



# UNC CHARLOTTE

The University of North Carolina at Charlotte  
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Office of the Chancellor  
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May 19, 2006

Dr. Alan Mabe  
Interim Senior Vice President for Academic Affairs  
and Vice President for Academic Planning  
Office of the President  
University of North Carolina  
Post Office Box 2688  
Chapel Hill, North Carolina 27515-2688

Dear Dr. Mabe:

Enclosed are three requests for authorization to establish new degree programs at UNC Charlotte. These programs are a B.A. in Art History, a B.S. in Construction Management, and an MBA in Sports Marketing and Sports Management.

The proposed bachelor's degrees fall within CIP codes for which UNC Charlotte does not already have programs, so requests are presented using the template of Appendix C to Policy 400.1.1. The proposed MBA program is a new degree program, but it falls within the CIP for our existing MBA. Thus, it is presented using the template of Appendix D.

Thank you for your consideration of these requests. Provost Joan Lorden or I would be pleased to respond to any questions that you may have regarding these requests.

Cordially,

Philip L. Dubois  
Chancellor

Enclosure (5 copies of baccalaureate proposals; 1 copy of MBA proposal)

cc: Provost Joan F. Lorden  
Dr. Nancy Gutierrez  
Dr. Robert E. Johnson  
Dr. Claude Lilly

**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 28, 2005

**Constituent Institution:** The University of North Carolina at Charlotte

CIP Discipline Specialty Title: Engineering Related Technology, Other

CIP Discipline Specialty Number: 15.9999 Level: B  M  1<sup>st</sup> Prof  D

Exact Title of Proposed Program: Bachelor of Science in Construction Management

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

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 2006

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.

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## **Executive Summary**

UNC Charlotte is uniquely positioned from geographic, demographic, and business perspectives to deliver a Construction Management program. The institution provides educational opportunities to residents of the largest metropolitan area in North Carolina. Charlotte is home to one of the most robust construction climates in North America. Furthermore, the Charlotte region is one of the largest metropolitan areas in the United States that does not currently have a construction science or construction management program.

The Department of Engineering Technology at UNC Charlotte proposes to establish a Bachelor of Science program in Construction Management. UNC Charlotte's Department of Engineering Technology has provided quality technical education for over 35 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, producing much needed graduates for the Charlotte construction industry. The proposed program is designed to provide the construction education necessary for entry into the construction industry (residential, commercial, industrial sectors, infrastructure, and heavy horizontal construction) and related careers such as real estate and land development, infrastructure development, code enforcement, and insurance. Construction professionals work with owners, engineers, architects, specialty and sub-contractors, government agencies, and others throughout the construction process to achieve timely completion of projects. This program will provide ready access to construction education and careers for the citizens of the Greater Charlotte region and beyond. It is anticipated that the program will house some 250 to 300 students within the initial four to six years of operation. Longer term, this program could see enrollments of 300 to 600 students at steady state.

The proposed Construction Management curriculum, which is designed to meet ACCE accreditation requirements, provides for a robust general education experience with a foundation of mathematics and sciences at the level of college algebra and trigonometry. Additionally, the program provides for a business core to include Accounting, Economics, Management, Statistics, and Business Law. The technical core of the curriculum follows the ACCE accreditation requirements and provides experiences in Construction Materials & Methods, Construction Surveying, Construction Drawings, Cost Estimating, Structures, Soils and Foundations, Building Systems, Project Scheduling & Control, Construction Contract Documents, Construction Practices, Highway Design and Construction, and Construction Project Administration. The technical core will utilize state-of-the-practice software applications such as AutoCad, Land Development, Primavera P3 and SureTrak, and Timberline Estimating.

The proposed program will share a common lower division (freshman and sophomore year) curriculum with the existing Civil Engineering Technology (CIET or Civil ET) Program, thus maximizing resources and providing students with a two-year window for exploration to determine which degree, the BSET in Civil Engineering Technology or B.S. in Construction Management, is their desired academic objective. In addition to the existing lower division courses, several of the required upper division construction classes are already taught within the Civil ET program. The existing Civil ET program is TAC of ABET accredited, serving this technical constituency within the region. The proposed Construction Management program will seek accreditation from the American Council for Construction Education (ACCE), thus providing program options accredited by the two

agencies which are authorized to accredit construction-related programs, ABET and ACCE. Students seeking to pursue the technical design path will study the existing TAC of ABET accredited Civil ET program after the sophomore year; students seeking a career in management will pursue the CM program (ACCE accredited) after the sophomore year. It should also be noted that this program will accept +2 transfers with an associate degree (AAS) in civil, construction, architecture, or surveying from community colleges across the Carolinas, the southeast and mid-Atlantic states.

According to the US Department of Labor's Bureau of Labor Statistics' (BLS) Occupational Outlook Handbook (OOH) 2002-03 Edition, *"Construction managers held about 308,000 jobs in 2000. Around 75,000 were self-employed. About 59 percent of construction managers were employed in the construction industry, about 24 percent by specialty trade contractors—for example, plumbing, heating and air-conditioning, and electrical contractors—and about 28 percent by general building contractors. Engineering, architectural, and construction management services firms, as well as local governments, educational institutions, and real estate developers employed others."*

The 2006-07 Edition of the OOH reported that *"Construction managers held 431,000 jobs in 2004. Over half were self-employed, many as owners of general or specialty trade construction firms. Most of the rest were employed in the construction industry, 13 percent by specialty trade contractors—for example, plumbing, heating and air-conditioning and electrical contractors—and 18 percent by general building contractors. Others were employed by architectural, engineering, and related services firms and by local governments."*

These two reports by the OOH point to an increase of 123,000 construction management jobs from 2000 to 2004. Projections for future increases are equally strong.

Data from the November 2004 National Occupational Employment and Wage Estimates provide estimates of numbers employed as Construction Managers and salary data. Nationally, mean annual wages of \$80,070 and median earnings of \$70,770 were reported in November 2004. The highest 25 percent earned more than \$93,540 while the top 10 percent earned more than \$131,260. According to a 2001 salary survey by the National Association of Colleges and Employers, candidates entering the construction industry with a bachelor's degree in construction management received job offers averaging \$40,740 a year. Analogous data from the November 2004 Metropolitan Area Occupational Employment and Wage Estimates for the metropolitan area of Charlotte-Gastonia-Rock Hill, NC-SC provided mean earnings of \$79,090 for construction managers.

*"Excellent employment opportunities for construction managers are expected through 2014 because the number of job openings will exceed the number of qualified individuals seeking to enter the occupation. This situation is expected to continue even as college construction management programs expand to meet the current high demand for graduates"* according to the 2006-07 Edition of the Occupational Outlook Handbook.. Currently, the national economic recovery is based to a large degree on the vast amount of infrastructure development and rehabilitation across the nation. This work will continue as much of our infrastructure has exceeded its design capacity or design life. Even before the devastating 2005 hurricane season, employment of construction managers was expected to grow by 14% nationally. North Carolina is expected to see a growth of 21% by 2010 according to state department of labor statistics. In addition, the 2005 hurricane season was unprecedented, devastating much of the gulf region. Estimates of losses due to 2005 hurricanes reach into the hundreds of billions in the United States. Rebuilding will take years to complete. Data from the U.S. Census Bureau of the Department of Commerce indicates that construction spending during October 2005 was estimated at a seasonally adjusted annual rate of \$1,131.7 billion, which is

7.9 percent above the October 2004 estimate of \$1,048.5 billion. The infrastructure and building needs of the Charlotte metropolitan area, coupled with the large construction industry located here, provide unique opportunities for a Construction Management program, including outreach and collaboration with the Charlotte construction community.

Graduates of the proposed construction management program will also find employment in related areas, such as cost estimating, construction and building inspection, real estate development, and insurance and property-casualty adjustment. Prospects for some of those related areas are also provided below from the 2006-07 OOH:

*Overall employment of cost estimators is expected to grow faster than average for all occupations through the year 2014. In addition to openings created by growth, some job openings will arise from the need to replace workers who transfer to other occupations or leave the labor force. In construction and manufacturing—the primary employers of cost estimators—job prospects should be best for those with industry work experience and a bachelor’s degree in a related field.*

*Employment growth in the construction industry, in which most cost estimators are employed, will account for most new jobs in this occupation. Construction and repair of highways, streets, and bridges, as well as construction of more subway systems, airports, water and sewage systems, and electric power plants and transmission lines, will stimulate demand for many more cost estimators. Similarly, increasing population and changing demographics will boost demand for residential construction and remodeling and school construction and repair, spurring demand for more cost estimators. As the population ages, the demand for nursing and extended-care facilities will increase.*

*Employment of construction and building inspectors is expected to grow faster than average for most occupations through 2014. Concern for public safety and a desire for improvement in the quality of construction should continue to stimulate demand for construction and building inspectors in government as well as in firms specializing in architectural, engineering, and related services.*

In addition to the 431,000 jobs held by construction managers in 2004, many other fields identified in the 2006-07 OOH are also staffed by construction management graduates:

*Cost estimators held about 198,000 jobs in 2004... Construction and building inspectors held about 94,000 jobs in 2004... Adjusters, appraisers, examiners, and investigators held about 263,000 jobs in 2004... Insurance underwriters held about 101,000 jobs in 2004.*

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

## I. DESCRIPTION OF THE PROGRAM

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

The proposed program is designed to provide the construction education necessary for entry into the construction industry (residential, commercial, industrial sectors, infrastructure, and heavy horizontal construction) and related careers such as real estate and land development, infrastructure development, code enforcement, and insurance. Construction professionals work with owners, engineers, architects, specialty and sub-contractors, government agencies, and others throughout the construction process to achieve timely completion of projects. This program will provide ready access to construction education and careers for the citizens of the Greater Charlotte region and beyond. The following excerpt from the BLS Occupational Outlook Handbook 2006-07 Edition describes the activities of the construction manager:

