improvement of Construction Operations	3 credits
CMET 6800	Independent Study in Construction and Facility Management	3 credits
CMET 6900	Master's Thesis and Research	1 – 6 credits

New Course Descriptions:

CMET 5240. Safety and Risk Management. (3) Prerequisite: CMET 4228 or consent of instructor. Topics of study will include causes and prevention of industrial accidents, hazardous processes and material, OSHA regulations and requirements, and design of accident prevention programs. (*Spring*)

CMET 5270. Operation of Constructed Facilities. (3) Prerequisite: CMET 3224 and ETCE 3271 or consent of instructor. Topics of study will include acquisition, operation, maintenance, and disposal of building systems, structures, permanent interiors, furniture, and equipment; grounds and other exterior elements. (*Spring*)

CMET 6000. Special Topics in Construction and Facility Management. (3) Study of specific new areas emerging in the various fields of construction and facility management. May be repeated for credit. (*On demand*)

CMET 6130. Building Information Modeling. (3) Prerequisite: ETCE 1104 or ETGR 1104 or consent of instructor. Topics of study will include the creation, management, and application of building information models to the construction, operation, and maintenance of a facility. Focus will be on 2D and 3D computer models of building components, renderings, animations, and interfacing with analysis tools. (*Fall*)

CMET 6135. Advanced Construction Planning and Management. (3) Prerequisite: ETCE 4126 or consent of instructor. Advanced methods for planning and controlling construction projects will be covered. Specific topics of study will include resource allocation, leveling and management, critical path method (CPM) and project evaluation and review techniques (PERT) of scheduling, project controls through cost-schedule integration, and schedule compression. (*Fall*)

CMET 6140. Building Energy Management. (3) Prerequisite: ETCE 3271 or ETME 3143 or consent of instructor. Topics of study will focus on the integrated planning of energy efficient technologies for building environmental control systems. Introduction to the design, planning, and optimization of HVAC systems and technology needed to integrate the heating, cooling, natural ventilation, lighting, electricity, and building energy management systems into a building's structure and design. (*Fall*)

CMET 6145. Facilities Management Financial Analysis. (3) Prerequisite: ETGR 3222 or ECON 2102 or consent of instructor. This course is a study of real property concepts, issues, and topics pertinent to the facility management professional to include fundamentals of commercial real estate investment, understanding market influences, contracts and property portfolio management. *(Fall)*

CMET 6155. Facility Instrumentation and Controls. (3) Prerequisite: ETME 3163 or consent of instructor. This course covers design and analysis of industrial process control instrumentation. Topics include process control devices and process control applications associated with industrial instrumentation and building and facility operation. *(Fall)*

CMET 6160. Research and Analytical Methods. (3) Prerequisite: STAT 1220 or consent of instructor. This course focuses on analytical and research techniques applicable to construction and facility management problems. Topics of study include defining research problems, experiment design, measurement, sampling, and analysis. *(Fall)*

CMET 6180. Alternative Project Delivery Methods. (3) Prerequisite CMET 3224 or consent of instructor. This course provides study of the many organizational arrangements between construction owners, designers, contractors, and financiers. Delivery methods studied include design-bid-build (DBB), design-build (DB), construction management (agency CM and CM@Risk), design-build-operate (DBO), and design-build-finance-operate (DBFO). *(Fall)*

CMET 6250. Asset Management for Facility Managers. (3) Prerequisite: CMET 5270 or consent of instructor. Study of useful life of building and infrastructure systems and creating a process to manage their life cycles; emphasis on justifying and funding capital projects. *(Spring)*

CMET 6255. Advanced Plant Layout and Design. (3) Prerequisite: CMET 5270 or consent of instructor. Topics of study include designing construction sites and facility plants with respect to material handling, equipment location, auxiliary services, capital requirements, safety, and personnel organization. *(On demand)*

CMET 6285. Quality Assurance in Construction. (3) Prerequisite: CMET 6160 or consent of instructor. This course covers the principles and applications of quantitative methods of quality control to production processes with an introduction to process control charts, Pareto charts, and other quality analysis tools for the construction industry. *(Spring)*

CMET 6290. Temporary Structures in Construction. (3) Prerequisite: ETCE 3163 or consent of instructor. Topics of study include temporary structures used to support construction operations such as concrete formwork, scaffolding systems, shoring systems, cofferdams, underpinning, slurry walls, and construction dewatering systems. *(On demand)*

CMET 6295. Design and Improvement of Construction Operations. (3) Prerequisite: CMET 6135. Topics of study include design of construction operations based on productivity concepts. Techniques for collecting data, analyzing, and formulating solutions to improve construction operations will be emphasized. *(Spring)*

CMET 6800. Independent Study in Construction and Facility Management. (3) Prerequisite: Consent of graduate committee advisor. Individual investigation and exposition of results for a directed project in construction and facility management. May be repeated for credit. *(On demand)*

CMET 6900. Master’s Thesis and Research. (1 – 6) Prerequisite: Consent of graduate committee advisor. Individual investigation culminating in the preparation and presentation of a thesis. May be repeated for credit. *(On demand)*

IV. FACULTY

- A. List the names of persons on the faculty who will be directly involved in the proposed program. Provide complete information on each faculty member’s education, teaching experience, research experience, publications, and experience in directing student research, including the number of theses and dissertations directed for graduate programs. The official roster forms approved by SACS can be submitted rather than actual faculty vita.

Licensure Track: All tracks, educational research component

Faculty Name	Highest Degree and Institution	Other degrees and Institutions
Anthony L. Brizendine, Professor	PhD, West Virginia University	MS, Virginia Tech
Dong Chen, Assistant Professor	PhD, Iowa State University	MS, Iowa State University
Rosida Coowar, Associate Professor	PhD, University of Central Florida	MS, University of Massachusetts
David Cottrell, Assistant Professor	PhD, Texas A&M University	BS, United States Military Academy
G. Bruce Gehrig, Assistant Professor	PhD, Colorado State University	MS, University of Colorado
John Hildreth, Assistant Professor	PhD, Virginia Tech	MS, West Virginia University
Donald Liou, Adjunct Assoc Professor	PhD, University of California at Berkeley	MS, University of California at Berkeley
Na Lu, Assistant Professor	EdD, Clemson University	MS, Clemson University
Chung-Suk Cho, Assistant Professor	PhD, University of Texas	MS, University of Hawaii at Manoa

Faculty Name	Highest Degree and Institution	Other degrees and Institutions
Carlos Orozco, Associate Professor	PhD, Carnegie Mellon University	MS, Carnegie Mellon University
Peter Schmidt, Assistant Professor	PhD, Vanderbilt University	MS, Rose Hulman Institute of Technology
Ahmad Sleiti, Assistant Professor	PhD, University of Central Florida	MS, University of Jordan
Aixi Zhou, Assistant Professor	PhD, Virginia Tech	MS, Lanzhou University

Full vitae for the above faculty are included in Appendix C.

B. Estimate the need for new faculty for the proposed program for the first four years. If the teaching responsibilities for the proposed program will be absorbed in part or in whole by the present faculty, explain how this will be done without weakening existing programs.

It is anticipated that this new enrollment stream will warrant the addition of four new faculty members over the next four years to adequately deliver the program.

C. If acquisition of new faculty requires additional funds, please explain where and how these funds will be obtained.

Faculty in the Construction Management program will be added through the campus' faculty line allocation process. These positions will be justified through enrollment growth. Additionally, research capability and production will increase as new faculty and graduate students are added.

D. Explain how the program will affect faculty activity including course load, public service and scholarly research.

No adverse effect is anticipated. In fact, the addition of new faculty hires in this developing construction group will provide additional catalyst for construction research, scholarly publication, and community outreach activity.

V. LIBRARY

A. Provide a general statement as to the adequacy of present library holdings for the proposed program.

Present library holdings are adequate to support the proposed MSCFM program. A search of the online catalog in the area of construction and facility management retrieved 3817 pertinent items. This total includes 3412 books and government documents, 44 periodical subscriptions, and 454 electronic resources specific to this area. In addition, the library has approximately 40 electronic databases, many with links to full text articles. The required

memorandum from the library summarizing its consultation concerning the MSCFM program is included in Appendix C.

B. State how the library will be improved to meet program requirements for the next five years. The explanation should discuss the need for books, periodicals, reference materials, primary source materials, etc. What additional library support must be added to areas supporting the proposed program?

No additional library support, other than the ongoing purchases for materials in this and the interrelated Engineering Technology, Civil Engineering, Engineering Management and Architecture programs, is necessary to support the program. Holdings are current and quite adequate to support this new degree program.

C. Discuss the use of other institutional libraries

The library's participation in an interlibrary loan consortium provides another means of effectively supporting research and instructional needs.

VI. FACILITIES AND EQUIPMENT

A. Describe facilities available for the proposed program.

The proposed program will share facilities with the existing Construction Management, Civil ET and Mechanical ET programs in the Smith Building. Laboratories currently exist to support construction materials, surveying, computer drafting, cost estimating, structures, hydraulics, soils, asphalt, stress analysis, thermodynamics, and instrumentation. Additional laboratories are in development which will support the building systems area.

B. Describe the effect of this new program on existing facilities and indicate whether they will be adequate, both at the commencement of the program and during the next decade.

Existing facilities are adequate to support the on-campus program at commencement and during the next decade.

C. Discuss any information technology services needed and/or available.

Existing information technology services and engineering computing capabilities are adequate to support the on-campus program. Additional infrastructure to support the online, distance education program will be required. Estimates of additional IT infrastructure (hardware and software) to support delivery of the distance component are approximately \$150,000.

D. Discuss sources of financial support for any new facilities and equipment.

Existing facilities and equipment are in place. Any additional new facilities or equipment will be funded through normal university funding sources to include projected funding from

RFPs from General Administration. Supplemental funding from public and private sources to include construction industry support will be utilized for program enhancements.

VII. ADMINISTRATION

Describe how the proposed program will be administered giving the responsibilities of each department, division, school, or college. Explain any inter-disciplinary or inter-unit administrative plans. Include an organizational chart showing the “location” of the proposed program.

The proposed program will be administered within the Department of Engineering Technology. The Department Chair has ultimate responsibility for the programs within the Department, reporting to the Dean of the College of Engineering, who in turn reports to the Provost.

At the University of North Carolina at Charlotte, the Dean of the Graduate School is the administrative officer with primary responsibility for the supervision of graduate programs. The Dean is responsible for the executive and administrative affairs of the Graduate School in accordance with policies determined by the UNC Charlotte Graduate Council, the Graduate faculty, and the Faculty Council. The Graduate School is responsible for monitoring the quality of graduate programs, the final admission of graduate students, appointments to the Graduate faculty, and the enhancement of research activities essential to the conduct of graduate programs.

The Graduate Dean’s main duties include the following:

- Admission of students
- Appointment of dissertation and thesis committees
- Approval of programs of study
- Admission of students to candidacy
- Final approval of dissertations

Upon admission to the MSCFM Program, the student will be assigned an appropriate Faculty Advisor from among the Construction Management or other appropriate Engineering Technology Faculty, based on the student’s prior training and stated interests. The Faculty Advisor will recommend a Plan of Study for the student’s first year of enrollment in the Program.

If the thesis option is selected, the Faculty Advisor will assist the student in identification of an appropriate research project. Before the beginning of the third semester following admission to the program, the student must form a three-member Advisory Committee with members chosen from among the Engineering Technology Faculty. The assigned Faculty Advisor may chair this committee or the student may select a new Faculty Advisor from among the Engineering Technology Faculty at the time the committee is formed.

Subject to the approval of the Dean of the Graduate School, the functions of the committee are to:

- Approve the student's plan of study
- Evaluate the student's academic progress each semester
- Evaluate the internship project or research project plan
- Certify the candidate's qualifications for the degree subject to the approval of the Dean of the Graduate School

VIII. ACCREDITATION

Indicate the names of all accrediting agencies normally concerned with programs similar to the one proposed. Describe plans to request professional accreditation. If the proposed new degree program is at a more advanced level than those previously authorized or if it is in a new discipline division, was SACS notified of a potential "substantive change" during the planning process? If so, describe the response from SACS and the steps that have been taken to date with reference to the applicable procedure.

Currently, there is no agency that accredits construction management graduate programs. The International Facility Management Association (IFMA) accredits first professional degrees in facility management. The program may ultimately seek accreditation by the IFMA for the facility management option within the curriculum.

IX. SUPPORTING FIELDS

Are other subject-matter fields at the proposing institution necessary or valuable in support of the proposed program? Is there needed improvement or expansion of these fields? To what extent will such improvement or expansion be necessary for the proposed program?

The MSCFM program has been designed to be self-contained within the Department of Engineering Technology, and support from other subject-matter fields outside the department is not necessary. As an inter-disciplinary program within an interdisciplinary department, the MSCFM program will rely on support from all disciplines within the department including construction management, civil engineering technology, mechanical engineering technology, fire safety engineering technology, and electrical engineering technology. Although not necessary to initiate the program, as the program matures valuable collaboration opportunities with other units within the College of Engineering, Belk College of Business, and College of Architecture can be developed to realize the program's full potential.

X. ADDITIONAL INFORMATION

Include any additional information deemed pertinent to the review of this new degree program proposal.

UNC Charlotte Construction & Facilities Management (CFM) Fellows Program

A unique aspect of the MS in Construction and Facilities Management program proposal will be the incorporation of a Construction and Facilities Management (CFM) Fellows Program which will provide the framework for graduate students in the MS in Construction and Facilities Management program to compete for and earn CFM Fellows appointments. Initially, these appointments will be within the UNC Charlotte Facilities Management Organization. Fellows will perform project-based campus work within the Capital Projects, Design Services, Maintenance and Operations, and Planning Divisions of the Facilities Management Group at UNC Charlotte to leverage services and organizational efficiency for the institution while completing degree requirements. Selected CFM Fellows will typically possess a BS in Construction Management, Bachelor of Architecture, or BS in Engineering so they will possess excellent education and experience which they can bring to bear in their Fellow appointments within UNC Charlotte’s Facilities Management Organization. Once established, the CFM Fellows Program may also be extended to serve other community organizations such as CMS Schools, North Carolina Community Colleges, and various other state agencies and charitable organizations in the Greater Charlotte region.

The MS in Construction and Facilities Management program courses will incorporate “green or sustainable” components throughout the curriculum. Some examples of how this will be accomplished in specific individual courses are outlined in the following table:

Course Number	Course Name	“Sustainability” or “Green” Topics
CMET 5240	Safety & Risk Management	Risk management issues associated with sustainable construction operations.
CMET 5270	Operation of Constructed Facilities	Acquisition, operation, maintenance, and disposal of sustainable building systems, structures, permanent interiors, furniture, and equipment; grounds and other exterior elements.
CMET 6140	Building Energy Management	Energy efficiency applications in homes, businesses, large buildings and industry. Topics include energy auditing, energy management, energy cost analysis, energy & electric rate structures, lighting, HVAC systems, motors and drivers, boilers and steam systems, cogeneration, evaluation of alternative systems and technologies, commercial and industrial applications.

Course Number	Course Name	“Sustainability” or “Green” Topics
CMET 6155	Facility Instrumentation and Controls	Design and analysis of process control and instrumentation required in sustainable building operations; “smart” controls for green buildings.
CMET 6250	Asset Management for Facility Managers	Life cycle analysis and capital budgeting of building and infrastructure systems based on the principles of sustainability.
CMET 6255	Advanced Plant Layout and Design	Layout and design for improved air quality, thermal comfort, noise and light. Create facilities that are warm in winter, cool in the summer, comfortably illuminated while promoting the health and wellbeing of the occupants. Use of land, energy and green materials efficiently to create facilities that are sustainable while economical to operate.
CMET 6285	Quality Assurance in Construction	Incorporating sustainability as a prominent evaluation criterion in process and quality control planning.

As an example of the potential impact the CFM Fellows program, current students in ETME 4245 - Energy Management (a senior elective) learn the theory and practical knowledge needed to perform energy audits for small to medium sized businesses. As part of the course requirements, students perform actual energy audits of local facilities for regional businesses as their final project. They collect data, do the calculations to perform an energy balance for each facility, make recommendations on how the business could save money through reduced energy consumption, and calculate the payback period for each energy-saving opportunity to determine which are cost effective. Students complete the course with a readily applicable skill set to reduce energy use for a greener planet while assisting the business community in North Carolina in becoming more energy efficient, and thus, more competitive in the global marketplace. CFM Fellows will have extended knowledge which will leverage this type of activity within UNC Charlotte, and extend this work to other state agencies and community organizations across the Greater Charlotte region.

XI. BUDGET

Provide estimates (using the attached form) of the additional costs required to implement the program and identify the proposed sources of the additional required funds. Use SCH projections (section II.C.) to estimate new state appropriations through enrollment increase funds. Prepare a budget schedule for each of the first three years of the program, indicating the account number and name for all additional amounts required. Identify EPA and SPA positions immediately below the account listing. New SPA positions should be listed at the first step in the salary range using the SPA classification rates currently in effect. Identify any larger or specialized equipment and any unusual supplies requirements.

For the purposes of the second and third year estimates, project faculty and SPA position rates and fringe benefits rates at first year levels. *Include the continuation of previous year(s) costs in second and third year estimates.*

Additional state-appropriated funds for new programs may be limited. Except in exceptional circumstances, institutions should request such funds for no more than three years (e.g., for start-up equipment, new faculty positions, etc.), at which time enrollment increase funds should be adequate to support the new program. Therefore it will be assumed that requests (in the “New Allocations” columns of the following worksheet) are for one, two, or three years unless the institution indicates a continuing need and attaches a compelling justification. However, funds for new programs are more likely to be allocated for limited periods of time.

See Appendix A for detailed budget information.

XII. EVALUATION PLANS

All new degree program proposals and degree program track descriptions must include an evaluation plan which includes: (a) the criteria to be used to evaluate the quality and effectiveness of the program, (b) measures to be used to evaluate the program, (c) expected levels of productivity of the proposed program/track for the first four years of the program (numbers of graduates), (d) the names, addresses, and telephone numbers of at least three persons...qualified to review this proposal and to evaluate the program once operational, and (e) the plan and schedule to evaluate the proposed new degree program prior to the completion of its fifth year of operation once fully established.

A. Criteria to be used to evaluate the proposed program (not in an order of priority).

The Department will employ its existing robust continuous improvement assessment process to this proposed program. The existing programs are assessed by an integrated program and course assessment process which external consultants have described as outstanding based upon their evaluation of our programs and processes. For the MSCFM program, the process will begin by establishing assessment measures and tools (i.e. primarily student work activities) that are directly tied to the established program educational outcomes. The assessment tools will be administered as part of the Department’s Individual Course Assessment Process (ICAP). Data collected through the ICAP process will be evaluated by a Focus Area Improvement Team (FAIT) that will be established for the MSCFM program. The FAIT team will then, based on the student performance data, make any recommendations for course and curricular improvement that may be deemed necessary to ensure continued program quality and improvement.