*“Construction managers plan, direct, and coordinate a wide variety of construction projects, including the building of all types of residential, commercial, and industrial structures, roads, bridges, wastewater treatment plants, and schools and hospitals. Construction managers may oversee an entire project or just part of a project... they typically schedule and coordinate all design and construction processes, including the selection, hiring, and oversight of specialty trade contractors.*

*Construction managers are salaried or self-employed managers who oversee construction supervisors and workers. They often go by the job titles program manager, constructor, construction superintendent, project engineer, project manager, construction supervisor, general contractor, or similar designations. Construction managers may be owners or salaried employees of a construction management or contracting firm, or may work under contract or as a salaried employee of the property owner, developer, or contracting firm overseeing the construction project.”*

The design of the curriculum comprising the proposed B.S. in Construction Management addresses the activities and essential skills necessary to perform the functions outlined in the description above. The curriculum, which is designed to meet ACCE accreditation requirements, provides for a robust general education experience with a foundation of mathematics and sciences at the level of college algebra and trigonometry. Additionally, the program provides for a business core to include Accounting, Economics, Management, Statistics, and Construction Law. The technical core of the curriculum follows the ACCE accreditation requirements and provides experiences in Construction Materials & Methods, Construction Surveying, Construction Drawings, Cost Estimating, Structures, Soils and Foundations, Building Systems, Project Scheduling & Control, Construction Contract Documents, Construction Practices, and Construction Project Administration. The technical core will utilize state-of-the-practice tools and software applications such as AutoCad, Land Development, Primavera P3 and SureTrak, and Timberline Estimating.

A model curriculum has been developed. It should be noted that the first two years of the proposed curriculum will be exactly the same as the approved lower division curriculum of

the existing BSET Civil Engineering Technology program at UNC Charlotte. This shared curriculum is pedagogically sound and reflects opportunities for enhanced efficiency and effectiveness of the unit. It also allows students a two-year window for exploration to determine which degree, the BSET in Civil ET or B.S. in Construction Management, is their desired academic objective.

## **B. List the education objectives of the program.**

**Program Educational Objectives:** These are statements that describe the expected accomplishments of B.S. in Construction Management 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 Construction Management program alumni will contribute to society as productive technologists/project managers and engaged citizens by:

1. Applying general and discipline-specific concepts and methodologies to identify, analyze, and solve technical problems.
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 Bachelor of Science in Construction Management degree from UNC Charlotte will be able to:

1. Utilize contemporary and discipline specific tools to acquire data, analyze problems, and implement current and emerging technology into the design of a system or process to satisfy defined criteria and achieve desired results.
2. Participate as a contributing member in the development, refinement and presentation of interdisciplinary and collaborative projects.
3. Engage in the pursuit of the knowledge and skills necessary and consistent with, the expectations of a practicing engineering technologist/construction manager.
4. Articulate, through oral and written reports and presentations, the viability of creative, logical and realistic solutions to defined problems and projects.



5. Recognize and respect the value of diversity, as well as the significance of ethical and societal issues, while completing assigned business and technical tasks with professional quality and in a timely manner.
6. Analyze and solve complex problems that involve applications in areas of construction management, while demonstrating knowledge of mathematical and scientific principles and business and management concepts fundamental to construction management and infrastructure development.

**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 will share a common lower division (freshman and sophomore year) curriculum with the existing Civil Engineering Technology Program, thus maximizing resources and providing students with an opportunity to choose a technical or management orientation in the upper division. In addition, several of the required construction classes in the upper division are already taught within the Civil ET program. These courses will be shared in the B.S. in Construction Management program. The Civil ET program is TAC of ABET accredited, serving a more technical constituency within the region. The Construction Management program will seek accreditation from the American Council for Construction Education. This will give UNC Charlotte program options for each of the two agencies which are authorized to accredit construction-oriented programs, ABET and ACCE. Students seeking to pursue the technical path will study the existing TAC of ABET accredited Civil ET program after the sophomore year; students seeking a career in management will pursue the CM program (ACCE accredited) after the sophomore year.

2) Faculty Resources: This program will share faculty resources with the existing Civil Engineering Technology program. Currently, five (5) full-time and two (2) part-time faculty members deliver the Civil ET program. Faculty currently teaching in the CIET program will deliver shared courses common to the proposed Construction Management program. This includes all freshman and sophomore courses and many junior and senior level courses. These programs will efficiently serve the spectrum of civil and construction technology through shared faculty and coursework, thus providing additional synergy and optimizing the use of resources.

3) Facilities: With the move by the Departments of Electrical and Computer Engineering, Mechanical Engineering, and Civil Engineering to new facilities earlier this year, 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 student projects. Existing laboratories and offices in Smith which now support the CIET program will be utilized by both programs (CIET and Construction Management) and are adequate to deliver the programs.

4) Other resources: Other resources such as Engineering Computing and Library resources are available for use by the Construction Management 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 the Civil Engineering Technology program and will be utilized by the Construction Management program. Library resources for the Civil ET program will also be shared by the Construction Management program.

## II. JUSTIFICATION FOR THE PROGRAM

### A. Describe the proposed program as it relates to:

#### 1. The institutional mission and strategic plan

This 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.

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

Work leading to the development of this request was begun in 2002 and contributes to Goals 1, 2, 3, 4, 5 and 6 of the Department's 2005-2010 Strategic Plan as listed below:

**GOAL #1:** Establish the School of Engineering Technology (June 2006)

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

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

#### Primary Initiatives for the Five Year Period

1. **B.S. in Construction Management (Fall 2006)**
2. Separate Electrical ET (Computer & Electronics tracks) into Electrical ET and Computer ET (2006)
3. Multi-Disciplinary B.S. in Facilities & Plant Engineering Technology (2007-2008)
4. Optics/Communications track in Electrical ET (2007)

#### Stretch Initiatives for the Period

5. Industrial Safety track in Fire Safety ET program (2009)
6. M.S. in Construction Management (2009)
7. Master's-level Fire Safety Core Courses (2005-2007)
8. Motorsports emphasis/track in Mechanical ET (2007 – 2009)

9. Plan/Add M.S. in Fire Service Administration (2009/2010)
10. Plan/Add distance education in Mechanical Engineering Technology (2010)
11. 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 School of Engineering Technology

1. Modify/Renovate Smith Building to provide adequate support for current and planned programs (2005-2006)
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

This plan has been reviewed at various stages of development and endorsed by our stakeholders. As noted, Goal 3 of the Department's strategic plan is to add new and/or expand existing programs in specific niche areas of Engineering Technology. Among the alternatives considered as part of this effort, the B.S. in Construction Management is the Department's first priority for new programs.

## **2. Student demand**

It is estimated that initial enrollments at the freshman level would range from 20 to 40 students depending upon timing of approval and subsequent recruiting efforts. With reasonable marketing and brand development, freshman enrollments are expected to increase to 40 to 60 per year within a few years. These estimates are considered conservative given the high demand for construction managers and the popularity of programs across the nation. For instance, the program at East Carolina University is approaching 600 students. The recently approved program at Western Carolina already has enrollments exceeding 225 students. 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 Construction Management program, including outreach and collaboration with the Charlotte construction community. The Department frequently receives inquiries from the Charlotte community desiring a construction management program. Internally, there is interest among the current student body of UNC Charlotte and the College of Engineering (COE) for such a program. The Department's Advisory Committee has endorsed this initiative as needed by the University's constituents.

## **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 5% or 6 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 is estimated at \$3.3 trillion over the next 10 years. Just consider the following 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.

UNC Charlotte holds a unique place from geographic, demographic, and business perspectives for a Construction Management program. The institution provides educational opportunities to residents of the largest metropolitan area in North Carolina. Charlotte is home to one of the most robust construction climates in North America. Furthermore, the Charlotte region is one of the largest metropolitan areas in the United States that does not have a construction science/management program.

UNC Charlotte's Department of Engineering Technology has provided quality technical education for over 35 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, producing much needed graduates for the Charlotte construction industry.

According to the Bureau of Labor Statistics' 2002-03 Edition of the Occupational Outlook Handbook the projected employment prospects for this profession were quite good.

*Construction managers held about 308,000 jobs in 2000. Around 75,000 were self-employed. About 59 percent of construction managers were employed in the construction industry, about 24 percent by specialty trade contractors—for example, plumbing, heating and air-conditioning, and electrical contractors—and about 28 percent by general building contractors. Engineering, architectural, and construction management services firms, as well as local governments, educational institutions, and real estate developers employed others.*

The 2006-07 Edition of the OOH provided the following update:

*Construction managers held 431,000 jobs in 2004. Over half were self-employed, many as owners of general or specialty trade construction firms. Most of the rest were employed in the construction industry, 13 percent by specialty trade contractors—for example, plumbing, heating and air-conditioning and electrical contractors—and 18 percent by general building contractors. Others were employed by architectural, engineering, and related services firms and by local governments.*

Data from the 2001 National Occupational Employment and Wage Estimates provide estimates of numbers employed as Construction Managers and salary data. Mean annual wages of \$66,190 were reported. Analogous data from the 2001 Metropolitan Area Occupational Employment and Wage Estimates for the metropolitan area of Charlotte-Gastonia-Rock Hill, NC-SC provided mean data of \$59,390.

Demand continues to outpace supply of construction professionals, which produces greater competition and higher wages for employees. Nationally, mean annual wages of \$80,070 and median earnings of \$70,770 were reported in November 2004. Analogous data from the November 2004 Metropolitan Area Occupational Employment and Wage Estimates for the metropolitan area of Charlotte-Gastonia-Rock Hill, NC-SC provided mean earnings of \$79,090 for construction managers.