Other external criteria which will be utilized to evaluate the program include but are not limited to the:

1. ability to attract students
2. quality of instruction
3. quality of program faculty
4. ability to produce graduates

5. quality and competence of graduates
6. career mobility and success
7. satisfaction of industry employers in construction and facilities management
8. quality of research and scholarly activity

B. Measures to be used to evaluate the program:

Various measures, both direct and indirect, are currently utilized to evaluate our existing programs. Those same measures will be applied to the proposed MSCFM program. Those measures include, but are not limited to:

- a. student enrollments
- b. scores on student course evaluations
- c. annual and post tenure reviews of faculty
- d. number of graduates produced
- e. graduate grade point averages and results of nationally-normed tests where applicable
- f. satisfaction of alumni on surveys
- g. satisfaction of employers on surveys
- h. level of research and scholarly activities

C. Projected productivity levels (numbers of graduates):

	Year 1 (2010-2011)	Year 2 (2011-2012)	Year 3 (2012-2013)	Year 4 (2013-2014)	TOTALS
B					
M	0	3 to 5	5 to 10	10 to 15	18 to 30
I/P					
D					

Ultimately, graduation rates are expected on the order of 20 to 30 students per year when the program has reached full maturity within 6 to 8 years.

D. Recommended consultants/reviewers: Names, titles, addresses, e-mail addresses, and telephone numbers. May not be employees of the University of North Carolina.

Franklin Hart, Dean,
 College of Engineering Technology &
 Computer Science
 Bluefield State University
 219 Rock Street, Bluefield, WV 24701
 E-mail: frankh@bluefieldstate.edu
 Office Phone: (304) 327-4121

Warren Hill, Dean, College of Applied Science &
 Technology
 Weber State University
 1801 University Circle
 Ogden, UT 84408-1801
 Email: whill@weber.edu
 Phone: 801-626-6303

E. Plan for evaluation prior to sixth operational year.

Normal department level assessments will occur as outlined in the Strategic Plan. Maturation of the proposed program is expected to take several years. The measures for evaluating

program success, as described above, are not likely to be fully realized in four years. Evaluation of the program must therefore assess progress toward the steady-state goals.

From the inception of the program, we will maintain a database of enrollment and student outcome data for students entering the MSCFM program. Application, admission, graduation, and post-graduate placement data will be collected. College of Engineering and Department of Engineering Technology staff will track the progress of alumni and their satisfaction with their employment outcomes for up to five years after graduation, when possible, by using mailed or e-mailed surveys. Staff will encourage self-reporting for alumni over longer periods by creating a self-service alumni website that encourages graduates to submit their contact information and current employment information, network via online discussion, and contact other alumni.

Based on employment data supplied by graduates, staff will make contact with frequent employers of our graduates and initiate formal or informal surveys of employer satisfaction. Feedback from the program's Industrial Advisory Board concerning the program and its educational outcomes will be solicited.

Fourth year milestones are listed below.

1. During the fourth year of the proposed program, enrollment will be assessed to determine whether it is meeting projections. Full-time enrollment in the program should approach 25 to 30 by the fourth year.
2. The program should have produced 18 to 30 graduates by the fourth year of operation.
3. Educational program outcomes should be satisfactorily met for 85 percent of graduates.
4. A panel of external evaluators will visit the UNC Charlotte campus to assess the overall success of the program. The evaluation report prepared by the evaluators will be reviewed by the Department Chair, by the Dean of the College of Engineering, and by the Provost.
5. Necessary changes in the program will be implemented based on the review to ensure that program goals are achieved.

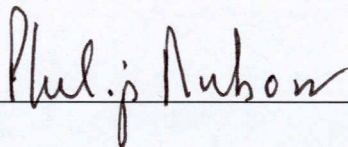
XIII. REPORTING REQUIREMENTS

Institutions will be expected to report on program productivity after one year and three years of operation. This information will be solicited as a part of the biennial long-range planning revision.

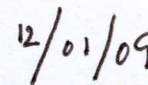
Proposed date of initiation of proposed degree program: August 2010

This proposal to establish a new program has been reviewed and approved by the appropriate campus committees and authorities.

Chancellor



Date



Appendix A:

Budget projections for the first three years of program operation

**Projected Funding for New Degree Program
Master of Science in Construction and Facilities Management
Regular Term 2010-2011
(Based on 2009-2010 Change in Student Credit Hours)**

Program Category	Change in Student Credit Hours			Instructional - Position Funding Factors			Instructional Positions Required		
	Undergrad	Masters	Doctoral	Undergrad	Masters	Doctoral	Undergrad	Masters	Doctoral
Category I				708.64	169.52	115.56	0.000	0.000	0.000
Category II				535.74	303.93	110.16	0.000	0.000	0.000
Category III				406.24	186.23	109.86	0.000	0.000	0.000
Category IV				232.25	90.17	80.91	0.000	0.000	0.000

Total Positions Required									0.000
Instructional - Position Salary Rate									\$79,891
Instructional Salary Amount	101-1310								\$0
Other Academic Costs								44.89300%	0
Total Academic Requirements	Purpose 101								\$0
Library	Purpose 151							11.48462%	0
General Instit Support	Purposes 152, 160, 170 180							54.04980%	0
Neg Adj Factor								50.00000%	n/a
In-state SCHs								0	0
Financial Aid (in-state)								67.99800%	0
Total Requirements									\$0

*Fringe rates for staff
FICA @ 7.65%
Retirement @ 8.75%
Medical @ \$4,527*

*Fringes for faculty salaries
FICA @ 7.65%
Retirement @ 11.86%
Medical @ \$4,527*

SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

Institution UNC Charlotte Date October 26, 2009
 Program (API#, Name, Level) 15.9999 Construction Management
 Degree(s) to be Granted M.S.C.F.M. Program Year 2010-11

ADDITIONAL FUNDING REQUIRED - BY SOURCE

	Reallocation of Present Institutional Resources	Enrollment Increase Funds	Federal/State or Other Non-state Funds (Identify)	New Allocations	Total
101 Regular Term Instruction					
1210 SPA Regular Salaries	\$0				\$0
1110 EPA Non-teaching Salaries					0
1310 EPA Academic Salaries	0	0	0		0
Program Coordinator Stipend					
Adjunct Faculty (backfill)					
Graduate Teaching Assistants (2)					
1810 Social Security	0		0		0
1820 State Retirement	0		0		0
1830 Medical Insurance (3432*X)	0				0
2000 Supplies and Materials	0				0
2300 Educational Supplies					0
2600 Office Supplies					0
3000 Current Services	0				0
3100 Travel					
3200 Communications					
3400 Printing & Binding					
5000 Capital Outlay (Equipment)	0				0
5100 Office Equipment					
5200 EDP Equipment					
TOTAL Regular Term Instruction	\$0	\$0	\$0	\$0	\$0
151 Libraries					
5000 Capital Outlay (Equipment)	500	0			500
5600 Library Book/Journal	500				
TOTAL Libraries	\$500	\$0	\$0	\$0	\$500
189 General Institutional Support					
2000 Supplies and Materials					0
2600 Office Supplies					
3000 Current Services					0
3200 Communications					
3400 Printing & Binding					
5000 Capital Outlay (Equipment)					0
5100 Office Equipment					
5200 EDP Equipment					
TOTAL General Inst. Support	\$0	\$0	\$0	\$0	\$0
TOTAL ADDITIONAL COSTS	\$500	\$0	\$0	\$0	\$500

NOTE: Accounts may be added or deleted as required.

**Projected Funding for New Degree Program
Master of Science in Construction and Facilities Management
Regular Term 2011-2012
(Based on 2010-2011 Change in Student Credit Hours)**

Program Category	Change in Student Credit Hours			Instructional - Position Funding Factors			Instructional Positions Required		
	Undergrad	Masters	Doctoral	Undergrad	Masters	Doctoral	Undergrad	Masters	Doctoral
Category I				708.64	169.52	115.56	0.000	0.000	0.000
Category II				535.74	303.93	110.16	0.000	0.000	0.000
Category III		180		406.24	186.23	109.86	0.000	0.967	0.000
Category IV				232.25	90.17	80.91	0.000	0.000	0.000

Total Positions Required									0.967
Instructional - Position Salary Rate									\$79,891
Instructional Salary Amount									\$77,218
Other Academic Costs								44.89300%	34,666
Total Academic Requirements									\$111,884
Library								11.48462%	12,849
General Instit Support								54.04980%	60,473
Neg Adj Factor								50.00000%	n/a
In-state SCHs								0	0
Financial Aid (in-state)								67.99800%	0
Total Requirements									\$185,206

101-1310

Purpose 101

Purpose 151

Purposes 152,
160, 170 180

Fringe rates for staff
FICA @ 7.65%
Retirement @ 8.75%
Medical @ \$4,527

Fringes for faculty salaries
FICA @ 7.65%
Retirement @ 11.86%
Medical @ \$4,527

\$5,907
\$9,158
\$4,376

\$19,441

SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

Institution **UNC Charlotte** Date **October 26, 2009**
 Program (API#, Name, Level) **15.9999 Construction Management**
 Degree(s) to be Granted **M.S.C.F.M.** Program Year **2011-12**

ADDITIONAL FUNDING REQUIRED - BY SOURCE

	Reallocation of Present Institutional Resources	Enrollment Increase Funds	Federal/State or Other Non-state Funds (Identify)	New Allocations	Total
101 Regular Term Instruction					
1210 SPA Regular Salaries					\$0
1110 EPA Non-teaching Salaries					0
1310 EPA Academic Salaries	0	77,218	0		77,218
1810 Social Security	0	5,907	0		5,907
1820 State Retirement	0	14,363	0		14,363
1830 Medical Insurance		4,527			4,527
2000 Supplies and Materials		2,000			2,000
2300 Educational Supplies		1,000			
2600 Office Supplies		1,000			
3000 Current Services		5,000			5,000
3100 Travel		2,000			
3200 Communications		2,000			
3400 Printing & Binding		1,000			
5000 Capital Outlay (Equipment)		2,869			2,869
5100 Office Equipment		500			
5200 EDP Equipment		2,369			
TOTAL Regular Term Instruction	\$0	\$111,884	\$0	\$0	\$111,884
151 Libraries					
5000 Capital Outlay (Equipment)		12,849			12,849
5600 Library Book/Journal		12,849			
TOTAL Libraries	\$0	\$12,849	\$0	\$0	\$12,849
189 General Institutional Support					
2000 Supplies and Materials		20,200			20,200
2600 Office Supplies		20,200			
3000 Current Services		20,200			20,200
3200 Communications		10,100			
3400 Printing & Binding		10,100			
5000 Capital Outlay (Equipment)		20,073			20,073
5100 Office Equipment		10,000			
5200 EDP Equipment		10,073			
TOTAL General Inst. Support	\$0	\$60,473	\$0	\$0	\$60,473
TOTAL ADDITIONAL COSTS	\$0	\$185,206	\$0	\$0	\$185,206

NOTE: Accounts may be added or deleted as required.

**Projected Funding for New Degree Program
Master of Science in Construction and Facilities Management
Regular Term 2012-2013
(Based on 2011-2012 Change in Student Credit Hours)**

Program Category	Change in Student Credit Hours			Instructional - Position Funding Factors			Instructional Positions Required		
	Undergrad	Masters	Doctoral	Undergrad	Masters	Doctoral	Undergrad	Masters	Doctoral
Category I				708.64	169.52	115.56	0.000	0.000	0.000
Category II				535.74	303.93	110.16	0.000	0.000	0.000
Category III		234		406.24	186.23	109.86	0.000	1.257	0.000
Category IV				232.25	90.17	80.91	0.000	0.000	0.000

Total Positions Required									1.257
Instructional - Position Salary Rate									\$79,891
Instructional Salary Amount									\$100,384
Other Academic Costs								44.89300%	45,065
Total Academic Requirements									\$145,449
Library								11.48462%	16,704
General Instit Support								54.04980%	78,615
Neg Adj Factor								50.00000%	n/a
In-state SCHS								0	0
Financial Aid (in-state)								67.99800%	0
Total Requirements									\$240,768

101-1310

Purpose 101

Purpose 151

Purposes 152,
160, 170 180

Fringe rates for staff
FICA @ 7.65%
Retirement @ 8.75%
Medical @ \$4,527

Fringes for faculty salaries
FICA @ 7.65%
Retirement @ 11.86%
Medical @ \$4,527

\$7,679
\$11,906
\$5,688
\$25,273

SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

Institution UNC Charlotte Date October 26, 2009
 Program (API#, Name, Level) 15.9999 Construction Management
 Degree(s) to be Granted M.S.C.F.M. Program Year 2012-13

ADDITIONAL FUNDING REQUIRED - BY SOURCE

	Reallocation of Present Institutional Resources	Enrollment Increase Funds	Federal/State or Other Non-state Funds (Identify)	New Allocations	Total
101 Regular Term Instruction					
1210 SPA Regular Salaries					\$0
1110 EPA Non-teaching Salaries					0
1310 EPA Academic Salaries	0	100,384	0		100,384
1810 Social Security	0	5,907	0		5,907
1820 State Retirement	0	11,906	0		11,906
1830 Medical Insurance		4,527			4,527
2000 Supplies and Materials		5,725			5,725
2300 Educational Supplies		3,000			
2600 Office Supplies		2,725			
3000 Current Services		9,000			9,000
3100 Travel		5,000			
3200 Communications		1,500			
3400 Printing & Binding		2,500			
5000 Capital Outlay (Equipment)		8,000			8,000
5100 Office Equipment		2,000			
5200 EDP Equipment		6,000			
TOTAL Regular Term Instruction	\$0	\$145,448	\$0	\$0	\$145,448
151 Libraries					
5000 Capital Outlay (Equipment)		16,704			16,704
5600 Library Book/Journal		16,704			
TOTAL Libraries	\$0	\$16,704	\$0	\$0	\$16,704
189 General Institutional Support					
2000 Supplies and Materials		26,200			26,200
2600 Office Supplies		26,200			
3000 Current Services		26,200			26,200
3200 Communications		13,100			
3400 Printing & Binding		13,100			
5000 Capital Outlay (Equipment)		26,215			26,215
5100 Office Equipment		13,100			
5200 EDP Equipment		13,115			
TOTAL General Inst. Support	\$0	\$78,615	\$0	\$0	\$78,615
TOTAL ADDITIONAL COSTS	\$0	\$240,767	\$0	\$0	\$240,767

NOTE: Accounts may be added or deleted as required.

Appendix B:
Faculty Curriculum Vitas

ANTHONY L. BRIZENDINE

Degrees & Professional Registrations

- Ph.D. in Civil Engineering, West Virginia University (GPA 4.0/4.0)
- M.S. in Civil Engineering, Virginia Polytechnic Institute and State University
- B.S. in Civil Engineering Technology, Summa Cum Laude, Bluefield State College
- REGISTERED PROFESSIONAL ENGINEER, Virginia & West Virginia
- PROFESSIONAL SURVEYOR, West Virginia

Teaching and Other Work Experience

- University of North Carolina at Charlotte, Professor & Department Chair, July 2002 to present
- Fairmont State University, School of Technology, Chair, 2000 – 2002
- West Virginia Transportation Technician Certification & Training Program, Director, 1999-2002
- Fairmont State University, Director of Engineering Technology, 1999 - 2000
- Fairmont State University Honors Program, Director, 1994 – 1999
- Fairmont State University, Department of Civil Engineering Technology: Professor w/ tenure, 1991-2002; Dept Coordinator, 1995-99
- Valley Falls Public Service District: Elected Chairman in 1997, 1998, 1999, 2000, 2001, 2002; Board of Directors, 1996-2002
- West Virginia University, Dept of Civil & Environmental Engineering: Adjunct Prof, 1998-2000; Guest Lecturer, 1995-1997
- West Virginia University Institute of Technology, Department of Civil Engineering, Visiting Professor, 1998
- U.S. Army Corps of Engineers, Waterways Experiment Station (WES), Vicksburg, Mississippi, Research Faculty/Civil Engineer on IPA Contract, 5/94 - 8/94, 5/93 - 8/93, 5/92 - 8/92, followed by contracts through December 1997

Active Membership in Professional and Scientific Societies

- Accreditation Board for Engineering & Technology - TAC Commissioner since 1998
 - TAC Executive Committee since 2002; Seats held: Vice-Chair for Policy; Criteria Committee Chair; Vice-Chair for Training; Operations Executive 2004-05; Chair-Elect 2005-06; TAC Chair, 2006-07.
- American Society of Engineering Education (ASEE)
 - Elected to serve two-year term on ETD Executive Committee as Treasurer, 2003-2005; Annual Conference Session Moderator, 1998, 1999, 2000, 2001, 2002; CIEC Conference Session Moderator, 1998, 1999, 2000, 2001
- Technological Education Initiative (TEI); NSF/ABET/Industry-sponsored program
 - *Facilitator*, Technological Education Initiative, NSF, 2001-2004
- American Society of Civil Engineers (ASCE)
 - ASCE National Committee on Technology Curricula and Accreditation (1996-2001), Chair (1998-99, 1999-2000), Secretary (1997-98)
 - Excellence in Civil Engineering Education (EXCEED) Program Design Team/Consultant (1999) & Senior Mentor (2001)
 - Appointed ASCE TAC/ABET Liaison for 1998, re-appointed 1999, 2000, 2001, 2002; ASCE Technology Accreditation Commission Convenor, 1999, 2000, 2001.
 - 2000 Engineering Technology Program Chair for Second National Civil Engineering Education Congress, Seattle, WA; 1999 Engineering Technology Program Chair for First National Civil Engineering Education Congress, Charlotte, NC; 1998 Engineering Technology Program Chair for Civil Engineering Conference, Boston, MA

- West Virginia Section ASCE President, 1996-97; Section Treasurer, 1997-1999; Section Continuing Education Committee Chair, 1995-96; Section Board of Directors, 1995-2000; National Management Conference Delegate '99
- Northern West Virginia Branch President, 1996; Branch President-Elect, 1995; Branch Vice President, 1994, 1998; Branch Secretary, 1992, 1993; National Management Conference Delegate, 1995; Branch Activities & Planning Committee Chair, 1993- 1996.; Fairmont State ASCE Student Advisor, 1991– 2002; principal advisor 1991 – 1998
- International Society of Soil Mechanics & Foundation Engineers (ISSMFE) Member

Honors / Awards / Recognitions

- Senior Mentor, ASCE Excellence in Civil Engineering Education (ExCEED) Program, 2001
- Bluefield State College 1999 Commencement Speaker; “Bearer of the Mace” - Distinguished Faculty, 1997-2000.
- 1998-99 William A. Boram Award for Teaching Excellence
- Excellence in Civil Engineering Teaching Award; Department of Civil and Environmental Engineering at West Virginia University, 1999
- 1997 Fairmont State University Excellence in Academic Advising Award (one award for university)
- 1997 Fairmont State University Outstanding Faculty Achievement Award (one of 3 university-wide)
- West Virginia Young Engineer of the Year, 1994, American Society of Civil Engineers
- FSU "Breaking Down Barriers for Students with Disabilities" Award, 1994; West Virginia Great Teachers Award, 1993

Selected Publications / Presentations / Grant Awards

- Co-PI, Diversity in Engineering Technology, NSF (\$898,000), 2003-2006; Enhancing Diversity, NSF (\$810,000), 2006-2009.
- PI, Transportation Certification & Training Programs, WV Dept. of Transportation (\$456,000), 2002; (\$397,000), 2001; 2000; (\$76,000), 1999; Ruskin Manufacturing Grant, 2001; NSF/WV EPSCOR Grants; Global Positioning, 2000; Penetration Resistance & Kinematic Viscosity, 1994; Direct Shear & Data Acquisition, 1993; Permeability & Consolidation, 1992
- ASCE Public Relations Merit Grant, 1999; Government Relations Grants, 1997, 1998, 1999; NASA Software Assurance Grant, Project Co-Director, 1996 – 1997; US Army Corps of Engineers, Waterways Experiment Station, Hydraulic Conductivity, 1994-1997; Fairmont State Foundation, Geoenvironmental Studies, 1993
- Invited Plenary Speaker, “What Have We Learned from Recent Experiences with the Accreditation of Engineering Technology Programs Under the New Outcomes Assessment Criteria?,” The 2004 Assessment Institute, Indianapolis, IN.
- Nicholas, Brizendine & Stilgenbauer, “MicroStation Applications for Highway and Transportation Structures Design,” *Proceedings of the 2003 American Society for Engineering Education Annual Conference & Exposition*, Nashville, TN.
- Engineering Technology Council Task Force on ET Scholarship, “The Scholarship Horizons in Engineering Technology: Choosing the Best Path,” *Proceedings of the 2003 American Society for Engineering Education Annual Conference & Exposition*, Nashville, TN, June 2003. **This paper, co-written with Task Force members, won a PIC Best Paper Award.**
- Invited Panelist, “Transition Visits Using TC2K – The Team Chair Perspective,” Engineering Technology Division, ASEE Annual Conference, American Society for Engineering Education, Nashville, TN, June 2003
- TAC of ABET Evaluator Training, 2003 CIEC Conference, American Society for Engineering Education, Tuscon, AZ; 2002 CIEC Conference, American Society for Engineering Education; 2003 ASEE Annual Conference, Nashville, TN; 2002 ASEE Annual Conference, Montreal, Canada; 2001 ASEE Annual Conference, Albuquerque, NM.

- “Developing an Outcomes-Based Model Curriculum”, Tennessee Community College Engineering Technology Consortium, February 2003
- Stilgenbauer, Nicholas & Brizendine, “Scheduling Transportation Projects Using Primavera® Project Planner As Part of the Software Series in Civil Engineering Technology Independent Learning Experiment at Fairmont State College,” *Journal of Engineering Technology*, Spring 2001
- Brizendine, A.L., “Developing Innovative Curriculum Models & Certification Programs To Meet the Needs of the West Virginia Department of Highways: Transportation Technician Certificate and Associate of Applied Science Programs”, 2001 ASEE CIEC Conference, San Diego, CA, January 2001
- Brizendine, A.L., “Transportation Technician Certification: A Two-Year Perspective,” *Proceedings of the 2001 American Society for Engineering Education Annual Conference & Exposition*, Albuquerque, NM, June 2001
- Brizendine, A.L., “Workforce Training Issues in the New Millennium,” West Virginia DOH Contracts Conference, Morgantown, WV, April 2001; “Professional Development for the New Millennium,” West Virginia DOH Design Engineering Conference, Pipestem, WV, March 2001; “Technician Training & Certification: Necessity in the New Millennium,” West Virginia DOH Construction Management Conference, February 2001
- Brizendine, & Nicholas, “Global Positioning: Multi-Programmatic Initiatives,” NSF/WV EPSCoR Conference, Charleston, WV, February 2001
- “Excellence in Teaching & Learning,” Conversations In Teaching, Fairmont State Faculty Development Program, Sept 2000.
- Brizendine, A.L., “Architectural, Civil, and Construction Engineering Technology Industrial Advisory Committees: Perceptions of Industry Advisors, Faculty and Administrators,” 2000 CIEC Conference, (ASEE), Orlando, Florida.
- PDW Participants, “A Model For Faculty Development: The ExCEED Teaching Workshop,” Consultant Report to the ASCE Board of Directors, September 1999
- Brizendine, A.L., & Brizendine, L.D., “Redefining Scholarship: A Win-Win Situation for Engineering & Technology,” (Nominated for Conference BEST PAPER AWARD); “An Independent Learning Experiment: Software Series in Civil Engineering Technology,” *Proceedings of the 1999 American Society for Engineering Education Annual Conference & Exposition*, Charlotte, NC, June 1999
- “TAC of ABET Program Criteria Changes: 2000 and Beyond,” “TAC of ABET Program Evaluator Training: 1999-2000,” “Defining Faculty Work,” 1999 ASCE Education Congress, Charlotte, NC, October 1999
- Brizendine, & Riley, “Case History: An Innovative Curriculum Model for Workforce Development in Engineering Technology,” 1999 CIEC Conference Proceedings, Palm Springs, CA, February 1999;
- Brizendine, and Copley, “A Model Curriculum for A Multidisciplinary Baccalaureate Degree in Civil & Mechanical Engineering Technology (CMET),” 1999 CIEC Conference Proceedings, Palm Springs, CA, February 1999
- Computer Controlled Data Acquisition Laboratory Experiences in Civil Laboratories,” “Continuing Professional Development for Engineering, Engineering Technology, and Industry Personnel,” (Nominated for BEST PAPER AWARD), *Proceedings of the 1998 American Society for Engineering Education Annual Conference & Exposition*, Seattle, WA, July 1998
- Brizendine, A.L., “Collaboration for Improved Laboratory Experiences: Capitalizing on Applied Research Opportunities, 1998 CIEC Conference Proceedings,” ASEE, Savannah, GA, February 1998
- Brizendine, A.L., Risk Based Analysis of Levees, Doctoral Dissertation, West Virginia University, August 1997
- “Probabilistic Analysis of Hydraulic Conductivity in Woody Vegetation,” U.S. Army Engineer Corps, Waterways Experiment Station, Vicksburg, Mississippi, December 1997

- Gabr, Wolff, Brizendine & Taylor, “Underseepage Analysis of Levees on Two-Layer & Three Layer Foundation”, *Computers and Geotechnics Journal*, March 1996
- Brizendine, Gabr, and Taylor, “LEVSEEP: Analysis Software for Levee Underseepage and Rehabilitation,” *Technical Report GL-95-10*, Department of the Army, Waterways Experiment Station, Corps of Engineers, Vicksburg, Mississippi, July 1995
- Gabr, Brizendine and Taylor, “Comparison Between Finite Element Study and Simplified Analysis of Levee Underseepage,” *Technical Report GL-95-11*, Department of the Army, Waterways Experiment Station, Corps of Engineers, Vicksburg, Mississippi, July 1995
- Gabr, Taylor, Brizendine, and Wolffe, “LEVEEMSU: Analysis Software for Levee Underseepage and Rehabilitation,” *Technical Report GL-95-9*, Department of the Army, Waterways Experiment Station, Corps of Engineers, Vicksburg, Mississippi, June 1995
- Klaus, Chisolm, Brizendine & Taylor, “Seepage Analysis Under Probable Maximum Flood (PMF) Conditions,” *Dam Safety 94*, The Association of State Dam Safety Officials, Boston, MA, September, 1994
- Brizendine, and Taylor, *Warfleigh Levee Project Analysis Report*, Louisville District Corps of Engineers, January, 1994.
- Brizendine, and Gabr, “Transient Seepage Analysis of Sardis Dam Under Probable Maximum Flood Event,” *Technical Report GL-93-83*, US Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi, December 1993

G. BRUCE GEHRIG

Degrees & Professional Registrations

- Ph.D. in Civil Engineering, Colorado State University, 2002
- M.S. in Civil Engineering, University of Colorado at Denver, 1990
- B.S. in Civil Engineering, Brigham Young University, 1984
- Professional Engineer, Colorado No. 26710.
- Professional Engineer, North Carolina No. 30648

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:

6 years, Department of Engineering Technology, Civil Engineering Technology.

Original appointment July 2002 at the rank of Assistant Professor, received tenure effective July 2008.

Related Teaching and Other Work Experience

- Colorado State University, Civil Engineering Department, Graduate Teaching Assistant, 1999 – 2002
- R.O. Anderson Engineering, Inc., Project Engineer, 1996-1999
- American Samoa Power Authority, Resident Construction Manager, 1993-1996
- Denver Water Department, Project Civil Engineer, 1985-1993

Active Membership in Professional and Scientific Societies

- American Society of Civil Engineers, Member
- American Society for Engineering Education, Member
- International Technology Education Association, Member
- Construction Institute (ASCE), Member
- Environmental and Water Resources Institute (ASCE), Member
- Tau Beta Pi National Engineering Honor Society, Member

Honors/Awards/Recognition

- Department of Engineering Technology's nominee for the William States Lee College of Engineering's 2007 Excellence in Undergraduate Teaching Award
- ASCE Excellence in Civil Engineering Education (ExCEED) Fellow, 2003

Selected Recent Publications/Presentations/Grant Awards

- *TECT: Teaching Engineering to Counselors and Teachers*, \$300,000 (3-year project), The National Science Foundation, PI: Dr. G. Bruce Gehrig, Co-PI's: Dr. Deborah Bosley, Dr. Lyndon Abrams, Dr. James Conrad, and Mr. Stephen Kuyath, May 2006 to present.
- *Development of an Integrated Construction Management and Civil Engineering Technology Curriculum*, \$11,350, UNC-Charlotte Curriculum Improvement and Development Grant, PI: Dr. G. Bruce Gehrig, Co-PI's: Dr. Donald Liou and Dr. Carlos Orozco, January 2005 to June 2006.
- Gehrig, G.B., Abrams, L., Bosley, D., Conrad, J., Kuyath, S., Denney, D., Teague, K., & Welch, B., "Expanding Engineering Diversity by Teaching Engineering to Counselors and Teachers," Proceedings of the 2007 American Society for Engineering Education Annual Conference & Exposition, June 24 – 27, 2007, Honolulu, Hawaii.
- Gehrig, G.B. & Cottrell, D.S., "Lessons-Learned from First Time Participation in Construction Management Student Competition," Proceedings of the 2007 American Society for Engineering Education Annual Conference & Exposition, June 24 – 27, 2007, Honolulu, Hawaii.
- Gehrig, G.B. & Brizendine, A.L., "Incorporating Outcome-Based Assessment Processes into a Construction Curriculum," International Proceedings of the 43rd Annual Conference of the Associated Schools of Construction, April 11 – 14, 2007, Flagstaff, Arizona.
- Gehrig, G.B., Brizendine, A.L. & Cottrell, D.S., "Development of an Integrated Construction Management and Civil Engineering Technology Curriculum," Proceedings of the 2006 American Society for Engineering Education Annual Conference & Exposition, June 18 – 21, 2006, Chicago, Illinois.

- Cottrell, D.S., Brizendine, A.L., & Gehrig, G.B., “*TC2K: A Successful Working Model for Continuous Improvement*,” Proceedings of the 2006 American Society for Engineering Education Annual Conference & Exposition, June 18 – 21, 2006, Chicago, Illinois.
- Gehrig, G. Bruce, “*Meeting the Challenge of Industry Demand for Construction Program Graduates*,” International Proceedings of the 42nd Annual Conference of the Associated Schools of Construction, April 20 – 22, 2006, Fort Collins, Colorado.
- Gehrig, G. Bruce, “*A Survey of the Status of Baccalaureate Degree Awarding Construction-Related Programs within the United States*,” International Proceedings of the 41st Annual Conference of the Associated Schools of Construction, April 7-9, 2005, Cincinnati, Ohio.
- Gehrig, G. Bruce, “*Adapting a Design-Construction Integration Methodology to Improve Construction Education*,” International Proceedings of the 40th Annual Conference of the Associated Schools of Construction, April 8-10, 2004, Provo, Utah.
- Gehrig, G.B., Abrams, L., Bosley, D., Conrad, J., Kuyath, S., “*Addressing the Demand for Engineers by Teaching Engineering to Counselors and Teachers*,” Meeting the Growing Demand for Engineers and Their Educators 2010 – 2020 International Conference Proceedings sponsored by IEEE, November 9 – 11, 2007, Munich, Germany.
- Liou, D.D. & Gehrig, G.B., “*Building the Framework for Hurricane Chaser, a Conceptual Wind-Energy Harvesting Vessel*,” 2nd International Conference on Sustainability Engineering and Science, “Talking and Walking Sustainability,” February 20 – 23, 2007, Auckland, New Zealand.
- Liou, D.D. & Gehrig, G.B., “*Sustainable Engineering as a Tool for Improving the Manufactured Housing Industry within the United States*,” Third International Conference on Construction in the 21st Century (CITC-III), “Advancing Engineering Management and Technology,” September 15 – 17, 2005, Athens, Greece.
- Gehrig, G. Bruce & Fontane, Darrell G., “*A Framework for Utilizing a Lessons-Learned Database to Improve the Performance of Public Sector Projects*,” Refereed Proceedings of the 3rd Annual International Conference on Information Systems in Engineering and Construction, June 12-13, 2003, Cocoa Beach, Florida.
- Gehrig, G. Bruce, “*A Potential Econometric Based Decision Support System for Water Reservoir Operations*,” 4th Annual Colorado State University Student Water Symposium, Fort Collins, Colorado, 2000.
- Gehrig, G. Bruce, “*A Review of Recreational Water Quality Criteria and an Investigation into the Recreational Water Quality of the South Platte River Through the Denver Metropolitan Area*,” South Platte River Resource Management: Finding a Balance Conference Proceedings, Fort Collins, Colorado, 1990.
- Gehrig, G. Bruce, “*K-12 Outreach: Teaching Engineering to Counselors & Teachers (TECT) in High Schools & Middle Schools*,” 2007 Engineering Technology Leadership Institute (ETLI), October 5 -8, 2007, Charlotte, North Carolina.
- Gehrig, G. Bruce, “*TECT: Teaching Engineering to Counselors and Teachers*,” Poster Presentation, NSF sponsored Teacher Professional Continuum (TPC) PI Conference, “Articulating a Vision of Teacher Quality,” May 7 – 9, 2006, Reston, Virginia.
- NSF Panelist, “*Recent NSF Grantees Research and Development Discussion*,” 69th Annual Conference International Technology Education Association, March 15 – 17, 2007, San Antonio, Texas.

Industrial and Professional Service (last five years)

- NSF Grant Proposal Review Panel, “Discovery Research K-12 (DR-K12) Program Solicitation, Arlington, Virginia, 2008.
- American Public Works Association (AWPA), in conjunction with Dr. Vincent Ogunro established a UNC-Charlotte AWPA student chapter, 2007
- TPC Advisory Group. Invited by NSF and the Education Development Center, Inc. to serve on the advisory group to plan the agenda for the next NSF TPC PI Conference, 2006 - 07
- Associated Schools of Construction, Construction Education Task Force, Member, 2006 - 07
- U.S.E.P.A. Grant Proposal Review Panel, “Benchmarking Sustainability in Engineering Education,” 2004.
- U.S.G.S. National Institutes for Water Resource Grant Proposal Review Panel, “Effectiveness of a Continuous Deflective Separation BMP for Sustaining Urban Water Supply Quality,” 2003.

- API/CID Grants Committee, COE representative, 2005 - 07.
- Undergraduate Course and Curriculum Committee, COE representative, 2007 - 08.
- Computing Facilities Advisory Committee, ET representative, 2004 to present.
- Academic Policy and Curriculum Committee, ET representative, 2006 - 07.
- Faculty Associate for Advising and Recruiting Search Committee, Member, 2004.
- Faculty Associate for Freshman Engineering & Advising Search Committee, Member, 2004.
- Construction Management Faculty Search Committee, Chair, 2007 to present.
- Civil Engineering Technology FAIT, Chair, 2004 to present.
- Freshman Engineering Technology FAIT, Member, 2004 to present.
- UNC-Charlotte SOAR Freshman & Transfer Orientation, CIET faculty representative
- JETS Summer Camp, 2005 -06.
- AGC Student Chapter advisor, 2008 to present.

Professional Development Activities (last five years)

- Ph.D. in Civil Engineering, Colorado State University, 2002
- Attended ASCE Excellence in Civil Engineering Education (ExCEED) faculty workshop, July 2003
- Attended numerous workshops and seminars on grant writing and advising
- Completed several advanced software application training sessions
- Attended workshops on WebCT and web-based course delivery
- Attended professional conferences

JOHN C. HILDRETH

Degrees & Professional Registrations

- Ph.D. in Civil Engineering, Virginia Polytechnic Institute and State University, 2003
- M.S. in Civil Engineering, West Virginia University, 1999
- B.S in Civil Engineering, West Virginia University, 1997
- Engineer Intern Number 7063, West Virginia

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:

1 year, Department of Engineering Technology, Civil Engineering Technology
Original appointment January 2008 at the rank of Assistant Professor

Related Teaching and Other Work Experience

- Virginia Polytechnic Institute and State University, Department of Civil Engineering, Senior Research Associate, 2005-2008
- Boyles and Hildreth Consulting Engineers, Inc, Project Engineer, 2002-2005
- Virginia Polytechnic Institute and State University, Department of Civil Engineering, Graduate Research Assistant, 1999-2002
- West Virginia University, Department of Civil Engineering, Graduate Teaching Assistant, 1997-1999
- Civil Tech Engineering, Inc, Project Engineer, 1996-1999
- Heeter Construction, Inc., Construction Engineer, 1995-1998

Active Membership in Professional and Scientific Societies

- American Society of Civil Engineers (ASCE) – Member
- Construction Institute (ASCE) – Member
- Construction Research Council (ASCE) – Member
- Transportation Research Board (TRB) – Member
- Association for the Advancement of Cost Engineering International (AACE) – Member
- American Society for Engineering Education (ASEE) – Member
- ASEE Construction Division – Member, Secretary/Treasurer 2008

Honors/Awards/Recognitions

- ASCE Excellence in Civil Engineering Education (ExCEEEd) Fellow, 2008
- Charles E. Via, Jr Research Fellow, 1999 – 2002

Selected Recent Publications/Presentations/Grant Awards

- “Construction Scheduling Processes”, Transportation Construction Management Institute (TCMI), Blacksburg, VA, 2006 – 2008.
- “Where We Are Going with Quality Control”, Geopier Foundation Company Annual Conference, Boston, MA, November 2007.
- “A Productivity Study of Geopier Installation Operations”, Geopier Foundation Company Annual Conference, Park City, UT, September 2006.
- Hildreth, J., Vorster, M. and Martinez, J., (2005) “Reduction of Short-Interval GPS Data for Construction Operations Analysis”, *Journal of Construction Engineering and Management*, ASCE, Reston VA, 131 (8), 920-927, August 2005.
- Williams, R. C., Hildreth, J. C., and Vorster, M. C. (2007) “BIDDS: A Bid Item Level Performance Time Database Management System.” *Proceedings of the International Workshop on Computing in Civil Engineering*, ed. Soibelman, L., Akinci, B., Pittsburgh, PA, July 25-28, 2007, American Society of Civil Engineers, Reston, VA.