*Earnings of salaried construction managers and self-employed independent construction contractors vary depending upon the size and nature of the construction project, its geographic location, and economic conditions. In addition to typical benefits, many salaried construction managers also receive benefits such as bonuses and use of company motor vehicles. Median annual earnings of construction managers in 2001 were \$61,060. The middle 50 percent earned between \$46,960 and \$80,580. The lowest 10 percent earned less than \$36,730, and the highest 10 percent earned more than \$108,460. By November 2004, those reported earnings had increased dramatically with the highest 25 percent earning more than \$93,540 while the top 10 percent earned more than \$131,260.*

According to a 2001 salary survey by the National Association of Colleges and Employers, candidates entering the construction industry with a bachelor's degree in construction management received job offers averaging \$40,740 a year. Current data indicates that average starting salaries exceed \$46,000 for construction management graduates. The following prospects were reported by the 2006-07 Edition of the OOH:

*Excellent employment opportunities for construction managers are expected through 2014 because the number of job openings will exceed the number of qualified individuals seeking to enter the occupation. This situation is expected to continue even as college construction management programs expand to meet the current high demand for graduates.*

Currently, the national economic recovery is based to a large degree on the vast amount of infrastructure development and rehabilitation across the nation. This work will continue as much of our infrastructure has exceeded its design capacity or design life. As evidence, during the three-month period immediately following the May 2003 and May 2004 graduation, 100% of the graduating seniors in Civil ET found employment. Employment of construction managers is expected to grow by 14% nationally. North Carolina is expected to see a growth of 21% according to state department of labor statistics. Annually, there is an average of 440 construction management job openings in North Carolina and 8,370 openings nationally. The number of job opportunities grows quickly when related openings in government agencies, real estate, insurance and other areas where skill sets in business, construction, management, code enforcement, cost analysis and control, scheduling and supervision are valued.

In addition to job growth, many openings result annually from the need to replace workers who transfer to other occupations or leave the labor force. The increasing complexity of construction projects should boost demand for management-level personnel within the construction industry, as sophisticated technology and the proliferation of laws setting

standards for buildings and construction materials, worker safety, energy efficiency, and environmental protection have further complicated the construction process. Advances in building materials and construction methods; the need to replace much of the nation's infrastructure; and the growing number of multipurpose buildings, electronically operated "smart" buildings, and energy-efficient structures will further add to the demand for more construction managers.

**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 program in Construction Management will certainly strengthen the existing degree programs in Engineering Technology. Academic infrastructure is in place to support laboratory experiences and computing needs of the program. The existing engineering technology programs (BSET) are growing quickly (Fall 2005 enrollments of 548 students) and will benefit from the synergy of the proposed Construction Management program. These programs represent popular and lucrative career opportunities which are technologically-based and appeal to today's college-bound population. All 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**

- Appalachian State University – Bachelor of Science degree in Industrial Technology, Construction (NAIT accredited) - 117 miles (2+ hours) from UNC Charlotte
- East Carolina University – Bachelor of Science in Construction Management (ACCE – accredited) - 240 miles (4+ hours) from UNC Charlotte
- North Carolina A&T – Bachelor of Science in Construction Management & Safety (ACCE – accredited) - 90 miles (1.5 hours) from UNC Charlotte and over 2 hours driving time from uptown Charlotte.
- Western Carolina University – Bachelor of Science in Construction Management (new program – not yet accredited) – 190 miles (3+ hours) from UNC Charlotte

Currently, UNC Charlotte delivers the only TAC of ABET accredited 4-year Civil Engineering Technology program in the State. The Construction Management program proposed herein will share the same lower division curriculum (freshman and sophomore

years) with the Civil Engineering Technology program, thus providing synergy and maximizing efficient utilization of resources.

**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 program differs from existing programs in several ways. First, the proposed program complements the existing BSET in Civil ET program by providing a management-oriented option to those desiring to work in infrastructure development from the construction side of the business. The existing Civil Engineering Technology program at UNC Charlotte is more analysis and design oriented while this proposed program in construction management provides the professional constructor perspective for managing infrastructure and development projects. At the same time, the proposed B.S. in Construction Management program at UNC Charlotte is designed to leverage the existing Civil Engineering Technology program at UNC Charlotte to provide a more robust mathematics, science, analysis and design experience than other construction management programs in the state. In addition, the program at UNC Charlotte will provide an emphasis on heavy horizontal construction and infrastructure development, which is not an area of significant concentration within many construction programs. Ultimately, ABET accreditation may also be sought for this program, which would make the program unique in the United States, as no other program is currently known to hold joint accreditation from both ABET and ACCE.

The Charlotte area is one of the fastest growing in the nation; hence, the need for construction professionals in this area is extraordinary. It is anticipated that this program can reach enrollments of 300 to 600 students when fully mature, and that all program graduates will find employment in the region. The effectiveness of distance education for this scale of student enrollment is dubious at best given the significant demand and interest in construction education. In addition, the local construction industry desires interactions with a site-based program, providing coop and internship opportunities for students around the Greater Charlotte region.

Correspondence from the American Council for Construction Education (ACCE), Carolinas Associated General Contractors (AGC), the Charlotte Chapter of the Professional Construction Estimators Association (PCEA), and the UNC Charlotte Department of Engineering Technology Civil & Construction Advisory Board are

attached to this request. These letters provide the professional community perspective and declaration of need for the program.

**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, B.S. programs**

**(Headcount Enrollment – Upper Division (juniors and seniors) Only**

University	Data	Year				
		<u>2000-2001</u>	<u>2001-2002</u>	<u>2002-2003</u>	<u>2003-2004</u>	<u>2004-2005</u>
Appalachian State University (15.9999, Industrial Technology, Construction)	Fall Enrollment	60	80	96	90	104
	Degrees awarded	24	36	34	41	39
East Carolina University (15.9999, Construction Management)	Fall Enrollment	169	169	231	251	285
	Degrees awarded	96	88	105	103	NA
North Carolina A&T University (15.9999, Construction Management)	Fall Enrollment	29	34	69	78	78
	Degrees awarded	9	11	11	6	15
Western Carolina University (15.1001, Construction Management; New program in 2003)	Fall Enrollment	-	-	-	21	51
	Degrees awarded	-	-	-	-	-
<b><u>Note: Enrollment data provided in this table reflects upper division only (juniors and seniors)</u></b>						

Contact was made with each institution above to gather information on program development and student demand. Total enrollments in all programs are strong with (fall 2005) total undergraduate enrollments of approximately 575 at ECU, 200+ each at ASU and WCU, and approximately 150 at NCA&T. 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, if somewhat conservative. Given the geographic proximity of UNC Charlotte to the Greater Charlotte metro region, its rapidly growing population and robust construction industry, our consultants anticipate that this proposed



program can reach enrollments of 300 to 600 students at steady state within the next decade.

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

	Year 1: 2006-07 (Headcount in Upper Division Only in parenthesis)*	Year 2: 2007-08 (Headcount in Upper Division Only in parenthesis)*	Year 3: 2008-09 (Headcount in Upper Division Only in parenthesis)*	Year 4: 2009-10 (Headcount in Upper Division Only in parenthesis)*
Full-time	40 (15)*	80 (35)*	120 (55)*	160 (90)*
Part-time	10 (10)*	20 (20)*	40 (40)*	60 (60)*
<b>TOTALS</b>	<b>50 (25)*</b>	<b>100 (55)*</b>	<b>160 (95)*</b>	<b>220 (150)*</b>

\*Note: Numbers in parenthesis indicate Upper Division Only.

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

Lower Division	Full-time <u>70+</u>	Part-time <u>0+</u>	Total <u>70+</u>
Upper Division Only	Full-time <u>90+</u>	Part-time <u>60+</u>	Total <u>150+</u>
Upper & Lower Division	Full-time <u>160+</u>	Part-time <u>60+</u>	Total <u>220+</u>

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 construction industry activity place us in a competitive advantage over many of the programs in the study; therefore, it is a conservative approximation to assume that the proposed program can only achieve average size. Students currently designated as CIET or ETGR freshman and sophomores will be able to matriculate to the program upon initiation.

**SCH production (upper division program majors, juniors and seniors only, for baccalaureate programs). 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: 2006-07 Program Category	Student Credit Hours (SCH) (Upper Division Only)		
	UG	Master's	Doctoral
Category I			
Category II			
Category III	<b>640</b>		
Category IV			

<b>Year 2: 2007-08</b>	<b>Student Credit Hours (SCH) (Upper Division Only)</b>		
<b>Program Category</b>	<b>UG</b>	<b>Master's</b>	<b>Doctoral</b>
Category I			
Category II			
Category III	<b>1440</b>		
Category IV			

<b>Year 3: 2008-09</b>	<b>Student Credit Hours (SCH) (Upper Division Only)</b>		
<b>Program Category</b>	<b>UG</b>	<b>Master's</b>	<b>Doctoral</b>
Category I			
Category II			
Category III	<b>2400</b>		
Category IV			

<b>Year 4: 2009-10</b>	<b>Student Credit Hours (SCH) (Upper Division Only)</b>		
<b>Program Category</b>	<b>UG</b>	<b>Master's</b>	<b>Doctoral</b>
Category I			
Category II			
Category III	<b>3840</b>		
Category IV			

Upper Division only student credit hour projections were derived assuming that full-time students will enroll in 32 credits per year and that part-time students will average 15 credits per year. Assumptions for the table above are 20 FTE upper division in fall 2006, 45 FTE in fall 2007, 75 FTE in fall 2008, and 120 FTE thereafter. This assumes initial freshmen class sizes of 20 in the first year and 40 to 60 thereafter. It should also be noted that this program will accept +2 transfers with an AAS in civil, construction, architecture, or surveying from community colleges, so students will also be admitted at the junior year.