- Lucko, G., Hildreth, J. C., Vorster, M. C. (2007) “Statistical Considerations and Graphical Presentation of the Residual Value of Heavy Construction Equipment.” *Proceedings of the International Workshop on Computing in Civil Engineering*, ed. Soibelman, L., Akinci, B., Pittsburgh, PA, July 25-28, 2007, American Society of Civil Engineers, Reston, VA.
- Hildreth, J. and Vorster, M., (2007) “Laboratory Learning of the Benefits Arising from Detailed Pre-Planning of Construction Operations”, *Proceedings of the 2007 ASEE Annual Conference*, Honolulu, Hawaii, 2007.
- Hildreth, J., Vorster, M. and Adams, H., (2007) “An Experimental Study of the Benefits Arising from Detailed Pre-Planning of Construction Operations”, *Proceedings of the 25th Anniversary Construction Management and Economics Conference*, University of Reading, UK, 2007.
- Hildreth, J. and Vorster, M., (2007) “Implications of Schedule Response”, *AACE International’s 51st Annual Meeting*, Nashville, TN, 2007.
- Williams, R., Hildreth, J., and Vorster, M., (2007) “A Bid Item Level Performance Time Database Management System as Part of a Framework for Progressively Estimating Contract Time”, *Proceedings of the 86th Annual Transportation Research Board Meeting*, Washington, DC, 2007.
- Henschel, B. and Hildreth, J., (2007) *PTD System Data Collection Comprehensive Training Guide*, Technical Report No. 07-11, Dept. of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, 2007.
- Brienza, R. and Hildreth, J., (2007) *Tracking Project Commodities for Progress Control*, Technical Report No. 07-09, Dept. of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, 2007.
- Gondy, C. and Hildreth, J., (2007) *Contract Time Determination Guidelines*, Technical Report No. 07-08, Dept. of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, 2007.
- Henschel, B. and Hildreth, J., (2007) *Implementing Change in a Public Agency: Applying a Process to Produce Change in VDOT*, Technical Report No. 07-07, Dept. of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, 2007.
- Arcuri, F. and Hildreth, J., (2007) *Required Performance Method for Schedule Control*, Technical Report No. 07-05, Dept. of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, 2007.
- Arcuri, F. and Hildreth, J., (2007) *A Development of an Intellectual Framework for Schedule Control*, Technical Report No. 07-04, Dept. of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, 2007.
- Henschel, B. and Hildreth, J., (2007) *Schedule Impact Analysis using CPM Schedules*, Technical Report No. 07-01, Dept. of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, 2007
- Williams, R. and Hildreth, J., (2006) *Framework of a Multi-Level Database of Highway Construction Performance Times*, Technical Report No. 06-05, Dept. of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, 2006.
- Rich, D. and Hildreth, J., (2006) *Evaluation of SiteManager as a Tool for Collecting Performance Time Data*, Technical Report No. 06-04, Dept. of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, 2006.
- Munoz, B. and Hildreth, J., (2005) *Management Principles of Scheduling*, Technical Report No. 05-04, Dept. of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, 2005.

Institutional and Professional Service (last five years)

- Reviewer for Journal of Construction Engineering and Management
- Reviewer for Automation in Construction
- Reviewer for 1st International Conference on Transportation Construction
- Member, TRB Application of Emerging Technologies to Design and Construction Committee
- Member, TRB Contract Law Committee
- Member, Civil Engineering Technology Focus Area Improvement Team (FAIT)
- Civil ET/Construction Management Faculty Search Committee

Professional Development Activities (last five years)

- Attended ASCE Excellence in Civil Engineering Education (ExCEED) faculty workshop, July 2008
- Completed Primavera P6 construction scheduling training
- Attended UNCC Summer Diversity Institute
- Attended workshops and seminars on grant writing and research funding
- Attended Geopier Foundation Company Annual Conference, 2006, 2007
- Attended ASEE Annual Conference, 2007
- Attended 25th Anniversary Construction Management and Economics Conference (CME25)
- Attended Annual Meeting of the Transportation Research Board (TRB), 2006, 2007, 2008
- Attended Construction Research Council meeting, Fall 2006, Fall 2007
- Attended Virginia Transportation Construction Alliance (VTCA) Spring conference, 2006, 2007
- Attended VDOT-VRTBA Consultant Forum, 2006

PETER L. SCHMIDT

Degrees & Professional Registrations

- Ph.D. in Mechanical Engineering, Vanderbilt University, 2006
- M.S. in Mechanical Engineering, Rose Hulman Institute of Technology, 1991
- B. S. in Mechanical Engineering, University of Louisville, August 1986
- Mechanical Engineer, State of Tennessee, License Number 102087
- Mechanical Engineer, State of Georgia, License Number 24125

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:

1 year, Department of Engineering Technology, Mechanical Engineering Technology
Original appointment August 2007 at the rank of Assistant Professor

Related Teaching and Other Work Experience

- Lecturer / Research Associate, Department of Mechanical Engineering, Vanderbilt University, August 2006 – July 2007
- Graduate Research Assistant, Department of Mechanical Engineering, Vanderbilt University, January 2003 – August 2006
- Sr. Mechanical Engineer, United Technologies/Carrier, June 2001 – December 2002
- Sr. Consultant, Cape-Dixson Associates, December 1996 – May 2001
- Sr. Applications Engineer, Wynn's International/Parker Hannifin, May 1992 – October 1995
- Mechanical Engineer, Dept. of Defense, Naval Surface Warfare Center, October 1986 – April 1992

Active Membership in Professional and Scientific Societies

- Institute of Noise Control Engineers
- American Society of Mechanical Engineers
- American Society of Heating, Refrigeration and Air Conditioning Engineers
- Acoustical Society of America
- American Society for Engineering Education

Selected Recent Publications/Presentations/Grant Awards

- S.M. Williams, P.L. Schmidt, I.E. Amundson and K.D. Frampton, "Source localization using regularized inversion", *Applied Acoustics*, Volume 67, pp 996-1008, 2006.
- P.L. Schmidt and K.D. Frampton, "Effects of in-plane forces on convected, fluid loaded plates", *Journal of Vibration and Acoustics*, Accepted for publication / In press.
- P.L. Schmidt, D.G. Walker, D. Yuhas and M. Mutton, "Thermal measurements of harsh environments using indirect acoustical pyrometry", accepted for 2007 Fall ASME IMECE conference.
- I.E. Amundson, P.L. Schmidt and K.D. Frampton, "Acoustic source localization with a distributed sensor network", 2004 ASME IMECE conference.
- James Conrad, William Heybruck, Daniel Hoch, Martin Kane, Peter Schmidt, Frank Skinner, and Linda Thurman, "Working with Industry Sponsors in a Multidisciplinary Senior Design Program," *Proceedings of the 2008 ASEE Conference*, Pittsburgh, PA, June 2008.
- P.L. Schmidt, K.D. Frampton, "The effect of in-plane loading on sound radiation from convected fluid loaded plates", submitted to the 151st Meeting of the Acoustical Society of America, Providence, Rhode Island. June 2006.
- P.L. Schmidt, S.M. Williams, I.E. Amundson and K.D. Frampton, "Self Localization of a distributed sensor network using Tikhinov Regularization", presented at the 149th Meeting of the Acoustical Society of America, Vancouver, British Columbia, May 2005.

- P.L. Schmidt, I.E. Amundson and K.D. Frampton, “Localization of acoustic sources with a distributed sensor network”, presented at the 147th Meeting of the Acoustical Society of America, New York, New York. May 2004.

Institutional and Professional Service (last five years)

- Reviewer for American Society of Mechanical Engineers, IMECE Conference, Fall 2006
- Reviewer for American Society of Mechanical Engineers, Journal of Vibration and Acoustics
- Reviewer for Journal of the Acoustical Society of America
- Reviewer for American Society of Engineering Education
- NCJets Trebuchet Competition Judge and Referee, October 2007
- Mechanical Engineering Tutor, Vanderbilt Athletic Department, 2006/2007
- Vanderbilt Student Volunteers for Science, Team Leader 2005/2006

Professional Development Activities (last five years)

- Attended 2004 Acoustical Society of America, New York NY, USA
- Attended 2005 Acoustical Society of America, Vancouver BC, Canada
- Attended 2006 Acoustical Society of America, Providence, RI, USA

DAVID S. COTTRELL

Degrees & Professional Registrations

- Ph. D. in Civil Engineering, Texas A&M University, 1995
- M.S. in Civil Engineering, Texas A&M University, 1987
- Bachelor of Science, United States Military Academy, 1978
- Registered Professional Engineer, Virginia, 1982

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:

3 years, Department of Engineering Technology, Civil Engineering Technology
Original appointment August 2005 at the rank of Assistant Professor

Related Teaching and Other Work Experience

- Assistant Professor of Engineering, Structural Design and Construction Engineering Technology, The Pennsylvania State University, 2005 – 2007
- Assistant Professor, Department of Civil and Mechanical Engineering, United States Military Academy, 1996 – 1998
- Instructor, Department of Civil and Mechanical Engineering, United States Military Academy, 1995 – 1996
- Chief, National Operations Center, US Army Corps of Engineers, 1998 - 2000
- Chief, Concepts Branch (R & D), US Army Engineer Center, 1993 - 1994
- Assistant Deputy Chief of Staff for Engineering, 1992 - 1993
- Senior Operations Officer (S3) for Engineer Battalion, 1991 - 1992
- Construction Management Engineer, 1987 - 1990

Active Membership in Professional and Scientific Societies

- American Society of Engineering Education (ASEE): Member
- Army Engineering Association (AEA): Lifetime Member and Association Fellow
- Associated Schools of Construction (ASC): Member

Honors/Awards/Recognition

- Recipient of the 2003-2004 *James Jordan Award* for teaching excellence
- Recipient of the 2002 *New Faculty Fellow Award* during the Frontiers in Education National Conference
- The Silver Order of the de Fleury Medal, 2000
- The Bronze Order of the de Fleury Medal, 1993

Selected Recent Publications/Presentations/Grant Awards

- Cottrell, David S., "Contractor Process Improvement for Enhancing Construction Productivity," *Journal of Construction Engineering and Management*, American Society of Civil Engineering, Reston, Virginia, February 2006, 189-196
- Cioci, Richard, David S. Cottrell, and Peter Idowu, "Engineering Technology Graduates Keep Pace with Their Engineering Colleagues to Succeed in a Master of Engineering Program," *Journal of Engineering Technology*, American Society of Engineering Education, Washington, D. C., December 2005, pp 189-196.
- Cottrell, David S. "Innovative Strategies for Teaching Construction Fundamentals: Implementing Design-Build Project Delivery Procedures into a Course in Cost Estimating," Peer-reviewed

Proceedings of the 2007 Annual Conference of the American Society for Engineering Education, Honolulu, Hawaii, June 2007.

- Cottrell, David S. "Keeping from Reinventing the Wheel: Some Lessons Learned from a Successful TC2K Program," Peer-reviewed *Proceedings of the 2007 Annual Conference of the American Society for Engineering Education, Honolulu, Hawaii, June 2007.*
- Cottrell, David S. "Outreach Initiative for Recruiting Women to Engineering: Doing a Good Deed for Girl Scouting" Peer-reviewed *Proceedings of the 2007 Annual Conference of the American Society for Engineering Education, Honolulu, Hawaii, June 2007.*
- Cottrell, David S. "Integrating TC2K into a Multi-Disciplinary Seminar Course: Finding a Hook for the "Soft" Outcomes," Peer-reviewed *Proceedings of the 2006 Annual Conference of the American Society for Engineering Education, Chicago, Illinois, June 2006.*
- Cottrell, David S. "Previews of Coming Attractions – Employing the First Year Seminar to Prepare Engineering Freshmen for Success in College and Beyond," Peer-reviewed *Proceedings of the 2006 Annual Conference of the American Society for Engineering Education, Chicago, Illinois, June 2006.*
- Gehrig, Bruce, Cottrell, David S, and Anthony Brizendine, "Development of an Integrated Construction Management and Civil Engineering Technology Curriculum," Peer-reviewed *Proceedings of the 2006 Annual Conference of the American Society for Engineering Education, Chicago, Illinois, June 2006*
- ADVANCE Grant (\$120,000), Apr 2007
- "Civil and Construction Engineering Technology Outreach to Girl Scouts." (\$6,000), Faculty Research Grant

Institutional and Professional Service (last five years)

- SPART Committee member
- Undergraduate Teaching Award Selection Committee member
- Graduate Teaching Award Selection Committee member
- Civil Engineering Technology FAIT Committee member

Professional Development Activities (last five years)

- Diversity Workshop, 2007
- NSF Career Workshop, 2007
- NSF Workshop: "Writing Proposals to meet NSF Expectations.", 2006
- DBAI Workshop, 2006
- ABET Institutional Rep: Participant in Training Seminar entitled "Institutional Representative Seminar on Technology Criteria 2000 (TC2K)," 2005
- "Grant Seeking A-Z Workshop" sponsored by the Office of Research and Graduate Studies at The Pennsylvania State University at Harrisburg, 2005

ROSIDA COOWAR

Degrees & Professional Registrations

- Ph.D. in Industrial Engineering, University of Central Florida, 2001
- M.S. in Electrical Engineering, University of Massachusetts, 1992
- Diploma in Telecommunications and Electronics, South London College, UK, 1972
- Six Sigma Black Belt Certification, 2005

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:

1 year, Department of Engineering Technology, Electrical Engineering Technology
Original appointment August 2007 at the rank of Associate Professor and Assistant Chair

Related Teaching and Other Work Experience

- Associate Professor/Assistant Chair/Program Coordinator, Engineering Technology Department, University of Central Florida, 1992 – 2007
- Visiting Professor, Department of Electrical Engineering Technology, University of Massachusetts, 1982 – 1992
- Professor, Institut National de Petrole, 1981 – 1982
- Professor, Institut National D'Electricite et D'Electronique, 1979 – 1981
- Lecturer, School of Industrial Technology, University of Mauritius, 1972 – 1973
- Production Control Manager, Integrated Technology Applications and Components, 1976 – 1978
- Process Engineer, Litronix, 1973 - 1976

Active Membership in Professional and Scientific Societies

- American Society of Engineering Education, Member
- Institute of Electrical and Electronics Engineers, Senior Member
- Tau Alpha Pi Honor Society for Engineering Technology, Member
- American Society for Quality, Senior Member

Honors/Awards/Recognitions

- Senior Faculty Fellowship (2004-2005) from UCF
- Recipient of the Teaching Incentive Program (TIP) Award from the State of Florida (2002)
- Certificate of Recognition from IEEE Education Activities Board (1997-2000)
- Advisor of the Year, Department of Engineering Technology (1997)
- Teacher of the Year, Department of Engineering Technology (1996)
- Advisor of the Year, Department of Engineering Technology (1995, 1996)
- Recipient of the Teaching Incentive Program (TIP) Award from the State of Florida (1995)
- Member of Tau Alpha Pi, the National Engineering Technology Honor Society
- Pride in Performance Certificate of Recognition from the State of Massachusetts (1990)

Selected Recent Publications/Presentations/Grant Awards

- “The Development of a Network Analysis Course for a High-Tech classroom”, R. Coowar, *ASEE Annual Conference Proceedings* June 2000
- “The Impact of Industrial Digital Design on Courses, Labs and Project Development”, R. Coowar and H. Biggelaar, *ASEE Annual Conference Proceedings* June 2000
- “Accreditation of two-year institutions”, R. Coowar and W. Buchanan, *ASEE SE Conference Proceedings* ASEE SE April 2002

- “Screening Designs for Large Numbers of Variables” R. Coowar – Dissertation Bell & Howell 2002
- “ASM Charts in VHDL”, R. Coowar and H. Biggelaar, *Computers in Education*, October 2004
- “Framework Development Using Six Sigma and Quality Tools to Achieve Operational Excellence in Higher Education”, S. Furterer and R. Coowar, *ASEM Annual Conference Proceedings*, October 2005
- “Design of On-Line Self-Regulated Controller Using PC Matlab”, A. Rahrooh and R. Coowar, *Computers In Education* 2006
- “Lean Six Sigma as an Improvement Tool in Academia”, R. Coowar and S. Furterer, ASEE 2006
- “Comprehensive Engineering Tech education Using Interactive Compressed Video” \$20,000, Co-Pi, SPIA, funded, 1994-1995
- “Grant-Aid Scholarship”, \$10,000, Funded, UCF, Fall 1997
- “Grant-Aid Scholarship”, \$10,000, Funded, UCF, Fall 1998
- “PLC_Robotics Undergraduate Teaching Laboratory Equipment” Provost’s Office, \$19,931, Pi, funded, 2003-2004
- “CNC-CIM Undergraduate Teaching Laboratory Equipment” Provost’s Office, \$19,977, Co-Pi, funded, 2004-2005

Institutional and Professional Service (last five years)

- IEEE Representative on TAC of ABET Commission
- Reviewer for the IEEE Transactions on Education
- Reviewer for Brooks/Cole publishing company
- Reviewer for the NSF ILI proposals FY 1996
- Reviewer for ITP and Prentice Hall

AIXI ZHOU

Degrees & Professional Registrations

- Ph. D. in Engineering Mechanics, Virginia Tech, 2002
- M.S. in Mechanical Engineering, Lanzhou University of Technology, 1999
- B.S. in Mechanical Engineering, Shenyang Institute of Aeronautical Engineering, 1996

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:

1 year, Department of Engineering Technology, Fire Safety Engineering Technology
Original appointment August 2007 at the rank of Assistant Professor

Related Teaching and Other Work Experience

- Postdoctoral Associate, Department of Engineering Science and Mechanics, Virginia Tech, 2006 – 2007
- Lecturer & Senior Scientist, School of Architecture, Civil & Environmental Engineering, Swiss Federal Institute of Technology-Lausanne (EPFL), 2003 – 2006
- Research Associate, Department of Structural Engineering, University of California-San Diego, 2002 – 2003
- Research and Teaching Assistant, Department of Engineering Science and Mechanics, Virginia Tech, 2000 – 2002
- Research and Teaching Assistant, Department of Mechanical Engineering, Lanzhou University of Technology, 1996 - 1999

Active Membership in Professional and Scientific Societies

- Society of Fire Protection Engineers (SFPE)
- American Society of Civil Engineers (ASCE)
- American Society for Engineering Educators (ASEE)

Honors/Awards/Recognitions

- Who's Who in Science and Engineering, 2007
- International Association of Bridge and Structural Engineering (IABSE) Young Engineer Travel Award, Zurich, Switzerland, 2004
- Excellent Science and Technology Development Award in Higher Education, the Government of Gansu, China, 2002
- Science and Technology New Star Award, the Government of Gansu, China, 1999
- Excellent Thesis Award, Lanzhou University of Technology, 1999
- Outstanding Graduate Student Award, Lanzhou University of Technology, 1996-1999
- Outstanding Student Award, Shenyang Institute of Aeronautical Engineering, 1992-1996

Selected Recent Publications/Presentations/Grant Awards

- “*Structural Fire Resistance of Fiber Reinforced Polymer Composites*”, supported by the UNC Charlotte Faculty Research Grant, 1/2008-5/2009, \$6,000, PI
- “*Standard for Load Resistance Factor Design of Pultruded Fiber-Reinforced Polymer Structures (Chapter 7-Plates)*”, supported by the American Society of Civil Engineers (in collaboration with Virginia Tech and the University of Maine), 10/2007-9/2010, \$138,896, Co-PI.
- “*Development and Application of Fire Resistive Models for Naval Composite Structures*”, supported by the Office of Naval Research through the Naval International Cooperative Opportunities in Science and Technology Program (NICOP), 7/2007-6/2010, \$385,759, PI.
- “*Fire Integrity in Advanced Ship Structures (SBIR)*”, supported by the Office of Naval Research, 08/2007-03/2008, \$5,000, Co-PI.
- “*Equipment for Soft Tissue/Soft Material Characterization*”, supported by the State Council of Higher Education for Virginia, 11/2006, \$63,550, Co-PI.