The following table is provided as additional information which summarizes FTE enrollment and SCH projections for both the upper and lower divisions.

<b>Program Year</b>	<b>FTE Student Enrollment (Total Projected SCH Generated)</b>		
	<b>Upper Division (Junior/Senior)</b>	<b>(Lower Division) Freshman/Sophomore</b>	<b>Totals</b>
Year 1: 2006-07	20 (640)	20 (640)	40 (1280)
Year 2: 2007-08	45 (1440)	60 (1920)	105 (3360)
Year 3: 2008-09	75 (2400)	100 (3200)	175 (5600)
Year 4: 2009-10	120 (3840)	100 (3200)	220 (7040)

### 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.

Arizona State University	AZ
Auburn University	AL
Clemson University	SC
Colorado State University	CO
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
Wentworth Institute of Technology	MA

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.

None.

#### B. Admission. List the following:

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

Admission requirements are the same as UNC Charlotte admission requirements.

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

There are no documents requirements beyond those for general admission to UNC Charlotte.

#### C. Degree requirements. List the following:

1. Total hours required. Major. Minor.

The proposed program leading to the Bachelor of Science degree in Construction Management is a 128 semester-hour program.

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

Not applicable.

**3. Grades required.**

All candidates must earn an overall 2.0 to graduate. In addition, all candidates must meet the Lee College of Engineering progression requirements (which require a *C* or better in all freshmen classes) and complete all courses (21 credits) in the Construction Business and Management Core with a *C* or better.

**4. Amount of transfer credit accepted.**

The Engineering Technology program at UNC Charlotte will provide three paths to earning the Bachelor of Science in Construction Management degree. Students may enroll in our programs in several ways: 1) as freshmen; 2) as transfers without an AAS in engineering technology; or 3) as upper division transfers after completing a two-year Associate of Applied Science (AAS) degree in a relevant engineering technology curriculum at a community or technical college. Incoming students with an AAS degree in civil, construction, surveying, or architectural engineering technology will generally receive junior class standing, with 64 semester credit hours applied toward the 128 credits required for the Bachelor of Science in Construction Management degree. AAS transfer student admission requires a 2.2 GPA at the community college.

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

None.

**6. Language and/or research requirements.**

None.

**7. Any time limits for completion.**

Not applicable.

**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.**

*ETCE 1121	Construction Methods .....	3
*ENGL 1101	English Composition .....	3
*ETGR 1100	Engineering Technology Computer Applications .....	3
*ETGR 1201	Intro. to Engineering Technology .....	2
*ETGR 1103	Technical Drawing I.....	2
*MATH 1100	College Algebra and Probability .....	3
*ETCE 1211	Surveying I.....	3
*ETCE 1222	Construction Materials .....	3
*ENGL 1102	Writing in the Academic Community .....	3
*ETGR 1104	Technical Drawing II .....	2
*MATH 1103	Precalculus Math for Science & Eng.....	3
*ETCE 2112	Construction Surveying & Layout .....	3
*ETGR 2101	Applied Mechanics I .....	3
*GEOL 1200	Physical Geology or CHEM 1111 or 1251.....	3
*MATH 1121	Calculus (ET) .....	3
*PHYS 1101	Introductory Physics I .....	3

*PHYS 1101L	Introductory Physics I Laboratory.....	1	
*ETCE 2241	Intro. Environmental Eng. Technology .....	3	
*ETGR 2102	Applied Mechanics II.....	3	
*PHYS 1102	Introductory Physics II.....	3	
*PHYS 1102L	Introductory Physics II Laboratory .....	1	
*STAT 1220	Elements of Statistics I.....	3	
*ECON 2101	Principles of Economics-Macro .....	3	General Education
*ETGR 3071	Engineering Technology Professional Seminar.(W) .....	1	
*ETCE 3123	Cost Estimating .....	3	renumbered ETCE 3281
*ETCE 3131	Foundations & Earthwork .....	3	renumbered ETCE 3121
*ETCE 3131L	Soil Testing Laboratory (W) .....	1	renumbered ETCE 3151
*ETCE 3163	Structural Analysis & Design I .....	3	renumbered ETCE 3111
*ACCT 2121	Principles of Accounting I.....	3	
*ETCE 3271	Building Systems .....	3	renumbered ETCE 3293
*ETGR 3222	Engineering Economics .....	3	
*ACCT 2122	Principles of Accounting II .....	3	
*BLAW 3150	Business Law I.....	3	
*CMET 4126	Project Scheduling and Control.....	3	renumbered ETCE 3243
*CMET 4126L	Construction Practices Laboratory (W).....	1	renumbered ETCE 3253
*ETCE 4251	Highway Design & Construction .....	3	renumbered ETCE 3293
*MGMT 3140	Management and Organizational Behavior .....	3	
*LBST 110X	The Arts and Society.....	3	General Education
*LBST 2101	Western Cultural and Historical Awareness.....	3	General Education
*LBST 2102	Global and Intercultural Connections.....	3	General Education
*LBST 221X	Ethical Issues/Cultural Critique.....	3	General Education
*Core Elective	Approved by program faculty advisors .....	3	Chosen from existing courses

**New:**

*CMET 1680	Professional Development I.....	1
*CMET 2680	Professional Development II.....	1
*ETCE 3163L	Structures & Materials Laboratory (W).....	1
*ETCE 3271L	Building Systems Laboratory (W).....	1
*CMET 3224	Construction Project Administration.....	3
*CMET 3680	Professional Development III.....	1
CMET 4073	Special Topics – Construction Management .....	1-4
*CMET 4125	Construction Codes and Documents .....	2
*CMET 4127	Construction Law and Regulatory Issues .....	3
*CMET 4228	Construction Office Operations .....	2
*CMET 4272	Construction Capstone Project (W,O).....	2
*CMET 4680	Professional Development IV .....	1

**NEW COURSE DESCRIPTIONS**

**CMET 1680. Professional Development I. (1)** Prerequisite: Open to freshman level Civil Engineering Technology and Construction Management majors. Seminar discussing professional development issues relating to the civil engineering technology and construction management professions. One hour per week. *(Pass/No Credit grading)*

**CMET 2680. Professional Development II. (1)** Prerequisite: Open to sophomore level Civil Engineering Technology and Construction Management majors. Seminar discussing professional development issues relating to the civil engineering technology and construction management professions. One hour per week. *(Pass/No Credit grading)*

**ETCE 3163L. Structures & Materials Laboratory. (1) (W)** Prerequisite or Corequisite: ETCE 3161. Laboratory exercises demonstrating basic theory and practical applications of structures and materials in construction. Three laboratory hours per week.

**ETCE 3271L. Building Systems Laboratory. (1) (W)** Prerequisite or Corequisite: ETCE 3271. Laboratory exercises demonstrating the basic theory and practical application of heating, ventilation, air conditioning, plumbing and electrical systems in construction. Three laboratory hours per week.

**CMET 3224. Construction Project Administration. (3)** Prerequisite: Junior Standing or AAS degree. A study of the project management processes used in the design and construction of civil engineering projects. Topics include the roles and responsibilities of project participants, project delivery methods, engineering and construction contracts, project control and documentation, and dispute resolution mechanisms. *(Yearly)*

**CMET 3680. Professional Development III. (1)** Prerequisite: Open to junior level Construction Management majors. Seminar discussing professional development issues relating to the civil engineering technology and construction management professions. One hour per week. *(Pass/No Credit grading)*

**CMET 4073. Special Topics – Construction Management. (1-4)** Prerequisite: senior standing and consent of instructor. A study of new and emerging technical topics pertinent to the field of construction management. May be repeated for credit. *(On demand)*

**CMET 4125. Construction Codes and Documents. (2)** Prerequisites: Junior Standing or AAS degree. An analysis of construction contract documents, building codes, permits, and specifications.

**CMET 4127. Construction Law and Regulatory Issues. (3)** Examination of the legal problems encountered by architects, engineers, contractors, owners, sureties, and lenders involved in the construction process. Special emphasis on the legal rights and liabilities of the various participants in construction projects. Claims preparation, negotiation, arbitration, and litigation methods of dispute resolution.

**CMET 4228. Construction Office Operations. (2)** Prerequisite: ETCE 3224. A study of management issues encountered in home and job-site office operations. Topics include construction safety, insurance and risk management, labor relations, procurement, cost accounting, subcontracting, and labor and equipment resource allocation and management.

**CMET 4272. Capstone Project. (2) (W,O)** Prerequisite: Senior standing in Construction Management and consent of the Department. Utilization of students' previous course work to creatively investigate and produce solutions for a comprehensive construction management project.

**CMET 4680. Professional Development IV. (1)** Prerequisite: Open to senior level Construction Management majors. Seminar discussing professional development issues relating to the civil engineering technology and construction management professions. One hour per week. *(Pass/No Credit grading)*

### **Proposed Course Numbering:**

As part of the proposal, existing and new courses within the Construction Management and Civil Engineering Technology programs will be numbered to conform to the following numerical identification system:

1<sup>st</sup> number references the year the course is offered:

- 1 = Freshman
- 2 = Sophomore
- 3 = Junior
- 4 = Senior

2<sup>nd</sup> number references the semester the course is offered:

- 0 = Special Topics
- 1 = Fall
- 2 = Spring
- 3 = On Demand
- 6 = Seminar

3<sup>rd</sup> number references the curriculum content area:

- 1 = Surveying
- 2 = Construction Management
- 3 = Geotechnical Engineering
- 4 = Water Resources Engineering
- 5 = Transportation Engineering
- 6 = Structural Engineering
- 7 = Other Engineering
- 8 = Professional Development

4<sup>th</sup> number references the sequence the course holds within the curriculum content area:

- 1 = first course in curriculum content area sequence
- 2 = second course in curriculum content area sequence, etc.

## 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.

Faculty Name	Highest Degree and Institution	Other degrees and Institutions
Anthony L. Brizendine, Professor & Chair	Ph.D., West Virginia University	M.S., Virginia Tech
David Cottrell, Assistant Professor	Ph.D., Texas A&M University	B.S., United States Military Academy
G. Bruce Gehrig, Assistant Professor	Ph.D., Colorado State University	M.S., University of Colorado
Donald Liou, Associate Professor	Ph.D., University of California at Berkeley	M.S., University of California at Berkeley
Carlos Orozco, Associate Professor	Ph.D., Carnegie Mellon University	M.S., Carnegie Mellon University

**Dr. Anthony L. Brizendine:** Dr. Brizendine is a licensed professional engineer and professional surveyor who brings in excess of a decade of industry/consulting experience to the classroom. He holds the M.S. and Ph.D. degrees in Civil Engineering (M.S. emphasis in Geotechnical Engineering, Ph.D. emphasis in Geo-Environmental). He has performed structural and geotechnical analysis and design for private and public buildings; performed hydraulic/hydrology evaluations for public and private projects; served as a consultant to the US Army Corps of Engineers for finite element analyses of levees and dams, and directed laboratory and field investigations in various districts in Mississippi, Ohio, West Virginia, Illinois,

California, and Washington. He has participated in reservoir erosion projects in Washington, Oregon, and Oklahoma.

In addition, Dr. Brizendine has served as a consultant and trainer to the construction industry, federal agencies, and private corporations. His varied experience allows him to contribute directly to the construction management, water resources, geotechnical, structural, and surveying and highway design technical core areas of the program.

**Dr. David S. Cottrell:** Dr. Cottrell brings over 22 years of industry experience and eight years of university-level teaching experience to the program. He graduated from the United States Military Academy with a Bachelor of Science degree in 1978 and retired in 2000 after 22 years of engineering service with the US Army Corps of Engineers. Studies at Texas A&M University resulted in an M.S. Degree in Civil Engineering in 1987 and a Ph.D. in 1995.

He is a registered Professional Engineer in Virginia since 1982 and has extensive work experience in project design and management over a wide variety of construction endeavors including new commercial building of child care facilities, medical dispensaries, and air traffic control facilities, extensive renovation projects in both residential and commercial venues, and horizontal highway construction involving both flexible pavements and concrete. His experience and academic credentials combine to directly support his contributions to the program in core areas including construction planning, scheduling, estimating, and management, as well as the engineering fundamentals encompassing statics, dynamics, mechanics of materials, graphic communications, and engineering economy.

**Dr. G. Bruce Gehrig:** Dr. Gehrig brings over 15 years of industry experience and six years of university-level teaching experience to the program. His academic preparation includes three degrees in civil engineering including a M.S. degree with an emphasis in water quality and water/wastewater treatment processes and a Ph.D. degree with an emphasis in water resources planning and management and the delivery of public works projects. He is a licensed professional engineer in both Colorado and North Carolina with work experience in the public, private, international, and construction sectors of the industry.

He has been involved in all stages of the delivery of civil infrastructure projects including the planning and design of large diameter potable water pipeline systems, water reservoirs, underground vaults, and hydroelectric power plants. In addition, he directly managed the construction of a large sewer collection system in a remote South Pacific location. He also has experience in land development engineering including the design of residential subdivisions and commercial developments, the preparation of hydrologic and stormwater management studies, and the engineering of river restoration and bank stabilization projects. His varied experience allows him to contribute directly to the construction management, environmental engineering, and surveying and highway design technical core areas of the program.

**Dr. Donald D. Liou:** Dr. Liou brings over 25 years of industry experience and 10 years of university-level teaching experience to the program. His academic preparation includes three degrees in civil engineering, including a B.S., an M.S., and a Ph.D. degree with an emphasis in structural engineering, and an MBA degree with emphasis in finance.



He is a licensed professional engineer in California, and has work experience in the design, project management, instrumentation, and construction of many power plants, subways and transit systems, and highways. His varied experience allows him to contribute directly to the structural analysis, structural design, building systems, engineering economics, construction management, and other technical core areas of the program.

**Dr. Carlos E. Orozco:** Dr. Orozco has more than 20 years of experience in industry and academia and is the author of numerous technical articles in the fields of scientific computing, optimization, and solid mechanics. His academic background includes B.S., M.S., and Ph.D. degrees in civil engineering with emphasis in structures, finite element methods, and optimization. Dr. Orozco has taught courses in multiple subject areas that range from solid mechanics and dynamics to engineering mathematics and optimization.

Dr. Orozco's industry experience includes the maintenance and design of business software, computer consulting for high performance computing systems, and the design of numerous civil engineering structures for hydroelectric power plants. Dr. Orozco is a licensed professional engineer in Colombia and a former Fulbright grantee. His current research interests lie in the areas of scientific computing and micromechanical analysis of advanced composite materials.

Short biographical summaries of the primary faculty are provided as 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 and student credit hour production targets being met.

**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 program. A search of the online catalog in the area of construction management retrieved 3312 pertinent items. Of this total, 751 have been acquired since 1999.

The Library owns or has electronic access to 42 journals and 248 electronic resources specific to this area. In addition, the library has approximately 40 electronic databases, many with links to full text articles.

### 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 as is.

### 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 Civil ET program in the Smith Building. Laboratories currently exist to support construction materials, surveying, computer drafting, cost estimating, structures, hydraulics, soils, asphalt, stress analysis, 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 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 program.

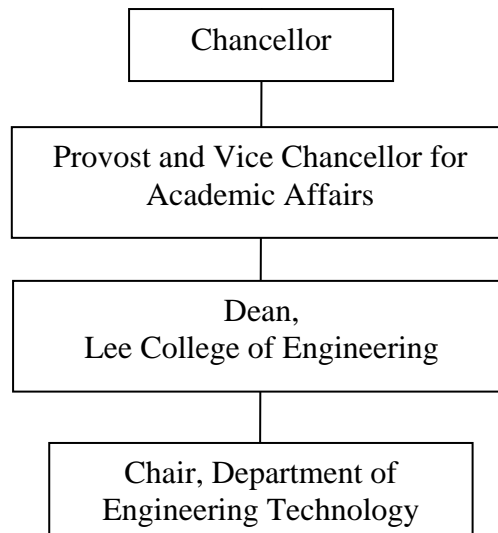
**D. Discuss sources of financial support for any new facilities and equipment.**

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



## 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.**

Two options exist for accrediting the proposed program. The American Council for Construction Education (ACCE) accredits most construction management programs in the United States. ABET, Inc., the recognized accreditor for college and university programs in applied science, computing, engineering, and technology also accredits construction programs. Both ABET, Inc. and ACCE are recognized by the Council for Higher Education Accreditation (CHEA). The program will seek accreditation by at least one of these agencies. Currently, plans are to pursue accreditation by ACCE. At some future time, the program may seek dual accreditation by both ACCE and ABET, Inc.

## 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?**

Beyond general education and major field coursework, the proposed program includes additional supporting coursework in mathematics, physics, chemistry, economics, and geology consistent with other engineering technology majors on campus. In addition, this program requires completion of a Construction Business/Management Core which includes one management (MGMT 3140), one business law (BLAW 3150) and two accounting (ACCT 2121 and 2122) courses from the Belk College of Business. Other courses in this core include computer applications (ETGR 1100), economics (ECON 2101), and engineering economics (ETGR 3222). It is estimated that the resources to deliver this component are in place for initial delivery. Anticipated growth of the Construction Management program will require additional faculty resources in support of the business/management core.

## X. ADDITIONAL INFORMATION

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

Not applicable.

## 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 estimates of additional costs in the first three years of program operation.

## 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 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. Criteria which will be utilized 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 construction industry employers

### 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 construction management program. Those measures include, but are not limited to:

1. student enrollments
2. scores on student course evaluations
3. annual and post tenure reviews of faculty
4. number of graduates produced
5. graduate grade point averages and results of nationally-normed tests where applicable
6. satisfaction of alumni on surveys
7. satisfaction of employers on surveys

### C. Projected productivity levels (numbers of graduates):

	Year 1 (2006-2007)	Year 2 (2007-2008)	Year 3 (2008-2009)	Year 4 (2009-2010)	TOTALS
B	0	3 to 5	7 to 15	15 to 25	25 to 45
M					
I/P					
D					

Ultimately, graduation rates are expected on the order of 75 to 100 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 24701-2198  
E-mail: [frankh@bluefieldstate.edu](mailto:frankh@bluefieldstate.edu)  
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Southern Polytechnic State University  
1100 South Marietta Parkway  
Marietta, GA 30060-2696  
E-mail: [bmoore@spsu.edu](mailto:bmoore@spsu.edu)  
Office Phone: 678-915-3715

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

Michael Holland, CPC, AIC, Executive Vice President  
American Council for Construction Education (ACCE)  
1717 North Loop 1604 East, Suite 320  
San Antonio, Texas 78232-1570  
Email: [mholland@acce-hq.org](mailto:mholland@acce-hq.org)  
phone: 210.495.6161

**E. Plan for evaluation prior to sixth operational year.**

Normal department level assessments will occur as outlined in the Strategic Plan. In addition, during year 5 of this new program, a comprehensive program review, which will include external evaluators, will be conducted. Also, it is anticipated that the program will request candidacy status from ACCE and/or seek ABET accreditation within this 5-year window which will require a comprehensive self-assessment. Once candidacy status has been achieved, ACCE will assign a program mentor to help guide the new program in its accreditation/continuing development efforts if ACCE accreditation is pursued. The current Department Chair has been involved as a TAC Commissioner and Executive Committee member since 1997; additionally, he was elected to serve as the Chair of the Technology Accreditation Commission of ABET for the 2006-2007 accreditation cycle. Hence, he can provide guidance for assessment and compliance with ABET accreditation requirements if this path is selected.