- “Fiber Reinforced Polymer Composites under Elevated and High Temperatures”, supported by the Swiss National Science Foundation, 10/2005-09/2007, CHF 90,160 (\$72,000), Co-PI.
- “Fatigue of Adhesively Bonded Joints from Pultruded GFRP Composites (Phases I and II)”, supported by the Swiss National Science Foundation, “, 05/2004-04/2008, CHF 234,881 (\$188,000), Co-PI. [Additional equipment funding of €142, 600 (\$240,000) was also awarded.]
- Lesko JJ, Peairs DM, Zhou A, Moffitt RD, Mutnuri B, Zhang W. (2008). Rapid prototyping and tooling techniques for pultrusion development. *SAMPE Journal*, 41(1): 65-68.
- Zhou A, Post N, Pingry R, Cain J, Lesko J, Case S. (2007). Durability of Composites under Fatigue Loads. *Durability of Composites for Civil Structural Applications*, Karbhari VM, editor, Woodhead Publishing: 126-149.
- Keller T, Riebel F, Zhou A. (2006). Multifunctional hybrid GFRP/steel joint for concrete slab structures. *ASCE Journal of Composites for Construction*, 2006; 10(6): 550-560.
- Keller T, Tracy C, Zhou A. (2006). Structural response of liquid-cooled GFRP slabs subjected to fire: Part II. Thermo-chemical and thermo-mechanical modeling. *Composites Part A: Applied Science and Manufacturing*, 37(9): 1296-1308.
- Keller T, Tracy C, Zhou A. (2006). Structural response of liquid-cooled GFRP slabs subjected to fire: Part I. Material and post-fire modeling. *Composites Part A: Applied Science and Manufacturing*, 37(9): 1286-1295.
- Keller T, Zhou A. (2006). Fatigue behavior of adhesively bonded joints composed of pultruded GFRP adherends for civil infrastructure applications. *Composites Part A: Applied Science and Manufacturing*, 37(8): 1119-1130.
- Keller T, Zhou A, Tracy C, Hugi E, Schnewlin P. (2005). Experimental study on the concept of liquid cooling for improving fire resistance of FRP structures for construction. *Composites Part A: Applied Science and Manufacturing*, 36(11):1569-1580.
- Zhou A, Coleman JT, Temeles AB, Lesko JJ, Cousins TE. (2005). Laboratory and field performance of cellular fiber reinforced polymer composite bridge deck systems. *ASCE Journal of Composites for Construction*, 9(5): 458-467.
- Zhou A, Keller T. (2005). Joining techniques for fiber reinforced polymer composite bridge deck systems. *Composite Structures*, 2005; 69(3): 336-345.
- Zhou A, Wei Y, Lang F. (2000). Theoretical investigation of controllable and regular fracture theory. *Key Engineering Materials*, 183 (1): 55-60.
- Yu Z, Zhou A, Bose, K. (2009). Modeling of composite panel under fire and compression. *COMPOSITES & POLYCON 2009*, Tampa, Florida, January 15-17, 2009.
- Peairs DM, Zhou A, Case SW, Lesko JJ, Post NL, Cain JJ. (2008). Monitoring of fatigue damage of marine composites using image analysis. *Society for Experimental Mechanics IMAC XXVI Conference Exposition*, Orlando, FL, February 4-7, 2008.
- Zhou A, Keller T. (2005). Structural responses of FRP elements under combined thermal and mechanical loadings: experiments and analyses. *4th Int. Conf. on the Response of Composite Materials to Fire*, Sep. 15-16, 2005, Newcastle, U.K.
- Zhou A, Bai Y, Keller T. (2005). Dynamic characteristics of bridge superstructures with FRP composite structural elements. *Composites in Construction*, July 11-13, 2005, Lyon, France.
- Keller T, Tracy C, Zhou A. (2005). Fire resistance of cellular GFRP slabs for building and bridge construction. *Composites in Construction*, July 11-13, 2005, Lyon, France.
- Keller T, Tracy C, Zhou A. (2004). A study on the fire behavior of multifunctional and fire resistant FRP building components. *Proceedings of the 2nd Int. Conf. on FRP Composites in Civil Engineering*, Adelaide, Australia, Dec. 8-10, 2004: 897-904.
- Zhou A, Keller T. Connections of fiber reinforced polymer bridge decks. *Proceedings of IABSE 2004 Symposium*, Sept. 22-24, 2004, Shanghai, China.
- Zhou A, Riebel F, Keller T. (2004).FRP element for thermal insulation and load transfer in concrete structures. *Proceedings of the 4th Int. Conf. on Advanced Composite Materials in Bridges and Structures*, July 20-23, 2004, Calgary, Canada.
- Zhou A, Vallée T, Keller T. (2004).Behavior of adhesively bonded joints from pultruded GFRP laminates under quasi-static loadings. *Proceedings of the 4th Int. Conf. on Advanced Composite Materials in Bridges and*

Structures, July 20-23, 2004, Calgary, Canada.

- Zhou A, Tirelli T, Keller T. (2004). Fatigue behavior of double-lap joints from pultruded GRFP laminates. *Advanced Polymer Composites for Structural Applications in Construction*, Woodhead Publishing Ltd., Cambridge, UK; 2004: 641-648.
- Zhou A, Brestel D, Karbhari VM. (2003). Effects of cutout on the performance of FRP cylindrical shells. *Proceedings of International SAMPE Symposium and Exhibition*, Long Beach, California, USA, 2003; 48(2): 2479-2492.
- Zhou A, Lesko JJ. (2003). Fiber-reinforced polymer decks for bridge systems: stiffness and strength. *Lightweight Bridge Decks, Proceedings of the European Bridge Engineering Conference*, March 27-28, 2003, Rotterdam, Netherlands, Paper 9.
- Zhou A, Lesko JJ, Coleman JT, Cousin TE. (2002). Failure modes and failure mechanisms of fiber reinforced polymer composite bridge decks. *Proceedings of the 3rd Int. Conf. on Composites in Infrastructure*. June 10-12, 2002, San Francisco, California, USA.
- Zhou A, Coleman JT, Lesko JJ, Cousins TE. (2001). Structural analysis of FRP bridge deck systems from adhesively bonded pultrusions. *Proceedings of the Int. Con. on FRP Composites in Civil Engineering*, Hong Kong, China, December 2001: 1413-1420.
- Zhou A, Lesko JJ, Davalos JF. (2001). Fiber reinforced polymer decks for bridge systems. *Proceedings of the Composites Fabricators Association COMPOSITES 2001 Convention*, October 3-6, 2001, Tampa, Florida, USA.
- Zhou A, Lesko JJ, Coleman JT, Cousins TE. (2001). Behavior of multi-cellular orthotropic FRP composite bridge deck under static loadings. *Proceedings of the American Society for Composites 16th Annual Conference*. September 10-12, 2001, Blacksburg, Virginia, USA

Institutional and Professional Service (last five years)

- Editorial Advisory Board Member, *Recent Patents on Materials Science*, Bentham Science Publishers.
- Associate Editor and Editorial Advisory Board Member, *International Handbook of FRP Composites in Civil Engineering*, CRC Press.
- Co-chairman, "Infrastructure" Session, SAMPE 2007 Conference and Exhibition, June 3-7, 2007, Baltimore, Maryland.
- Co-chairman, "Soft Composites" Session, 3rd International Conference on Composite in Construction (CCC 2005), Lyon, France, 11-13 July 2005.
- Reviewer for Journal of Composites for Construction
- Reviewer for Engineering Fracture Mechanics
- Reviewer for International Journal of Fatigue
- Reviewer for Composites Science and Technology

CARLOS EDUARDO OROZCO

Degrees & Professional Registrations

- Ph.D. in Civil Engineering, Carnegie Mellon University, 1993
- M.S in Civil Engineering, Carnegie Mellon University, 1984
- B.S. in Civil Engineering, Universidad Nacional de Colombia, Medellin, Colombia, 1983.

Number of years service on this faculty, including date of original appointment and dates of advancement in rank:

7 years, Department of Engineering Technology, Civil Engineering Technology
Original appointment July 2001 at the rank of Associate Professor, granted tenure as of August, 2005.

Related Teaching and Other Work Experience

- University of Virginia, Department of Civil Engineering, Assistant Professor, 1994-2001
- Pittsburgh Supercomputing Center, Senior User Consultant, 1993-1994
- Antioquia School of Engineering, Medellin, Colombia, Adjunct Professor, 1989
- Medellin University, Medellin, Colombia, Adjunct Professor, 1985, 1989
- International Colombia Resources Corporation (Exxon), Barranquilla, Colombia, Systems Analyst, 1985-1988
- Integral S.A., Medellin, Colombia, Design Engineer, 1981-1985, 1988-1989

Active Membership in Professional and Scientific Societies.

- American Society for Engineering Education (ASEE), Member

Honors/ Awards/Recognitions

- Recipient of the *Computers in Education* HARDEN-SIMONS prize for the best computational paper published in the *Computers in Education Journal* of the ASEE in 2005.
- Tau Alpha Pi Teacher of the Year, UNC Charlotte, 2004.
- Selected by the Aeroelasticity Branch of the NASA Langley Research Center for the NASA Faculty Fellowship Program (NFPP). Summer, 2003
- Ohio Aerospace Institute (OAI) summer faculty fellowship. NASA Glenn Research Center, 1999
- Nominated for an All-University Teaching Award. University of Virginia, 1998
- Certificate of Appreciation. Summer Bridge Program, University of Virginia, 1998
- Fulbright Grantee, 1983-1984
- National University of Colombia Fellow, 1983

Selected Recent Publications/Presentations/Grant Awards

- Orozco C. E., "A General Micromechanical Method for the Analysis of Complex Microstructure Composites". *Proceedings of the 15th International Conference on Composites/Nano Engineering, ICCE/15*. Haiko, Hainan Island, China, July 15-21, 2007.
- Orozco C. E., "A Comparison of Optimization Techniques for a Modeling Problem in Viscoelasticity". *Proceedings of the 14th International Conference on Composites/Nano Engineering, ICCE/14*". Boulder, Colorado, July 2-8, 2006.
- Orozco C. E., "The Modal Superposition Method Using Maple®: A Structural Dynamics Application for the Classroom". *Proceedings of the 4th Latin American and Caribbean Conference*. Mayaguez, Puerto Rico, June 21-23, 2006.
- Orozco C. E., "Optimal Tailoring of a Viscoelastic Model for Polymeric Matrix Composites". *Proceedings of the 12th International Conference on Composites/Nano Engineering, ICCE/12*. Tenerife, Canary Islands, Spain, August 1-6, 2005.
- Orozco C. E., "Application of the Strain-Compatible Volume-Averaging Method to Viscoelastic Analysis of Composites". *Proceedings of the 11th International Conference on Composites/Nano Engineering, ICCE/11*. Hilton Head Island, SC, August 2004.

- Orozco C. E., "Modeling the Viscoelastic Behavior of Multi-Phase Composites Using the Generalized Method of Cells," *Proceedings of the 10th International Conference on Composite Engineering, ICCE/10*, p535, New Orleans, LA, July 2003.
- Orozco C. E. and Pindera M-J., "Viscoelastic Analysis of Multi-Phase Composites Using the Generalized Method of Cells," *AIAA Journal*, Vol. 40, No. 8, pp. 1619-1626, August 2002
- Orozco C. E., "Micromechanical Analysis of Complex Microstructure Composites Using the SCVA Method," *Proceedings of the 9th International Conference on Composite Engineering, ICCE/9*, p575, San Diego, California, July 2002
- Orozco C. E. and Gan H., "Viscoplastic Response of Multi-Phase Composites Using a Strain-Compatible Volume-Averaging Method," *Composites Part B: Engineering*, Vol. 33, pp. 301-313, June 2002
- Orozco, C. E., "Analysis of the Microstructure of Advanced Composites Using the SCVA Method," Department of Civil and Environmental Engineering, Invited Lecture, Carnegie Mellon University, Pittsburgh, PA, March 2002
- Roche S. B., Orozco C. E., Barton F. W., Gomez J. P., Massarelli P., "Finite Element Evaluation of the Structural Integrity of Composite Bridge Decks," Technical Report, Mid-Atlantic Universities Transportation Center, July 2001
- Orozco, C. E., "Design Optimization of Nonlinear Mechanical Systems," Invited Lecture, Pennsylvania State University, Delaware County., Media, PA, April 2001
- Orozco, C. E. "The Conservation of Angular Momentum and Space Mechanics," Invited Lecture, Pennsylvania State University, Delaware County. Media, PA, April 2001
- Orozco, C. E., "Optimal Design of Nonlinear Mechanical Systems," Invited Lecture, University of North Carolina at Charlotte, March 2001
- Orozco, C. E., "High-Resolution Micromechanical Analysis of Complex Microstructure Composites," Invited Lecture, Tulane University. New Orleans, LA, March 2001
- Gan H., Orozco C. E., and Herakovich C. T., "A Strain-compatible Method for Micromechanical Analysis of Multi-Phase Composites," *International Journal of Solids and Structures*, Vol. 37, No. 37, pp. 5097-5122, July 2000
- Orozco, C. E., "The Strain-Compatible Volume-Averaging (SCVA) Method for Curved Geometries," Invited Lecture, NASA Glenn Research Center at Lewis Field, Cleveland, Ohio, July 2000
- Orozco C. E. and Pindera, M-J., "Plastic Analysis of Complex Microstructure Composites Using GMC," *AIAA Journal*, Vol. 37, No. 4, pp 482-488, April 1999
- Orozco C. E., "Applications of the Strain-Compatible Volume-Averaging Method to Unidirectional Composites," In *Collaborative Aerospace Research and Fellowship Program*, NASA Glenn Research Center and Ohio Aerospace Institute (OAI), Final Report, 1999
- Gan H., Orozco C. E. and Herakovich C. T., "A Shear Compatible Method of Cells for Micromechanics," *Proceedings of the 13th National Congress of Applied Mechanics*, University of Florida, Gainesville, Florida, June 1998
- Baber T. T., Maddox R. A., and Orozco C. E., "A Finite Element Model for Harmonically Excited Viscoelastic Sandwich Beams," *Computers and Structures*, Vol. 66, No. 1, pp 105-114, January 1998
- Orozco C. E. and Pindera M-J, "A High-Resolution GMC Formulation for the Analysis of Composites with Functionally Graded Microstructures," *Proceedings of the 4th International Conference on Composites Engineering, ICCE/4*, p757, Big Island of Hawaii, July 1997
- Orozco C. E., "Computational Aspects of Modeling Complex Microstructure Composites using GMC," *Composites Engineering*, Vol. 28B, pp 167-175, 1997
- Orozco C. E. and Ghattas, O. N., "A Reduced SAND Method for Optimal Design of Nonlinear Structures," *International Journal for Numerical Methods in Engineering*, Vol. 40, pp 2759-2774, 1997
- Ghattas O. N. and Orozco C. E., "A Parallel Reduced Hessian SQP Method for Shape Optimization," *Multidisciplinary Design Optimization: State of the Art*, Natalia M. Alexandrov and M. Y. Hussaini, editors, SIAM, pp. 133-152, 1997 (Book chapter)
- PI, "A Computational Model for the Viscoelastic Behavior of Polymeric Matrix Composites," UNC Charlotte Faculty Research Grant (\$3,500), 2004-2005
- PI, "Structural Performance of Simple Aerospace Structures in a Microgravity Environment," NASA Graduate Fellowship Program (\$24,000), 2004.