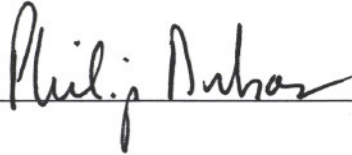
## IX. REPORTING REQUIREMENTS

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 14, 2006

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

Chancellor



Date





**Projected Funding for New Degree Program  
 Bachelor of Science in Construction Management  
 Regular Term 2006-2007  
 (Based on 2005-2006 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				643.72	171.44	138.41	0.000	0.000	0.000
Category II				487.37	249.94	146.74	0.000	0.000	0.000
Category III	0			364.88	160.93	122.95	0.000	0.000	0.000
Category IV				230.52	102.45	70.71	0.000	0.000	0.000

*Fringe rates for staff*  
 FICA @ 7.65%  
 Retirement @ 06.82%  
 Medical @ \$3,748

*Fringes for faculty salaries*  
 FICA @ 7.65%  
 Retirement @ 11.16%  
 Medical @ \$3,748

\$0  
 \$0  
 \$0  


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 \$0

Total Positions Required	<b>0.000</b>
Instructional - Position Salary Rate	<u>\$67,481</u>
101-1310 Instructional Salary Amount	\$0
Other Academic Costs 44.89300%	<u>0</u>
Purpose 101 Total Academic Requirements	\$0
Purpose 151 Library 11.48462%	0
Purposes 152, 160, 170 180 General Instit Support 54.04980%	0
Neg Adj Factor 50.00000%	n/a
In-state SCHs 0	
Financial Aid (in-state) 67.99800%	<u>0</u>
<b>Total Requirements</b>	<b><u>\$0</u></b>

## SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

Institution		UNC Charlotte		Date		December 6, 2005	
Program (API#, Name, Level)		15.9999 Engineering Technologies/Technicians, Other -					
		Construction Management					
Degree(s) to be Granted		B.S.Construction Management				Program Year 2006-07	
ADDITIONAL FUNDING REQUIRED - BY SOURCE							
	Reallocation of Present Institutional Resources	Enrollment Increase Funds	Federal/State or Other Non-state Funds (Identify)	New Allocations	Total		
<b>101 Regular Term Instruction</b>							
1210 SPA Regular Salaries							\$0
1110 EPA Non-teaching Salaries							0
1310 EPA Academic Salaries	0	0	0				0
1810 Social Security	0		0				0
1820 State Retirement	0						0
1830 Medical Insurance (3432*X)	0						0
2000 Supplies and Materials							0
3000 Current Services							0
4000 Fixed Charges							0
5000 Capital Outlay (Equipment)							0
<b>TOTAL Regular Term Instruction</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>151 Libraries</b>							
5000 Capital Outlay (Equipment)		0					0
5600 Library Book/Journal							
<b>TOTAL Libraries</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>189 General Institutional Support</b>							
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							
<b>TOTAL General Inst. Support</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>TOTAL ADDITIONAL COSTS</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

NOTE: Accounts may be added or deleted as required.

**Projected Funding for New Degree Program  
 Bachelor of Science in Construction Management  
 Regular Term 2007-2008  
 (Based on 2006-2007 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				643.72	171.44	138.41	0.000	0.000	0.000
Category II				487.37	249.94	146.74	0.000	0.000	0.000
Category III	640			364.88	160.93	122.95	1.754	0.000	0.000
Category IV				230.52	102.45	70.71	0.000	0.000	0.000

*Fringe rates for staff*  
 FICA @ 7.65%  
 Retirement @ 06.82%  
 Medical @ \$3,748

*Fringes for faculty salaries*  
 FICA @ 7.65%  
 Retirement @ 11.16%  
 Medical @ \$3,748

\$9,055  
 \$13,209  
 \$6,574  


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 \$28,838

Total Positions Required	<b>1.754</b>
Instructional - Position Salary Rate	<u>\$67,481</u>
101-1310 Instructional Salary Amount	\$118,362
Other Academic Costs 44.89300%	<u>53,136</u>
Purpose 101 Total Academic Requirements	\$171,498
Purpose 151 Library 11.48462%	19,696
Purposes 152, 160, 170 180 General Instit Support 54.04980%	92,694
Neg Adj Factor 50.00000%	n/a
In-state SCHs 0	
Financial Aid (in-state) 67.99800%	<u>0</u>
<b>Total Requirements</b>	<b><u>\$283,888</u></b>

## SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

Institution		UNC Charlotte		Date		December 6, 2005	
Program (API#, Name, Level)		15.9999 Engineering Technologies/Technicians, Other -					
		Construction Management					
Degree(s) to be Granted		B.S. Construction Management			Program Year 2007-08		
<b>ADDITIONAL FUNDING REQUIRED - BY SOURCE</b>							
	Reallocation of Present Institutional Resources	Enrollment Increase Funds	Federal/State or Other Non-state Funds (Identify)	New Allocations	Total		
<b>101 Regular Term Instruction</b>							
1210 SPA Regular Salaries							\$0
1110 EPA Non-teaching Salaries							0
1310 EPA Academic Salaries	0	118,362	0				118,362
1810 Social Security	0	9,055	0				9,055
1820 State Retirement		13,209					13,209
1830 Medical Insurance		6,574					6,574
2000 Supplies and Materials		9,000					9,000
2300 Educational Supplies		7,000					
2600 Office Supplies		2,000					
3000 Current Services		8,798					8,798
3100 Travel		6,798					
3200 Communications		1,000					
3400 Printing & Binding		1,000					
5000 Capital Outlay (Equipment)		6,500					6,500
5100 Office Equipment		1,500					
5200 EDP Equipment		5,000					
<b>TOTAL Regular Term Instruction</b>	<b>\$0</b>	<b>\$171,498</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$171,498</b>
<b>151 Libraries</b>							
5000 Capital Outlay (Equipment)		19,696					19,696
5600 Library Book/Journal		19,696					
<b>TOTAL Libraries</b>	<b>\$0</b>	<b>\$19,696</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$19,696</b>
<b>189 General Institutional Support</b>							
2000 Supplies and Materials		30,900					30,900
2600 Office Supplies		30,900					
3000 Current Services		30,900					30,900
3200 Communications		15,450					
3400 Printing & Binding		15,450					
5000 Capital Outlay (Equipment)		30,894					30,894
5100 Office Equipment		15,400					
5200 EDP Equipment		15,494					
<b>TOTAL General Inst. Support</b>	<b>\$0</b>	<b>\$92,694</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$92,694</b>
<b>TOTAL ADDITIONAL COSTS</b>	<b>\$0</b>	<b>\$283,888</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$283,888</b>

NOTE: Accounts may be added or deleted as required.

**Projected Funding for New Degree Program  
 Bachelor of Science in Construction Management  
 Regular Term 2008-2009  
 (Based on 2007-2008 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				643.72	171.44	138.41	0.000	0.000	0.000
Category II				487.37	249.94	146.74	0.000	0.000	0.000
Category III	800			364.88	160.93	122.95	2.193	0.000	0.000
Category IV				230.52	102.45	70.71	0.000	0.000	0.000

*Fringe rates for staff*  
 FICA @ 7.65%  
 Retirement @ 06.82%  
 Medical @ \$3,748

*Fringes for faculty salaries*  
 FICA @ 7.65%  
 Retirement @ 11.16%  
 Medical @ \$3,748

\$11,318  
 \$16,511  
 \$8,217  


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 \$36,047

Total Positions Required	<b>2.193</b>
Instructional - Position Salary Rate	<u>\$67,481</u>
101-1310 Instructional Salary Amount	\$147,952
Other Academic Costs 44.89300%	<u>66,420</u>
Purpose 101 Total Academic Requirements	\$214,372
Purpose 151 Library 11.48462%	24,620
Purposes 152, 160, 170 180 General Instit Support 54.04980%	115,868
Neg Adj Factor 50.00000%	n/a
In-state SCHs 0	
Financial Aid (in-state) 67.99800%	<u>0</u>
<b>Total Requirements</b>	<b><u>\$354,860</u></b>

## SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

Institution	<b>UNC Charlotte</b>			Date	<b>December 6, 2005</b>
Program (API#, Name, Level)	<b>15.9999 Engineering Technologies/Technicians, Other - Construction Management</b>				
Degree(s) to be Granted	<b>B.S. Construction Management</b>			Program Year	<b>2008-09</b>
<b>ADDITIONAL FUNDING REQUIRED - BY SOURCE</b>					
	Reallocation of Present Institutional Resources	Enrollment Increase Funds	Federal/State or Other Non-state Funds (Identify)	New Allocations	Total
<b>101 Regular Term Instruction</b>					
1210 SPA Regular Salaries					\$0
1110 EPA Non-teaching Salaries					0
1310 EPA Academic Salaries	0	147,952	0		147,952
1810 Social Security	0	11,318	0		11,318
1820 State Retirement	0	16,511			16,511
1830 Medical Insurance		8,217			8,217
2000 Supplies and Materials		13,374			13,374
2300 Educational Supplies		11,374			
2600 Office Supplies		2,000			
3000 Current Services		8,500			8,500
3100 Travel		6,000			
3200 Communications		1,500			
3400 Printing & Binding		1,000			
5000 Capital Outlay (Equipment)		8,500			8,500
5100 Office Equipment		2,500			
5200 EDP Equipment		6,000			
<b>TOTAL Regular Term Instruction</b>	<b>\$0</b>	<b>\$214,372</b>	<b>\$0</b>	<b>\$0</b>	<b>\$214,372</b>
<b>151 Libraries</b>					
5000 Capital Outlay (Equipment)		24,620			24,620
5600 Library Book/Journal		24,620			
<b>TOTAL Libraries</b>	<b>\$0</b>	<b>\$24,620</b>	<b>\$0</b>	<b>\$0</b>	<b>\$24,620</b>
<b>189 General Institutional Support</b>					
2000 Supplies and Materials		38,600			38,600
2600 Office Supplies		38,600			
3000 Current Services		38,600			38,600
3200 Communications		19,300			
3400 Printing & Binding		19,300			
5000 Capital Outlay (Equipment)		38,668			38,668
5100 Office Equipment		19,300			
5200 EDP Equipment		19,368			
<b>TOTAL General Inst. Support</b>	<b>\$0</b>	<b>\$115,868</b>	<b>\$0</b>	<b>\$0</b>	<b>\$115,868</b>
<b>TOTAL ADDITIONAL COSTS</b>	<b>\$0</b>	<b>\$354,860</b>	<b>\$0</b>	<b>\$0</b>	<b>\$354,860</b>

NOTE: Accounts may be added or deleted as required.

**Appendix B:  
Supporting Letters**

**DOCUMENTATION OF CONSULTATIONS**



**UNC CHARLOTTE**

**Consultation on Library Holdings  
J. Murrey Atkins Library**

**To: Dr. Tony Brizendine**

**From: Joanne S. Klein**

**Date: December 2, 2005**

**Course/Program: New Degree Program: Bachelor of Science in Construction  
Management**

**Summary of Librarian's Evaluation of Holdings:**

**Evaluator: Joanne S. Klein Date: December 2, 2005**

**Please Check One:**

- Holdings are superior \_\_\_\_\_
- Holdings are adequate \_\_\_\_\_ **X**
- Holdings are adequate only if Dept. purchases additional items. \_\_\_\_\_
- Holdings are inadequate \_\_\_\_\_

**Comments:**

A search of the online catalog in the area of construction management retrieved 3312 pertinent items. Please see the following table. Of this total, 751 have been acquired since 1999. Because there is some overlap of subject headings, the actual total number of titles may be less than this, but the collection, especially if bolstered by ongoing purchases for this and the interrelated Engineering Technology, Civil Engineering, Engineering Management and Architecture programs, is current and quite adequate to support this new degree program. The Library owns or has electronic access to 42 journals and 248 electronic resources specific to this area. In addition, the library has approximately 40 electronic databases, many with links to full text articles. Also, the library's participation in an

**Appendix B:  
Supporting Letters**

interlibrary loan consortium provides another means of effectively supporting research needs.

**Atkins Library Holdings in Areas Related to Construction Management  
December, 2005**

<b>Keyword/Subject Heading</b>	<b>All Holdings</b>	<b>Post 1999</b>	<b>Journals</b>	<b>Electronic Resources</b>
Applied Mechanics	189	7	17	32
Building Code*	128	25	0	0
Building Systems	34	6	1	1
Construction Management	675	181	3	47
Construction Material*	475	120	2	32
Earthwork*	68	7	0	10
Engineering Econom*	108	12	1	8
Engineering Survey*	41	4	3	2
Physical Geology	34	2	0	0
Project Cost Estimat*	99	66	0	7
Project Management	388	188	0	59
Project Scheduling	64	40	0	12
Road Design and Construction	261	28	0	8
Soil Testing	112	23	0	2
Structural Analysis	288	8	2	9
Structural Design	175	5	3	7
Structural Engineering	138	18	10	8
Technical Drawing	35	11	0	4
<b>Totals</b>	<b>3312</b>	<b>751</b>	<b>42</b>	<b>248</b>

*Joanne S. Klein*

Reference Librarian  
Engineering and Information Technology  
J. Murrey Atkins Library  
University of North Carolina at Charlotte  
9201 University City Boulevard  
Charlotte, NC 28223  
(704) 687-3232





# American Council for Construction Education

1717 North Loop 1604 East, Suite 320  
San Antonio, Texas 78232-1570  
Tel: 210.495.6168  
Fax: 210.495.6168  
E-mail: acce@acce-hq.org

December 6, 2005

Mark Benjamin  
*President*  
Robert Segner  
*Vice President*  
Murray Jones  
*Secretary*  
Walter E. Dukes  
*Treasurer*  
Michael M. Holland  
*Executive Vice President*

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

Re: Construction Management Program

Dear Dr. Brizendine,

You have inquired about the potential of developing a program in Construction Management for your Department in the University of North Carolina at Charlotte. In working with the American Council for Construction Education, we have a keen insight into the demand for Construction Management graduates in our country, and can say without any reservation, there is a severe need for additional graduates out of a program like yours ( and others!).

As you know, the construction industry represents approximately 8% of our Gross Domestic Product. Employing over 7 million people daily in our country, the construction industry continues to evolve, implementing an increasing amount of state-of-the-art technology. Construction companies: general contractors, specialty subcontractors, consultants, owners, including governmental agencies all are demanding Construction Managers to be the leaders in this technology revolution, from within.

The management of these companies and their various elements is the key to their success, not only success in delivering their services, but also success in managing the risk of the company, the project and needs of their clients. Construction Management Programs are the best in preparing the future owners of construction companies – this was the initial impetus in establishing the American Council for Construction Education. The development of standards for Construction Management was and continues to be a collaboration of educators and practitioners to find the balance for these graduates.


A study completed by Dr. David Bilbo of Texas A & M projected that in 2003, the number of Construction Management graduates was going to meet only 50% of the needs of the industry. Anecdotally, that number (50%) was high – the demand was much greater than the graduates available. The BLS says in 2003 the national average of starting salaries in 2003 for Construction Management graduates with a 4-year degree was \$42,300; today it is over \$46,000, with 100% of the graduates having a job before graduation. Certainly, this is an indication of how these programs and graduates from them are needed in our industry.



December 6, 2005  
Dr. Anthony L. Brizendine  
Page 2 of 2

We are excited about your moving forward in developing a degree program in Construction Management. As the accrediting body for Construction Science and Management programs in the US, we look forward to working with your Department on this project. Please call us if there is more we can do to support your efforts.

Best regards,  
American Council for Construction Education

A handwritten signature in cursive script, appearing to read "Michael M. Holland".

Michael M. Holland  
Executive Vice President



Workforce Development • Profit Management • Business Development • CompTrustAGC

December 19, 2005

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 Anthony,

Carolinas AGC, Inc. is pleased to support your plans to offer a bachelor of science in construction management.

As your executive summary for this proposal describes, the Charlotte Metrolina region is expected to continue its growth and demand for construction services in all sectors. This growth will continue to place demands on our industry to provide qualified professionals to meet the needs of a changing industry.

We believe that forging partnerships between the public, private, educational and association sectors are needed to meet the challenge of recruitment, training, placement and professional development of our workforce.

Our relationship previously has been positive and productive. Examples include our partnership and support in such programs as the UNCC/AGC Student Chapter and the CAGC HUB Academies offered on the Charlotte campus.

Development of this Bachelor of Science program will be an additional positive step in dealing with this demand.

Carolinas AGC, Inc. salutes your department for this proposal and offers our support in making this plan a reality.

Sincerely,

Stephen P. Gennett, President & CEO  
Carolinas AGC, Inc.



**RALPH WHITEHEAD ASSOCIATES, INC.**

Consulting Engineers

Charlotte    Atlanta    Jacksonville    Richmond  
Rock Hill    Charleston    Kansas City    Raleigh

Website:  
www.rwhitehead.com

1000 W. Morehead Street  
Suite 200  
Charlotte, NC 28208

Mailing Address:  
Post Office Box 35624  
Charlotte, NC 28235

704 372-1885 Voice  
704 372-3393 Fax

December 13, 2005

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: CONSTRUCTION MANAGEMENT PROGRAM**

Dear Dr. Brizendine:

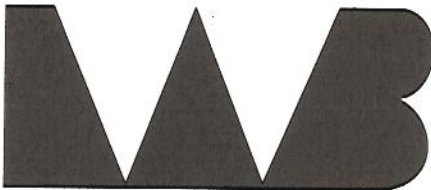
As Chairman of the Civil & Construction Board of Industry Advisors for the Department of Engineering Technology, I am writing this letter of support for the proposed Bachelor of Science in Construction Management program at UNC Charlotte. The Engineering Technology Department has taken our input seriously 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 finally moving forward.

The proposed program will benefit greatly from the existing BSET program in Civil Engineering Technology. Courses, laboratories and facilities currently utilized in the Civil ET program can be shared and provide an excellent base for the proposed Bachelor of Science in Construction 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  
Chairman, UNC Charlotte Civil & Construction Technology Advisory Board  
Vice President, Construction Services, Ralph Whitehead Associates, Inc.



**Wayne Brothers, Inc.**

December 5, 2005

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:

On behalf of the Charlotte Chapter of the Professional Construction Estimators Association (PCEA), it is my pleasure to express our support for your proposal to establish a BS in Construction Management (BSCM) at UNC Charlotte. As you are aware, our organization has supported your existing BSET program in Civil Engineering Technology for many years. The existing Civil Engineering Technology program provides a strong foundation for the proposed Construction Management program.

The Charlotte construction industry is robust; in fact, the region has an insatiable appetite for construction professionals. We are continuously seeking new sources of construction talent. Without doubt, the proposed program will provide the educational access necessary for many citizens of the region to enter our profession. Therefore, we look forward with eagerness to the initiation of this new program option in your Department beginning next year.

Please let us know at PCEA if we can be of assistance in the establishment of this program.

Sincerely yours,

Bobby Phillips  
Vice President, Wayne Brothers, Inc.