- PI, “A Reliability-based Monitoring System for Highway Bridges,” Mid-Atlantic Universities Transportation Center (\$90,546), 1999
- PI, “Applications of the Strain-Compatible Volume-Averaging Method to the Analysis of Unidirectional Composites,”
- Life Prediction Branch, NASA Glenn Research Center (\$10,000), Summer 1999
- PI, “From the Traveling Salesman to the Diet Problem: An Introduction to Optimization,” University of Virginia, Office of the Provost (\$6,500), 1998
- PI, “Applications of GMC to the Micromechanical Analysis of Built-Up Composite Panels,” Collier R&D (\$28,308), 1997

Institutional and Professional Service (last five years)

- University of North Carolina at Charlotte, Faculty Advisory Summer Sessions Committee, Member, 2007-2009.
- ETGR FAIT Chairman, ongoing.
- CIET FAIT, Member, ongoing.
- Department of Engineering Technology Reappointment and Tenure Review Committee, Member, ongoing.
- Department of Engineering Technology CIET Faculty Search Committee, Member, ongoing.
- Department of Engineering Technology ABET Committee, Member, 2003.
- Explore UNC Charlotte, Engineering Technology Department Representative, 2003 & 2004
- Session Chair: 14th International Conference on Composites/Nano Engineering, ICCE/14, Boulder, CO, August, 2006.
- Session Chair: 12th International Conference on Composites/Nano Engineering, ICCE/12, Tenerife, Canary Islands, Spain, August 2005.
- Reviewer: International journal of Solids and Structures (IJSS), 2004.

Professional Development Activities (last five years)

- 15th International Conference on Composites/Nano Engineering, ICCE/15, Hainan Island, China, July 15-21, 2007.
- 14th International Conference on Composites/Nano Engineering, ICCE/14, Boulder, CO, July 2-8, 2006.
- 4th Latin American and Caribbean Conference, Mayaguez, Puerto Rico, June 21-23, 2006.
- 12th International Conference on Composites/Nano Engineering, ICCE/12, Tenerife, Canary Islands, Spain, August 2005.
- 11th International Conference on Composites/Nano Engineering, ICCE/11, Hilton Head Island, SC, August 2004.
- 10th International Conference on Composites/Nano Engineering, ICCE/10, New Orleans, LA, July 2003.

CHUNG-SUK CHO

Degrees & Professional Registrations

- Ph.D. in Civil Engineering, University of Texas at Austin, May 2000
- M.S. in Civil Engineering, University of Hawaii at Manoa, July 1997
- B.S. in Civil Engineering, Sung Kyun Kwan University, February 1995

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:

Original appointment August 2008 at the rank of Assistant Professor
Department of Engineering Technology, Civil Engineering Technology

Related Teaching and Other Work Experience

- Assistant Professor, North Carolina A&T State University, Department of Construction Management and Occupational Safety & Health, 2004 – 2008
- Research Assistant, University of Texas at Austin, 1998 –2000
- Research Assistant, University of Hawaii at Manoa , 1996 –1997
- Project Manager/Associate Project Control Specialist, Fluor Corporation, 2000 –2004

Active Membership in Professional and Scientific Societies

- Member, American Society of Civil Engineers
- Member, National Association of Industrial Technology
- Member, Academic Committee, Construction Industry Institute (CII)
- Member, Risk Committee, Construction Institute (CI)

Honors/Awards/Recognition

- Certificate of Appreciation – “OSHA 10-Hour Construction Safety & Health Course”, 39th
- NAIT Convention
- Certificate of Appreciation – NAIT Presenter, Panama City Beach, FL. 2007
- Certificate of Appreciation – NAIT Presenter, Cleveland, OH. 2006
- Chair for NAIT Construction Focus Group

Selected Recent Publications/Presentations/Grant Awards

- Chung-Suk Cho (2007). “Comparative Evaluation of Bead-to-Bead and Top-Cap Retread Tires by way of Analysis of Data Available with North Carolina Department of Transportation.” TA2007-02, North Carolina Department of Transportation Equipment & Inventory Control, Raleigh, North Carolina.
- Chung-Suk Cho (2007). “Comparative Evaluation of Bead-to-Bead and Top-Cap Retread Tires by way of Survey of Literature and State of Practice in North America, Europe and Elsewhere.” TA-2007-03, North Carolina Department of Transportation Equipment & Inventory Control, Raleigh, North Carolina.
- G. Edward Gibson, Yu-Ren Wang, and Chung-Suk Cho, (2006). “What is Preproject Planning Anyway?” *J. of Management in Engineering*, ASCE, 22(1), January, pp 35-42.
- Cho, C. S., and Gibson, G. E., Jr., (2001). “Scope Management Using Project Definition Rating Index for Building Projects.” *J. Architectural Engrg.*, ASCE, 7 (4), 115-125.
- Cho, C. S., and Gibson, G. E., Jr. (2000). “Development of a Project Definition Rating Index (PDRI) for General Building Projects.” Refereed Proceedings, ASCE, *Constr. Congress VI*, 343-352.
- Cho, C. S., Furman, J. C., and Gibson, G. E., Jr., (2000). “Development of the Project Definition Rating Index (PDRI) for Building Projects.” Research Report 155-11. Construction Industry Inst., Austin, Texas. 296 pages.
- Cho, C. S., and Gibson, G. E., Jr., (1999). “Project Definition Rating Index for Buildings.” Proceedings, 1999, *CPI Conf.*, 77-97, Austin, Texas.

- Cho, C. S., and Gibson, G. E., Jr., (1999). "Project Definition Rating Index for Buildings." Proceedings, 1999, *Construction Industry Institute Annual Conf.*, 133-155, San Antonio, Texas.
- Cho, C. S. (1997). "Falling Rock Hazard Analysis and Mitigation for Temporary Construction Excavation Rock.", MSc. Thesis. Department of Civil Engineering, University of Hawaii at Manoa, Honolulu, Hawaii.
- Cho, C. S., and Singh, A. (1997). "Rockfall Hazard Index Evaluation and Mitigation for Temporary Excavations in Volcanic Rock at Construction Sites.", Research Report UHM/CE/97-04, University of Hawaii at Manoa, Honolulu, Hawaii.
- Cho, C. S. and Lee, S. H. "Impact of Project Environments on Project Change Management Best Practice" National Association of Industrial Technology, Panama City Beach, Florida, October 25, 2007.
- Cho, C. S. and Foust, D. "Advancement of Global Positioning System (GPS) Application in Construction Industry" National Association of Industrial Technology, Panama City Beach, Florida, October 25, 2007.
- Cho, C. S. and Shofoluwe, M. "Integration of "LEED" concepts into a CM Program" National Association of Industrial Technology Convention, Cleveland, Ohio, November 23, 2006.
- Cho, C. S. "OSHA 10-Hour Construction Safety & Health Course" NAIT Conference, Cleveland, Ohio, November 24, 2006.
- Cho, C. S. "PDRI for Building Projects – Development Process Using Metrics." Guest lecturer in CE 395 R.4, Metrics, a graduate course at the University of Texas at Austin, February 28, 2000.
- Cho, C. S. "Development of the Project Definition Rating Index (PDRI) for Building Projects" Dissertation Defense at the University of Texas at Austin, February 28, 2000.
- Cho, C. S. "Development of a PDRI for General Buildings." ASCE, Construction Congress VI, Orlando, Florida, February 22, 2000.

Industrial and Professional Service (last five years)

- Faculty Council, School of Technology, 2006 – 2008
- Distance Learning Committee, School of Technology, 2007 – 2008
- Admission, Suspension, & Probation Policy Review Committee, 2006 – 2007
- University Senates, 2005 – 2007
- Graduation and Retention, School of Technology, 2004 – 2007
- Curriculum Committee, School of Technology, 2005 – 2006
- Grades Appeal Board, School of Technology, 2004 – 2005

DON CHEN

Degrees & Professional Registration

- Ph.D., Civil Engineering (Construction Engineering and Management emphasis), Iowa State University, May 2006
- M.S., Civil Engineering (Construction Engineering and Management emphasis), Iowa State University, December 2002
- M.S, Statistics, Iowa State University, degree expected December 2009
- B.S. , Civil Engineering, Tongji University, Shanghai, China, July 1992

Number of years service on this faculty, including date of original appointment and dates of advancement in rank

- Assistant Professor, Civil Engineering Technology & Construction Management, University of North Carolina at Charlotte, May 2009 to present
- Assistant Professor, Construction Management, Ball State University, Muncie, Indiana, August 2006 to May 2009

Related Teaching and Other Work Experience

- Research and Teaching Assistant, Construction Engineering, Iowa State University, Ames, Iowa, August 2000 to August 2006
- MWH-Boda Environmental Engineering Group, Project Engineer, Beijing, China, January 1999 to August 2000
- Wuzhou Engineering Services, Structural Engineer, Beijing, China, July 1992 to January 1999

Active Membership in Professional and Scientific Societies

- LEED AP, June 2009 to present
- Full Member, Sigma Xi, 2003 to present
- Member, American Society of Civil Engineers (ASCE), 2001 to present
- Member, National Association of Industrial Technology (NAIT), April 2008 to present
- Member, American Statistical Association (ASA). 2004 to 2006

Honors/Awards/Recognition

- Teaching Excellence Award, Iowa State University, Ames, Iowa, March 2006
- Research/Teaching Assistantship and Graduate College Scholarship, Iowa State University, Ames, Iowa, August 2000 to August 2006
- Crashing Through Award, Dale Carnegie Training – Human Relation and Communication Skills, Ames, Iowa, November 2001

Selected Recent Publications/Presentations/Grant Awards

- Thomas, H. R., Minchin, R. E., Chen, D. (2003) "*Role of Workforce Management in Bridge Superstructure Labor Productivity*," Journal of Management in Engineering. ASCE, January 2003, Vol. 19(1): 9-16.
- Thomas, H. R., Horman, M. J., Minchin, R. E., Chen, D. (2003) "*Improving Labor Flow Reliability for Better Productivity as Lean Construction*," Journal of Construction Engineering and Management. ASCE, May 2003, Vol. 129(3): 251-261.
- Chen, D., Jahren, C. T., and Kim, S. (2007) "*A Study of Cold In-Place Recycled Asphalt Roads*," 2007 Associated Schools of Construction Region III Conference, October 24-27, 2007, Downers Grove, Illinois.
- Jahren, C.T., Lee, H., Chen, D, and Kim, J. (2007) "*Evaluation of long-term field performance of cold in-place recycled road*," Proceedings of Mid-Continent Transportation Research Symposium, Iowa State University. August 16-17, 2007.
- Chen, D., Jahren, C. T., Kim, J., Lee, H., and Heitzman, M. (2007) "*Evaluation of Long-Term Performance of Cold In-Place Recycled Asphalt Roads*," Transportation Research Board, January 21-25, 2007, Washington, D.C.
- Kim, J., Lee, H., Jahren, C. T., Chen, D, and Heitzman, M. (2007) "*Long-Term Field Performance of Cold In-Place Recycled Asphalt Roads in Iowa*" Transportation Research Board, January 21-25, 2007, Washington, D.C.
- Chen, D, and Jahren, C. T. (2005) "*Cold In-Place Recycled Asphalt Roads in Iowa*." Greater Iowa Asphalt Conference, March 2-3, 2005, Des Moines, Iowa.
- Jahren, C. T., and Chen, D (2005) "*Long-Term Performance of Cold In-Place Recycled Asphalt Roads*," Mid-Continent Transportation Research Symposium, August 18-19, 2005, Ames, Iowa.
- Chen, D, and Jahren, C. T. (2003) "*Construction Scheduling for Urban Freeway Renewal Project – A Case Study*," Mid-Continent Transportation Research Symposium, August 21-22, 2003, Ames, Iowa.

Institutional and Professional Service (last five years)

- Member, University Senate, Ball State University, 2007 to present
- Member, Faculty Council, Ball State University, 2007 to present
- Member, Undergraduate Education Committee, Ball State University, 2007
- Member, Creative Teaching Committee, Ball State University, 2007
- Member, University Salary & Benefits Committee, Ball State University, 2007
- Member, University Traffic Appeals Subcommittee, Ball State University, 2007

- Member, Promotion and Tenure Committee, Department of Technology, Ball State University, 2008-2009
- Chair, Facilities Planning and Renovation Committee, Dept. of Technology, Ball State University, 2007 to present
- Member, Sustainability Committee, Department of Technology, Ball State University, 2007 to 2008
- Member, Salary Committee, Department of Technology, Ball State University, 2007 to present
- Member, Search Committee, Construction Management Tenure Track Faculty Position, Ball State University, 2008
- Reviewer, Journal of Construction Engineering and Management, ASCE, 2005 to present
- Reviewer, Proceedings of Associated Schools of Construction Annual Conference, April 2008 to present

Professional Development Activities (last five years)

- Coach, Commercial Team, Associated Schools of Construction (ASC) Region III, Student Competition, Downers Grove, Illinois, October 2007
- Representative of Department of Technology, Faculty/Student Exchanges Program (1+2+1) with institutions in China, March 31st to April 14th, 2007
- Instructor, Microsoft Project Training, National Society of Black Engineers Regional Leadership Conference, Ames, Iowa, August 2005
- Representative, Construction Engineering and Management Division, Graduate Student Dean's Advisory Board, Iowa State University, August 2005 to Aug. 2006

NA LU, Ed.D., AIC

Degrees & Professional Registration

- Ed.D. - Construction Education, Clemson University, May 2007
- Master of Construction Science & Management, Clemson University, August 2005
- Master of Business Management, Xi'an University of Architecture & Technology, Beijing International MBA (Fordham University, NY & Beijing University, China), August 2003
- Bachelor of Construction Management, Xi'an University of Architecture & Technology, Xi'an, Shannxi Province, PRC, August 1997
- Construction Safety Training Program, Japanese Construction Safety and Health Association, Tokyo, Japan 2003-2004

Number of years service on this faculty, including date of original appointment and dates of advancement in rank

University of North Carolina at Charlotte, Charlotte, NC, May 2009- Present, Assistant Professor of Construction Management Engineering Technology

Related Teaching and Other Work Experience

- Roger Williams University, Bristol, RI, Assistant Professor, School of Engineering, Computing and Construction Management, August 2007- May 2009
- Clemson University, Clemson, SC, Lecturer, Department of Construction Science & Management, September 2006 - May 2007
- Kiewit Southern Co. Atlanta, GA, Project Engineer at Miami International Airport, Miami, FL, August 2005- September 2006
- Clemson University, Clemson, SC, Teaching Assistant, Department of Construction Science & Management, September 2005 – September 2006
- Three River Eco-builder Co. Phoenix, AZ, Summer intern as field engineer, May 2005 - August 2005
- Japanese Construction Occupational Safety and Health Association, Researcher, 2003 - 2004
- Xi'an University of Architecture & Technology, Xi'an, PRC, Assistant Professor, School of Construction Management, September 1999 - August 2002
- Xi'an University of Architecture & Technology, Xi'an, PRC, worked as owner's rep, August 1997- August 1999

Active Membership in Professional and Scientific Societies

- American Society of Civil Engineering (ASCE)
- US Green Building Council Rhode Island Chapter (USGBC)
- International Building Performance Simulation Association (IBPSA)
- American Institute of Constructors (AIC)

Selected Recent Publications/Presentations/Grant Awards

- Lu, N., "The current use of offsite construction techniques in the U.S. construction industry," *Proceedings of the American Society of Civil Engineers (ASCE) Construction Research Congress 2009*, Seattle, WA, April 2009.
- Lu, N., "Comparative study on offsite construction techniques in US building construction," *Journal of Construction Management & Economic*, UK, Under Review.
- Lu, N., "Contractor's perspective on modular construction techniques in US building construction," *Proceedings of 44th annual ASC International Conference*, Gainesville, FL, April 2009.
- Lu, N., "Assessment the correlation between undergraduate internship with their academic performance in Construction Management program," Proceeding of 44th annual ASC International Conference, Gainesville, FL, April 2009.
- Lu, N., Liska, R. "The designers' and general contractors' perceptions of offsite construction techniques in the United States construction industry," *International Journal of Construction Education and Research*, Vol 4, No. 13, pp 1-13.
- Lu, N., "The current use of offsite construction techniques in the U.S. construction industry," *Proceedings of the American Society of Civil Engineers (ASCE) Construction Research Congress 2009*, Seattle, WA, April 2009.
- Lu, N., "Investigation of The designers' and general contractors' perceptions of offsite construction techniques in the United States construction Industry," Doctorate Dissertation, Published UMI Dissertation Service.
- Lu, N., Bausman, D., "Distance Education: A Learning Experience," 42nd annual ASC International Conference Proceedings, April 2006.
- Lu, N., Bausman, D., "A Comparative Analysis of Asynchronous Distance Education," 42nd annual ASC Region II Conference, October 2005.
- Lu, N., "A Comparative of the Chinese and North American MBA Education Systems," *Journal of Xi'an University of Arch. & Tech.*, April 2003.
- Lu, N., "A Practical Method for Construction Project Estimating," *Journal of Xi'an University of Arch. & Tech.*, August 2002.

- *The current use of offsite construction techniques in US construction industry*, ASCE Construction Research Congress, Seattle, April 2009
- *Comparative study on offsite construction techniques in US building industry*, The 44th annual ASC international conference, Gainesville, FL April 2009.
- *Undergraduate internship experience with their academic performance*, The 44th annual ASC international conference, Gainesville, FL April 2009.
- *Sustainable Site Analysis for Manufactured Residential Housing*, Fall Convention of Manufactured Housing Institute of South Carolina, Greenville, South Carolina, November 2006.
- The Design and implementation of nuclear power plant construction engineering course modules, CO-PI \$124,296, Nuclear Regulatory Commission, 2009.
- Assessment the correlation of undergraduate internship with their academic performance, PI, \$2,000, Roger Williams University, RI, 2008.
- A comparative study on American Institute of Constructors with Chinese Construction Association, Sponsored by Chinese Construction Ministry, 2008.
- Innovative technology for an existing commercial building in Phoenix, AZ, 2007, Sponsored by Roger Williams University.
- Offsite construction techniques in the United States Construction Industry, Co-PI, \$55,000, Clemson University, 2007.
- A comparative analysis of asynchronous distance education, Directed by Dr. Dennis C. Bausman, Sponsored by Clemson University, SC, 2005.
- Chinese construction safety and health investigation, Sponsored by Japanese Construction Safety and Health Association, 2003.
- A compensation module for project manager in construction, Sponsored by Xi'an Construction Economic Institute, PRC, 2003.
- Organizational plan for Mozambique Officer building project, 2002, Sponsored by Xi'an International Project Contract Corp. PRC.

Institutional and Professional Service (last five years)

- ASC/AGC Students Heavy Civil Competition Team, Northeast Region First Place, New Jersey, 2007 & 2008,
- Co-advisor for the engineering student competition team in developing innovative technologies for existing building. The team won 1st place of the international WERC competition in Albuquerque, NM, in April 2008.
- Conference Session Chair for the “ Technology and Process Improvement” Sessions, ASCE Construction Congress Research Conference, Seattle, WA April 2009.
- Journal Reviewer: ASCE Journal of Construction Engineering and Management, International Journal of Construction Education and Research, and Journal of Construction Management & Economic, UK.

AHMAD K. SLEITI

Degrees & Professional Registration

- Ph.D. in Mechanical Engineering, University of Central Florida (UCF), Orlando, FL, 2004
- M.S., Mechanical Engineering, University of Jordan (UJ), Amman, Jordan , 2001
- B.S. and M.S. in Mechanical Engineering, Rostov State Building University (RISI), Rostov on Don, Russia, 1991
- Certified Energy Manager (CEM), <http://www.aeecenter.org/certification/CEMpage.htm>
- Certified Energy Auditor, (CEA), USA

Number of years service on this faculty, including date of original appointment and dates of advancement in rank

- University of North Carolina at Charlotte, Assistant Professor, Department of Engineering Technology, and Member, Energy Production and Infrastructure Center (EPIC), May 2009 to Present

Related Teaching and Other Work Experience

- University of Central Florida (UCF), Assistant Professor – Director of Hydrogen and Fuel Cell/Energy Systems Technology Program, Mechanical, Materials and Aerospace Engineering & Engineering Technology Departments, 2007-2009
- University of Central Florida (UCF), Research Associate, Project Manager and Adjunct Professor, Mechanical, Materials and Aerospace Engineering Department (MMAE), 2004-2007
- Electrodynamics Associates, Inc., Oviedo Florida, USA, Senior Mechanical Engineer, Thermal and mechanical design and testing of high-speed rotating electric machines, 2003-2004
- University of Central Florida (UCF), Research and Teaching Assistant and Instructor, Department of Mechanical, Materials and Aerospace Engineering (MMAE), 2001-2004
- Penta Group Engineering Co, Jordan, Project Engineer & Project Manager, Thermal Management, Heat Transfer, Energy Systems, HVAC, 1995-2001
- SIGMA Consulting Engineers, Jordan, Design and Consulting Engineer, Energy Systems, Thermal Management, Heat Transfer, HVAC, 1993-1995
- BETA Engineering Industries Co, Jordan, Research and Development Engineer, Design, Manufacturing and Development of Boilers, Compressors and Burners, 1991-1993

Active Membership in Professional and Scientific Societies

- Member of American Society of Mechanical Engineers (ASME), Since 2001
- Member of American Institute of Aeronautics and Astronautics (AIAA), Since 2003
- Member of American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE)
- Member of The American Society of Engineering Education (ASEE), since 2008
- Florida Renewable Energy Producers Association (FREPA), since 2008

Selected Recent Publications/Presentations/Grant Awards

- A.K. Sleiti, “Multiscale Thermal Transport Phenomena in Dielectric Composites” in preparation.
- E.J. Naimaster and A.K. Sleiti, “Effects of Electrode Microstructure on Intermediate Temperature Solid Oxide Fuel Cell Performance” Accepted by ASME Journal of Fuel Cell Science Technology, 2009.
- A.K. Sleiti, ““Transient Flow of Air through Rectangular Vents in Horizontal Partition”, Accepted by HVAC&R Research, American Society of Heating, Refrigerating and Air-Conditioning Engineers, 2009.
- A.K. Sleiti and A. Mehrabian, "Case Study of Cost Effective Small Wind Turbine", Accepted by Energy Sources, Part B Economics, Planning, and Policy, 2009.
- A.K. Sleiti, “Advancement of Renewable Energy Engineering Technologies”, Submitted to International Journal of Engineering Education, 2009.
- A.K. Sleiti, “Computational Tool for Optimizing Turbine Cooling Design-1” Submitted to the Technology Interface Journal, 2009.
- A.K. Sleiti, “Engineering Technology Hydrogen and Fuel Cell Education Program Concentration – I”, Submitted to International Journal of Engineering Education, 2009.
- A.K. Sleiti, “Design and Pressure Loss Reduction in the Hydrogen Flow Heat Exchanger with Tube Bundles”, *the Technology Interface Journal*, Volume 9 No. 2, Spring 2009, ISSN# 1523-9926, <http://technologyinterface.nmsu.edu/Spring09/>
- K. Sleiti “ Effect of Vent Aspect Ratio on Unsteady Laminar Buoyant Flow Through Rectangular Vents in Large Enclosures”, *International Journal of Heat and Mass Transfer* 51 (2008) 4850–4861.
- Quan Liu, A. K. Sleiti, and J. S. Kapat, “Application of Pressure and Temperature Sensitive Paints for Study of Local Heat Transfer to a Circular Impingement Air Jet” *International Journal of Thermal Sciences* 47 (2008) 749–757.
- K. Sleiti and J. S. Kapat, 2008, “ Effect of Coriolis and Centrifugal Forces on Turbulence and Transport at High Rotation and Density Ratios in Rib-Roughened Channel”, *International Journal of Thermal Sciences* 47 (2008) 609–619. <http://authors.elsevier.com/offsetprints/THESCI2673/995f6101c4f59e8f69bf70701d7bb440>

- K. Sleiti and J. S. Kapat, 2006, "Effect of Coriolis and Centrifugal Forces at High Rotation and Density Ratios", AIAA Journal of Thermophysics and Heat Transfer, Volume 20, No. 1, pp. 67-79.
- K. Sleiti, 2007, "Advanced cooling technology for rotors of high-power low-duty cycle generators using polyalphaolefins" Journal of Synthetic Lubrication, Vol. 24, No.2, pp. 77-90, March 2007.
- R. Kumar, A. K. Sleiti and J. S. Kapat, 2006 "Unsteady Laminar Buoyant Flow Through Rectangular Vents in Large Enclosures", AIAA Journal of Thermophysics and Heat Transfer, Vol. 20, No.2, pp. 276-284, April-June 2006.
- K. Sleiti and J. S. Kapat, 2006 "An Experimental Investigation of Liquid Jet Array and Single Phase Spray Impingement Cooling Using Polyalphaolefin", Experimental Heat Transfer Journal, Volume 19, No. 2, pp. 149-163 April 2006.
- K. Sleiti and J. S. Kapat, 2006 "Comparison Between EVM and RSM Turbulence Models in Predicting Flow and Heat Transfer in Rotating Rib-Roughened Channels". Journal of Turbulence, Volume 7. No.29, pp. 1-21, 2006.
- K. Sleiti and J. S. Kapat, 2006 "Heat Transfer in Channels in Parallel-Mode Rotating at High Rotation Numbers", AIAA Journal of Thermophysics and Heat Transfer, Vol. 20, No.4, pp. 748-753, October-December 2006.
- N R Nagaiah, A. K. Sleiti, S Rodriguez, J S Kapat, L. An and L. Chow, 2006 "A Novel Design and Analysis of a MEMS Ceramic Hot-Wire Anemometer for High temperature Applications". J. Phys.: Conf. Ser. 34, pp. 277-282.
- K. Sleiti and J. S. Kapat, 2005, "Fluid Flow and Heat Transfer in Rotating Curved Duct at High Rotation and Density Ratios", ASME Journal of Turbomachinery, Volume 127, Issue 4, pp. 659-667.
- Orlovskaya, N., Sleiti, A., Naimaster, E., Bonadies, M., Kapat, J., and Johnson, C., "Impact of Temperature and Porosity on Sc2O3-CeO2-ZrO2 Intermediate Temperature Solid Oxide Fuel Cell Performance," 47th AIAA Aerospace Sciences Meeting, AIAA-2009-1207, Orlando, FL, 2009.
- A.K. Sleiti, "Bachelor of Science - Engineering Technology Hydrogen and Fuel Cell Education Program Concentration – I", ASME 2008 International Mechanical Congress and Exposition (IMECE) IMECE2008-69090, October 31 2008 - November 06 2008, Boston Massachusetts, USA
- K. Sleiti, "Effect Effect of reduced Temperature and Cathode Porosity on the performance of Tubular Solid Oxide Fuel Cell". Proceedings of ASME 2008 Summer Heat Transfer Conference, HT2008-56447, August 10-14, 2008 Jacksonville, Florida, USA.
- "Computational Fluid Dynamics Study of High Performance Low Temperature Planar Solid Oxide Fuel Cell (SOFC) using Sc₂O₃-CeO₂-ZrO₂ Electrolyte". Fuel Cell Science, Engineering and Technology Conference, June 18 – 20, 2007, New York, USA.
- Hydrogen and fuel cell/Energy Systems technologies Program Development, PI, 09/08-09/10, US Department of Energy FSEC, \$499K
- Instrumentation for Multiscale Thermal Transport of Dielectric Composites, PI, 05/09-06/10, AFSOR, \$94K
- Thermal/fluids transport processes in High Power-Low Density El. Machines, PI, 12/07-12/09, DOD, through Electrodynamics, \$89K
- Advancement of Renewable Energy Engineering Technologies, PI, 11/09-10/11, NSF, \$250K
- Intermediate Temperature SOFCs: A comprehensive approach to designing materials for superior functionality, Co-PI, 03/07-06/08, NASA, \$130K
- Optimization of ThermoElectric/Control Design for Advanced Motor/Generator, Co-PI, 12/05–01/08, DOD SBIR II, Electrodynamics, \$176K
- Computational Fluid Dynamics Study for Design and Pressure Loss Reduction in the Omega Cooler - Phase I, 07/05–11/05, Senior Investigator, Siemens Power Generation (SPG)/ Generator, \$60K
- Integration of High Speed Compact Efficient Generator for DEW Applications, 01/05–08/05, Senior Investigator, DOD (Air Force) – Electrodynamics, \$70k
- Impingement Film Coupling Project – Phase I AND II, 02/04–05/06, Senior Invest. & Project manager, Siemens Power Generation (SPG / Gas Turbine, \$185K
- Development of Physics Based Cooling Feasibility Tool, 04/04–02/05, Senior Invest. & Project manager, Siemens Power Generation (SPG), \$65K
- Advanced cooling technology: Basic Film Cooling- Phase II, 03/05–03/06, Senior Invest. & Project manager, Siemens Power Generation (SPG / Gas Turbine, \$89K
- Shroud Film Cooling, Shroud Cooling Test (SCT), 03/04–02/06, Senior Invest. & Project manager, Siemens Power Generation (SPG / Gas Turbine, \$277K

Professional Development Activities (last five years)

- (ABET a-k criteria): develop assessment tools to evaluate student learning outcomes in the classroom.
- Information Fluency Initiative Grants Conference, UCF 2008
- Workshops in Technology Entrepreneurship (2006, 2007)
- SBIR/STTR Grant preparation workshop (2006, 2007)
- Fuel Cell Workshop (2006); Leadership Excellence Certificate, (2006); Supervisory Skills Series Certificate, (2006); Teamwork Series Certificate, (2005)
- Computational Fluid Dynamics (CFD) Training series (2002, 2003)

DONALD D. LIOU

University Address

Department of Engineering Technology
The University of North Carolina at Charlotte
Charlotte, NC 28223-0001
(704) 687-4179

Education

Ph.D. in Structural Engineering, University of California at Berkeley, 1978.
Dissertation Title: *Seismic Analysis of Offshore Structures Supported on Pile Foundation.*
M.B.A., Haas School of Business, University of California at Berkeley, 1987.
Dissertation Title: *Impact of the 1986 Tax Reform Act on Accounting Methods for Construction Companies.*
M.S. in Civil Engineering, University of California at Berkeley, 1972.
Dissertation Title: *Nonlinear Analysis of Axisymmetric Reinforced Concrete Structures.*
B.S. in Civil Engineering, National Taiwan University, Taiwan, 1970.

Professional Affiliations

Member, American Society of Civil Engineers (ASCE)
Professional Civil Engineer, State of California, C 24861
Advisor, Student Chapter of the Association of General Contractor of America (AGC)

Teaching Experience

Tenured Associate Professor of Engineering Technology, William States Lee College of Engineering, University of North Carolina at Charlotte, 1995-

Awards and Honors

1991: 10-year service award, Bechtel Corporation, San Francisco.
1993: Outstanding service award for completion of Kawasaki Man Made Island Project, Bechtel Civil Company, San Francisco.

Professional Experience

Structural consultant, retrofit Sugar-Creek steel bag-house in Kansas City, Missouri for designed wind forces, 2001. Provide technical support to Mikropul, 2002.

Project manager, Jihe Expressway (\$250 millions, 35 km, four-lane freeway north of Shen Zhen, China) and Daxie Island Bridge projects (highway and rail combined RC bridge south of Shanghai). Bechtel Civil Inc., Hong Kong Office, HK, November 1993 to June 1995.

Project manager and manager of instrumentation, Trans-Tokyo Bay East Kawasaki Island Project, Taisei, Tobishima, Penta Ocean, and Bechtel Joint-Venture (\$1 billion, deep-sea diaphragm island), Bechtel International Inc., Tokyo Office, Japan, October 1991 to October 1993.

Project engineer and proposal manager, San Francisco Muni Metro Turnback Project (tunnel in soft bay mud), McCarran airport south freeway tunnel project (highway tunnel), Golden Gate Bridge transit study project (suspension bridge), Bechtel Civil Inc. San Francisco Office, September 1989 to September 1991.

Chief Civil and Architectural Engineer and Director of Quality Center, Taipei Department of Rapid Transit Systems (\$12 billion, 70 km, 72 stations rapid and medium capacity transit system), Taipei City Government, Taipei, Taiwan, ROC, July 1987 to August 1989.

Part-time structural consultant, Hsu and Associates, AIA, structural design of Quelin Holiday Inn Hotel Project (9 story RC building), Quelin, Quangsi, China, July 1985 to June 1987.

Seismic engineering specialist, seismic analysis and design of Diablo Canyon Nuclear Power Project, Bechtel Power Corporation, San Francisco Office, March 1983 to June 1985.

Dynamic Analysis Group Leader, Taipower Fourth Nuclear Power Project, Pacific Engineers and Constructors, Ltd. (a joint-venture of Overseas Bechtel Inc.), Taipei, Taiwan, ROC, February 1981 to February 1983.

Senior Engineer, Special Structure Group, In-house consultant to various nuclear power generation projects in US, Japan, and Taiwan, Bechtel Power Corporation, San Francisco Office, February 1978 to January 1981.

Principal Engineer, Structural consultant to various nuclear power generation projects, URS/Blume, San Francisco, August 1977 to January 1978.

Research Assistant to Prof. Joseph Penzien, Standard Oil of California Grant (offshore platform on piles project), University of California at Berkeley, Berkeley, California, January 1975 to July 1977.

Associate Engineer, EDS Nuclear Inc., San Francisco, Structural consultant to various nuclear power generation projects, January 1973 to December 1974.

Research Assistant to Prof. A. C. Scordelis, University of California at Berkeley, (development of finite element program for RC structure), December 1971 to December 1972.

Second Lieutenant of the Construction and Maintenance Unit, Chia Yi Air Base, ROC Air Forces, June 1970 to July 1971.

Publications

“Retrofitting a Missouri Steel Baghouse,” Accepted for publication in *ASCE Journal of Performance of Constructed Facilities* accepted for publication on April 9, 2002.

“Performance of Inclinometers in Diaphragm Walls,” *ASCE Geotechnical Special Publication No. 90, Geo-Engineering For Underground Facilities*, June 1999, pp 900-911.

“Thermal Effects in Large-Sized Diaphragm Wall,” *ASCE Journal of Performance of Constructed Facilities*, Vol. 13, No. 1, February 1999, pp. 17-21.

“The Effects of Construction Joints in Mass Flowable Concrete,” *ASCE Materials Journal*, Vol. 10, No. 1, February, 1998, pp 34-39.

“A Feasibility Study on Using Aluminum in Soft-Ground Traffic Tunnels,” Faculty Research Grant Report, University of North Carolina at Charlotte, February 28, 1997.

“Barricades on the Roads,” *Civil Engineering*, Volume 67, Number 4, April 1997, pp 64-65.

“The Effects of Construction Joints in Mass Concrete,” *Proceedings of the Fourth ASCE Materials Engineering Conference*, Washington D. C., November 10-14, 1996, Volume 1, pp 193-202.

“On the Constraints Facing Foreign Investors in the Build-Operate-and-Transfer Market of Developing Economies,” *Proceedings of 1996 CIB Beijing Conference on Construction Modernization and Education*, October 21-24, 1996, Beijing, China, China Architecture and Building Press.

“Thermal Cracking in the Diaphragm-Wall Concrete of Kawasaki Island,” *Proceedings of the International RILEM Symposium*, Munich, Germany, October 1994, pp 393-400.

“International Trends in Bridge Design,” (co-authored with Kwok T. Lam & Thomas R. Lammers, chapter in *Infrastructure for China*, Robart Technical Service, Liverpool, UK, 1994.

“Instrumenting a Man-Made Island Project,” *Proceedings of ARECDAO 93*, Barcelona, Spain, 1993.

“The E&M Tendering Strategy of TRTS Project,” *Proceedings of Third Canada - Republic of China Business Association Meeting*, Edmonton, Canada, April 10-13, 1989.

“Impact of the 1986 Tax Reform Act on Accounting Methods for Construction Companies,” MBA Thesis, University of California, Berkeley, May 1987.

“Evaluation of Clearance Requirements for Bulk Commodities,” *Topic Report*, Bechtel Power Corporation, San Francisco, California, 1984.

“Simple Procedure for Estimating Weight of Concrete Foundations for Low-Speed Vibrating Machines,” *Design Guide*, Pacific Engineers and Constructors, Ltd., 1983.

“Frequency-Domain Redigitization Method for Seismic Time Histories,” *Earthquake Engineering & Structural Dynamics*, Vol. 10, No. 3/May-June 1982, pp 511-515.

“Seismic Soil-Structure Interaction Analysis Considering Basemat Uplift,”
Theoretical Manual, Bechtel Power Corporation, San Francisco, California, February, 1981.

“Simplified Methods for Predicting Seismic Basemat Uplift of Nuclear Plant Structures,” (co-authored with W. S. Tseng), *Proceedings of Sixth International Conference on Structural Mechanics in Reactor Technology, 1981.*

“Seismic Soil-Structure Interaction Analysis Considering Basemat Uplift: Thoretical Manual For Computer Program CE 444 (UPLIFT),” *Topic Report, Bechtel Power Corporation, San Francisco, California, February 20, 1981.*

“Mathematical Modeling of Piled Foundations,” (co-authored with Prof. J. Penzien), Institute of Civil Engineers, *Numerical Methods of Offshore Piling, ICE, London, 1980, pp 69-74.*

“Investigation on High Frequency Spectral Peaks Associated with the Pilgrim II Seismic Response Time Histories,” *Topic Report, Bechtel Power Corporation, San Francisco, California, June 1980.*

“Limerick RPV Model Sensitivity Study,” *Topic Report, Bechtel Power Corporation, San Francisco, California, July 1979.*

“Seismic Analysis of Offshore Structures Supported on Pile Foundation,” Ph.D. Dissertation, University of California, Berkeley, 1978.

“Seismic Analysis of Offshore Structures Supported on Pile Foundation,” (co-authored with Prof. J. Penzien), University of California, Berkeley, 1977, *EERC Report 77-25.*

“Nonlinear Analysis of Axisymmetric Reinforced Concrete Structures,” *Graduate Student Report, Structural Engineering and Structural Mechanics, University of California, Berkeley, California, 1972.*

Research Proposals and White Papers

“Re-engineering Masonry-Block Basement for Moisture-Related Problems,” (PI: Donald Liou, Co-PI: Bruce G. Gehrig), submitted to AGC Education and Research Foundation, October 2003.

“Thermally Optimized Concrete for Building Structures,” (PI: Carlos E. Orozco and Co-PI: Donald D. Liou), submitted to the National Science Foundation on December 2003.

“The Generative Urban Dwelling,” (PI: Dale Brentrup & Donald Liou, Co-PI: Douglas Ramers, Charles Mobley, Randy Swanson, Michael Swisher, Richard Preiss, Paul Clark) an architecture/engineering intercollegiate proposal submitted to Solar Decathlon Competition Program, National Renewable Energy Laboratory (NREL), Department of Energy, August 2001.

“Proposal to Ensure Energy Efficiency of One Future Campus Building,” a white paper submitted to Robert Johnson, Dean of College of Engineering, UNC Charlotte, April 2001.

“Spectral and Non-spectral Characterization of Near-Field Earthquake Records,” (Co-PI: Mehmet Celebi, Barry Sherlock, and Janos Gergely), an international cooperative research proposal to NSF, INT-0098447, September 27, 2000.

“Comparison of Spectral Versus Non-spectral Characterization of Earthquakes in Taiwan and Turkey,” (Co-PI: Mehmet Celebi, Barry Sherlock, and Janos Gergely), an international cooperative research proposal to NSF, CMS- 0085181, April 4, 2000.

“Design of a Beam Furnace to be used in the Fire Safety Program,” (Co-PI: Charles Mobley), a multidisciplinary design project proposal to SUCCEED and the Creative Projects Laboratory, May 7, 1999.

“Evaluation of Sub-Sea Physical Environmental Data for The Beaufort Sea,” a white paper to: Minerals Management Service, Department of the Interior, (Co-PI: Barry Sherlock, Irvin Jones, Falid Ahmad, and Randall Forsythe), April 26, 1999.

“R&D Activities for Through the Wall Imaging Systems,” a white paper to Directorate of Contracting, Department of the Army, (Co-PI: Barry Sherlock, Irvin Jones, and Falid Ahmad), February 28, 1999.

“Development of a Module of Computer-Aided Design Tool for Teaching,” a subcontract proposal to Northeastern University, included in Using CAD Analysis Tools to Teach Engineering Fundamentals, a proposal to the National Science Foundation, Ref. 9872441 (PI: Dr. William Cole), March 31, 1998.

“Pavement Heating System,” a white paper to Westinghouse River Company, Aiken, South Carolina, December 17, 1997.

“Laboratory Study on the Use of Tire Crumb in Backfill and Reinforced Soil Applications,” a white paper to Continental Tire Company, Germany, July 9, 1997.

“Study on the Time-Dependent Behavior of Buried Thermoplastic Pipe,” a proposal to the National Science Foundation, Ref. CMS-9713580, April 1997.

Funded Research and Education Activities

SOLAR DECATHLON 2001-2002: The Generative Urban Dwelling, (PI: Dale Brentrup & Donald Liou, Co-PI: Douglas Rammers, Charles Mobley, Randy Swanson, Michael Swisher, Richard Preiss, Paul Clark) an architecture/engineering intercollegiate competition, National Renewable Energy Laboratory (NREL), Department of Energy, awarded August 31, 2001.

UNC Charlotte Faculty Research Grant for study of “A Feasibility Study on Using Aluminum in Soft-Ground Traffic Tunnels,” 1996.

Graduate Program & Competition Advising

Member of the Master Degree Advising Committee for David Cranford, Civil Engineering, testing of geogrid, academic advisor: Alan Stadler, defense date: June 16, 2000.

Appendix C:
Supporting Letters



Consultation on Library Holdings

To: John Hildreth
From: Alison Bradley
Date: April 23, 2008
Subject: Master of Science in Construction and Facilities Management

Summary of Librarian's Evaluation of Holdings:

Evaluator: Alison Bradley **Date:** April 23, 2008

Check One:

- 1. Holdings are superior _____
- 2. Holdings are adequate x
- 3. Holdings are adequate only if Dept. purchases additional items. _____
- 4. Holdings are inadequate _____

Comments:

Current library holdings should be sufficient to support the proposed MS in Construction and Facilities Management. A search of the catalog shows that we currently own 3817 relevant items, with 3412 books and government documents, 44 periodical subscriptions, and 454 electronic resources (these numbers include some duplication). A summary of these holdings with the Library of Congress Subject Headings and keywords used to search is attached.

Additional research interests may be supported through the library's interlibrary loan services as well.

With anticipated ongoing purchases in this and related fields of study, library support for this degree should be sufficient to support research at the Master's level.

Alison Bradley

Evaluator's Signature

April 23, 2008

Date

Revised 4/23/2008
OAA jdp

Library Holdings Evaluation for Master of Science in Construction and Facilities Management

Prepared by Alison Bradley, April 23 2008

LC Subject Heading	Total			Electronic Resources
	Entries	Monographs	Periodicals	
Mechanics Applied	193	138	17	38
Building Laws	142	168	0	4
Earthwork	57	50	0	8
Engineering Econom*	74	70	0	6
Physical Geology	28	26	0	0
Project Management	437	376	0	65
Production Scheduling	71	61	0	2
Roads Design And Construction	275	271	0	10
Soils Testing	66	65	0	1
Structural Analysis Engineering	288	266	2	24
Structural Design	182	173	3	12
Structural Engineering	135	107	10	11
Keyword				
Construction Management	777	722	6	78
Building Code*	391	402	1	14
Construction Material*	701	517	5	181
Totals	3817	3412	44	454

Some duplication of entries may occur



STV/Ralph Whitehead Associates

1000 West Morehead Street, Suite 200
Charlotte, North Carolina 28208
(704)372-1885 fax:(704)372-3393

April 23, 2008

Anthony L. Brizendine, PhD, PE
Chair & Professor, Department of Engineering Technology
University of North Carolina at Charlotte
9201 University City Blvd
Charlotte, NC 28223-0001

**SUBJECT: MASTERS of SCIENCE
IN CONSTRUCTION & FACILITIES MANAGEMENT**

Dear Dr. Brizendine:

As Chairman of the Civil & Construction Board of Industry Advisors for the Department of Engineering Technology, I am writing this letter of support for the proposed Masters of Science in Construction & Facilities Management program at UNC Charlotte. The Engineering Technology Department has taken the Advisory's Board input seriously and has addressed the needs of the construction industry in and around Charlotte in developing this proposed program. The Board is pleased that this initiative is moving forward.

The proposed program will benefit greatly from the existing BSET program in Construction Management. Courses, laboratories and facilities currently utilized in the Civil ET program can be shared and provide an excellent base for the proposed Masters of Science in Construction & Facilities Management program. Additionally, the existing Civil ET faculty provides a strong core from which to build the program; they are an outstanding group with excellent credentials and significant construction and project management experience. The practical experience of the existing faculty, overall strength of the engineering technology programs, and philosophy of applied engineering in the Department provides the ideal formula for success of the proposed construction management program.

The construction industries of Charlotte and the surrounding areas have needed this program for some time, and we look forward with anticipation to the initiation of the program.

Sincerely yours,

Jeffrey L. Gagné, PE, DBIA
Chairman - UNC Charlotte Civil & Construction Technology Advisory Board
Vice President - STV/Ralph Whitehead Associates, Inc.



RT Dooley

4024 Barringer Drive
Charlotte, NC 28217
(704) 679-9287
(704) 527-6682 (Facsimile)

April 23, 2008

Mr. Anthony L. Brizendine, PHD, PE

Chair & Professor, Department of Engineering Technology
University of North Carolina at Charlotte
9201 University City Blvd.
Charlotte, NC 28223-001

Dear Dr. Brizendine:

On behalf of RT Dooley Construction Company, I offer an endorsement for the proposed Master of Science in Construction and Facilities Management (MSCFM) at UNCC.

We are proud of our partnership with UNCC, which provides opportunities for undergraduates to experience practical field and office experience during summer and after school hours. These internships provide an environment for the students to apply what they are learning in their studies to real world situations and more adequately prepares them for employment after graduating.

The curriculum suggested for the MSCFM program will provide for studies in specific areas which will open even greater opportunities for students choosing to participate.

Building Information Modeling, Building Energy Management studies and other courses suggested in the curricula will provide MSCFM graduates with valuable education that will enable them to compete at higher levels within our industry. Green building requirements (LEED), the ever growing complexity of Building Management Systems and many other technological advancements in our industry have increased dramatically in the past few years, making the MSCFM program not only appropriate, but quite timely.

We offer our best wishes for the program, and our continued support of your endeavors.

Sincerely,

RT DOOLEY CONSTRUCTION COMPANY

Tim Garrison
President

THE WHITING-TURNER CONTRACTING COMPANY

(INCORPORATED)

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April 24, 2008

Dr. Anthony L. Brizendine
Chair and Professor
Engineering Technology/Construction Management
UNC Charlotte
9201 University City Blvd.
Charlotte, NC 28223-0001

Re: Master of Science in Construction & Facilities Management

Dear Dr. Brizendine,

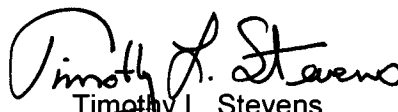
I write this letter in support of your proposal to implement a Master of Science in Construction & Facilities Management program.

As Vice President of Whiting-Turner Contracting Company, I am very cognizant of the need for qualified graduates in these disciplines. As a member of your Construction Management Advisory Board and having presented to your Construction Professional Development Seminar during each of the past two years at UNC Charlotte, I am also extremely aware of the quality programming in your BS Construction Management program. Extension of this program to the MS in Construction & Facilities Management is a logical step to produce advanced technical workers for the North Carolina construction and business communities.

I look forward to continuing the working relationship between Whiting Turner Contracting Company and your Department to establish this program and provide internship and career opportunities for graduates of the program.

Very truly yours,

THE WHITING-TURNER CONTRACTING COMPANY


Timothy L. Stevens
Vice President



April 23, 2008

Anthony L. Brizendine, PhD, PE
Chair & Professor, Department of Engineering Technology
University of North Carolina at Charlotte
9201 University City Blvd.
Charlotte, NC 28223-0001

Dear Dr. Brizendine:

As a member of the Civil Engineering Technology and Construction Management Industry Advisory Board representing AREVA NP, it is my pleasure to provide this letter of support for the proposed Master of Science program in Construction & Facilities Management at the University of North Carolina, Charlotte (UNCC). AREVA NP has been a strong supporter of the Engineering Technology program for many years and has benefited from the employment UNCC graduate engineers in our nuclear engineering, services, and construction operations.

The need for such a program is quite apparent, not only for AREVA, but other engineering and construction companies in this area. Charlotte has become the hub for engineering and construction companies poised to deploy the next generation of nuclear power generation plants in the United States. The proposed program will provide the type of construction leadership necessary to build these plants, and facilities manager's necessary to maintain them once in operation.

AREVA NP thanks you for your progressive planning to prepare future construction professionals for North Carolina and our nation.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Michael K. Phillips', written over a horizontal line.

Michael K. Phillips
Manager, Construction Management
AREVA NP, Inc.



Turner Construction Company
5955 Carnegie Blvd., Suite 300
Charlotte, NC 28209
704.554.1001
704.554.1035

April 21, 2008

Anthony L. Brizendine, PhD, PE
Chair & Professor, Department of Engineering Technology
University of North Carolina at Charlotte
9201 University City Blvd
Charlotte, NC 28223-0001

Re: Master of Science in Construction and Facilities Management

Dear Mr. Brizendine,

Thank you for the opportunity to review your proposal to implement a Master of Science in Construction and Facilities Management. I can say with confidence that this is a worthy program to be offered at the University of North Carolina at Charlotte.

The education I received as a graduate of the Master of Civil Engineering / Construction Management Program from the New Jersey Institute of Technology has helped progress my career in a direction that I do not believe would have been available to me had I not pursued the degree. As a result, I believe that implementation of the proposed program at the University of North Carolina at Charlotte would be beneficial not only to the individual students but to the industry as a whole. I am confident that graduates of this program would enter the industry with a professional advantage not possessed by other job candidates.

Currently, the Carolinas Business Unit of Turner Construction Company employs six University of North Carolina at Charlotte graduates. It is our hope to continue to grow our business unit with the hiring of graduates of the Master of Construction and Facilities Management Program. In addition, Turner would like to offer our continued support with guest speakers

I applaud your efforts to implement this program and look forward to supporting the program in any way that I can.

Sincerely,

Edward Maher
Project Manager, LEED AP
Turner Construction Company
Carolinas Region



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WWW.PROVIDENCEDAY.ORG

April 18, 2008

Anthony L. Brizendine, PhD, PE
Chair & Professor, Department of Engineering Technology
University of North Carolina at Charlotte
9201 University City Blvd
Charlotte, NC 28223-0001

Re: Need for Facilities Management Graduates

Dr. Brizendine,

As a facilities management professional with more than 25 years of experience in construction and facilities engineering, I am keenly aware of the need for qualified graduates having specialized knowledge in these fields.

Over the past several months I have been reviewing resumes of individuals who have applied for the position of Assistant Director of Facilities at Providence Day School. I have been disappointed in the qualifications of these applicants. Most of the applicants fall into two broad categories; those with backgrounds as mechanical or construction technicians but lacking academic credentials, and those with college degrees but lacking specific facilities management experience.

I would be very interested in having a graduate-level program in Charlotte that would provide the necessary training and focus to produce qualified facilities management personnel. I am convinced that there is a very real and pressing need for these graduates, and I applaud your efforts to bring such a program to UNCC.

Please contact me if you have any graduates that you believe may fit our needs.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas F. Beggs".

Thomas F. Beggs, P.E.
Director of Facilities
Providence Day School

April 23, 2008

Dr. Anthony L. Brizendine, PhD, PE
Chair & Professor, Department of Engineering Technology
University of North Carolina at Charlotte
9201 University City Blvd.
Charlotte, NC 28223-0001

Subject: **Master of Science in Construction & Facilities Management Proposal
Request to Establish MS Program for acceptance of Engineering Technology
Department of Engineering Technology
University of North Carolina at Charlotte**

Dear Dr. Brizendine:

This letter is being issued to your attention for submittal to the UNC System General Administration showing my support for the subject MS program in the Department of Engineering Technology at UNC-Charlotte. There is such a need for this type program in the Department of Engineering Technology at UNC-Charlotte that will produce graduates who will contribute to the North Carolina construction and facilities management industries. Having worked first hand, and trained, in the Cost Engineering Division of Project Time & Cost, Inc., I have seen first hand the need for Engineering Technology Graduates to further their education beyond the bachelor level to meet our client and industry needs. The availability of the subject MS program in the Department of Engineering Technology at UNC-Charlotte will support this effort.

I graduated in 1980 from UNC-Charlotte in the Department of Engineering Technology with a Bachelor of Engineering Technology Degree of Civil Engineering.

Sincerely,

Gary B. Bradley, PE, CIT
Senior Forensic Consultant

Dr. Anthony L. Brizendine, PhD, PE
Construction Management & Engineering Technology
University of North Carolina at Charlotte
9201 University City Boulevard
Charlotte, NC 28223

July 30, 2009

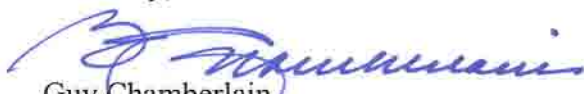
Dear Dr. Brizendine,

I am pleased to provide a letter of support from Charlotte Mecklenburg Schools to the University of North Carolina at Charlotte for your proposal to establish a Master of Construction and Facilities Management program.

This program will be one of only a few true graduate level facility management programs in the country, and allow UNC Charlotte to supply a well educated facilities workforce that does not readily exist in North Carolina. A unique aspect of the MS Construction & Facilities Management program is the Construction & Facilities Management (MSCFM) Fellows Program which will provide graduate students in the MS Construction & Facilities Management program to perform project-based campus work within the Capital Projects, Design Services, Maintenance & Operations, and Planning Divisions of the Facilities Management Group at UNC Charlotte.

Of particular interest to Charlotte Mecklenburg Schools is the potential for the MSCFM Fellows Program to be extended to serve other community organizations such as CMS, local community colleges, and other state agencies and charitable organizations in the Charlotte region.

Sincerely,



Guy Chamberlain
Associate Superintendent for Auxiliary Services



June 12, 2009

Dr. Anthony L. Brizendine, PhD, PE
Professor & Chairman
Engineering Technology & Construction Management

Facilities Management
Associate Vice Chancellor: 704/687-2181
Capital Projects: 704/687-6280
Design Services: 704/687-2605
Facilities Business Office: 704/687-3952
Housekeeping and Recycling: 704/687-3099
Maintenance & Operations: 704/687-2150
Planning: 704/687-6438
Fax: 704/687-3171

Dear Dr. Brizendine,

Facilities Management at the University of North Carolina at Charlotte is pleased to endorse the proposal to establish the MS in Construction & Facilities Management degree program. Through our Facilities Management Department, we agree to partner with the academic program to establish the Construction & Facilities Management (CFM) Fellows Program. This is a unique aspect of the proposed program which will assist the University in meeting green construction and energy efficiency goals within the business unit of UNC Charlotte. Incorporation of the Construction & Facilities Management (CFM) Fellows Program will provide the framework for graduate students in the program to compete for and earn CFM Fellows appointments. Initially, we anticipate three appointments within the UNC Charlotte Facilities Management Department. As the program grows, additional appointments will be made.

Fellows will perform project-based campus work within the Capital Projects, Design Services, Maintenance & Operations, and Planning Sections of the Facilities Management Department at UNC Charlotte. Projects will leverage services and organizational efficiency for the institution while allowing the Fellows to complete degree requirements. CFM Fellows will typically possess a BS in Construction Management, Bachelor of Architecture, or BS in Engineering so they will possess excellent education and experience which they can bring to bear in their appointments.

I believe this program will provide excellent opportunities for your future students while also allowing them to make significant, positive contributions in construction management and facilities management to the state of North Carolina.

Sincerely yours,

Philip M. Jones, P.E.
Associate Vice Chancellor Facilities Management