## **ANTHONY L. BRIZENDINE**

### **Degrees & Professional Registrations**

- Ph.D. in Civil Engineering, West Virginia University, 1997. (GPA 4.0/4.0)
- M.S. in Civil Engineering, Virginia Polytechnic Institute and State University, 1990.
- B.S. in Civil Engineering Technology, Summa Cum Laude, Bluefield State College, 1989.
- REGISTERED PROFESSIONAL ENGINEER, Virginia
- LICENSED PROFESSIONAL SURVEYOR, West Virginia

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

3 years, Department of Engineering Technology

Original appointment July 2002 at the rank of Professor and Department Chair

### **Related Teaching and Other Work Experience**

- Fairmont State College, School of Technology, Chair, 2000 – 2002
- West Virginia Transportation Technician Certification & Training Program, Director, 1999-2002
- Fairmont State College, Director of Engineering Technology, 1999 - 2000
- Fairmont State College Honors Program, Director, 1994 – 1999
- Fairmont State College, Department of Civil Engineering Technology: Professor with tenure, 1991-2002; Department Coordinator, 1995-1999
- Valley Falls Public Service District: Elected Chairman in 1997, 1998, 1999, 2000, 2001, 2002; Board of Directors, 1996-2002
- West Virginia University, Department of Civil & Environmental Engineering: Adjunct Professor, 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; Chair-Elect 2005
- 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 and 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 member of the Faculty, 1997, 1998, 1999 and 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 Seminar Award, 1993

**Selected Recent Publications / Presentations / Grant Awards**

- 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, when
- 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, June 2003
- 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 by the members of the Task Force, 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, Chattanooga, TN, 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 Program, Fairmont State Faculty Development Program, September 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, February 2000 proceedings?
- 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 same, 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
- "Collaboration for Improved Laboratory Experiences: Capitalizing on Applied Research Opportunities, 1998 CIEC Conference Proceedings," ASEE, Savannah, GA, February 1998
- 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

**Institutional and Professional Service (last five years)**

- Department Chair, 2002 to present
- See previous entries for professional service

**Professional Development Activities (last five years)**

Numerous workshops/seminars/professional presentations each year at a variety of ASEE, ASCE, ABET and other conferences; participated in conferences and professional societies during that period as evidenced above; self taught several new engineering software tools in the areas of hydraulics, hydrology and scheduling.

## **G. BRUCE GEHRIG**

### **Degrees & Professional Registration**

- 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
- REGISTERED PROFESSIONAL ENGINEER, Colorado & North Carolina

### **Number 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 July 2002 at the rank of Assistant Professor; reappointed effective July 2005

### **Related Teaching and Other Work Experience**

- Direct Analytical Network, Kings Mountain, North Carolina, Consultant, 2004 to present
- Colorado State University, Ft. Collins, Colorado, Civil Engineering Department, Graduate Teaching Assistant, 1999-2002
- R O Anderson Engineering, Inc., Minden, Nevada, Project Engineer, 1996-1999
- American Samoa Power Authority, Pago Pago, American Samoa, Resident Construction Manager, 1993-1996
- Denver Water Department, Denver, Colorado, Project Civil Engineer, 1985-1993

### **Active Membership in Professional and Scientific Societies**

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

### **Honors/Awards/Recognition**

- ASCE Excellence in Civil Engineering Education (ExCEED) Fellow, 2003
- Tau Beta Pi National Engineering Honor Society, 1984

### **Selected Recent Publications/Presentations/Grant Awards**

- Gehrig, G. Bruce, "A Survey of the Status of Baccalaureate Degree Awarding Construction-Related Programs within the United States," *International Proceedings of the 41<sup>st</sup> Annual Conference of the Associated Schools of Construction* (blind peer-reviewed), Cincinnati, Ohio, April 2005
- Gehrig, G. Bruce, Liou, Donald D., and Orozco, Carlos E., "Development of an Integrated Construction Management and Civil Engineering Technology Curriculum," \$11,350 UNCC Curriculum and Instructional Development Grant, 2005-2006.
- Gehrig, G. Bruce, "Adapting a Design-Construction Integration Methodology to Improve Construction Education," *International Proceedings of the 40<sup>th</sup> Annual Conference of the Associated Schools of Construction* (blind peer-reviewed), Provo, Utah, April 2004
- Gehrig, G. Bruce and Fontane, Darrell G., "A Framework for Utilizing a Lessons-Learned Database to Improve the Performance of Public Sector Projects," *Third International Conference on Information Systems in Engineering and Construction Refereed Conference Proceeding*, Cocoa Beach, Florida, June 2003
- Gehrig, G. Bruce, A Decision Support System Framework to Improve Design-Construction Integration and Project Performance on Public Sector Underground Utility Projects, Ph.D. Dissertation, Colorado State University, Fort Collins, Colorado, 2002
- 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.

### **Institutional and Professional Service (last five years)**

- Civil Engineering Technology Focus Area Improvement Team (FAIT), 2002 to present
- Freshman Engineering Technology Focus Area Improvement Team (FAIT), 2004 to present
- ABET Self-Study Writing Committee, Member, 2004 to present
- Civil ET/Construction Management Faculty Search Committee, Member, 2005
- COE Faculty Associate for Advising and Recruiting Search Committee, Member, 2004 to 2005
- COE Faculty Associate for Freshman Engineering & Advising Search Committee, Member, 2004
- UNCC SOAR Freshman Orientation CIET Faculty Representative, 2004
- U.S.E.P.A. Grant Proposal Review Panel, "Benchmarking Sustainability in Engineering Education," 2004



- COE Computing Advisory Committee, Engineering Technology Representative, 2003 to present
- JETS Summer Camp, Civil Engineering Program Director, 2004
- Participated in ET Department Articulation Conference, 2003 & 2005
- Participated in biannual Industrial Advisory Committee meetings, 2003 to present
- Explore UNC Charlotte, ET Department Representative, 2003 & 2004
- Faculty representative for on-campus community college visitations and information sessions
- Proposal Evaluator: U.S.G.S. National Institutes for Water Resource, 2004
- Reviewer: International Proceedings of the Annual Conference of the Associated Schools of Construction, 2004 & 2005

**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 as referenced above

## **DAVID S. COTTRELL**

### **Degrees & Professional Registrations**

- Doctor of Philosophy, Texas A&M University, 1995
- Master of Science in Civil Engineering, Texas A&M University, 1987
- Bachelor of Science, United States Military Academy, 1978
- REGISTERED PROFESSIONAL ENGINEER, Virginia, 1982

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

- (New Hire for fall 2005) Original appointment August 15, 2005; Assistant Professor of Civil Engineering Technology

### **Related Teaching and Other Work Experience**

- School of Science, Engineering, and Technology, Structural Design and Construction Engineering Technology, Pennsylvania State University, Harrisburg, Pennsylvania, Assistant Professor, 2000-2005
- United States Military Academy, Department of Civil and Mechanical Engineering, West Point, New York, Assistant Professor, 1996-1998
- United States Military Academy, Department of Civil and Mechanical Engineering, West Point, New York, Instructor, 1995-1996

### **Active Membership in Professional and Scientific Societies**

- American Society of Engineering Education (ASEE), Member
  - ASEE Peer Reviewer, National Conferences, 2001-2004
- American Society of Civil Engineers (ASCE)
  - Senior mentor/instructor, "ExCEED" – *Excellence in Civil Engineering Education* workshops, 2001-2003
  - Reviewer, *Journal of Professional Issues*, 2002-2003
- Associated Schools of Construction (ASC)
  - Reviewer, *International Proceedings of the Annual Conference of the ASC*, 2001-2003
- Army Engineering Association (AEA)
  - Lifetime Member and Association Fellow

### **Honors/Awards/Recognitions**

- The 2003-2004 *James Jordan Award* for teaching excellence, April 2004
- The 2002 *New Faculty Fellow Award*, *Frontiers in Education National Conference*, November 2002
- Nominated for ASCE 2002 ExCEED *New Faculty Excellence in Teaching Award*, February 2002
- The Silver Order of the de Fleury Medal, presented by the AEA on Behalf of the Engineer Regiment for Inspirational Leadership while in Critical Positions of Authority and Responsibility, June 2002
- Mechanics Division, ASEE, Award for Best Paper Presentation at the Annual Conference, June 1997
- The Bronze Order of the de Fleury Medal, presented by the AEA on Behalf of the Engineer Regiment for Inspirational Leadership while in Critical Positions of Authority and Responsibility, October 1993

### **Selected Recent Publications/Presentations/Grant Awards**

- Cottrell, David S., "Closing the Loop: Assessing, Evaluating, and Improving a TC2K Quality Program," Peer-reviewed *Proceedings of the 2004 Annual Conference of the American Society for Engineering Education*, Salt Lake City, Utah, June 2004
- Cottrell, David S., "Elementary and High School Students Building Virtual Bridges to Engineering Heights with Computer Aided Design," Peer-reviewed *Proceedings of the 2004 Annual Conference of the American Society for Engineering Education*, Salt Lake City, Utah, June 2004
- Cottrell, David S. and Joseph J. Cecere, "Innovative Construction Curriculum Development – Meeting the Needs of Our Constituencies," Peer-reviewed *Proceedings of the 2004 Annual Conference of the American Society for Engineering Education*, Salt Lake City, Utah, June 2004
- Cottrell, David S., "Innovative Strategies for Teaching Graphics Communications – Designing Residential and Commercial Properties in an Introductory Course," Peer-reviewed *Proceedings of the 2004 Annual Conference of the American Society for Engineering Education*, Salt Lake City, Utah, June 2004
- Cottrell, David S., "Outreach Scholarship – A Valuable Key to Promotion and Tenure," Peer-reviewed *Proceedings of the 2003 Annual Conference of the American Society for Engineering Education*, Nashville, Tennessee, June 2003
- Cottrell, David S., "Planning and Execution – The Key to Developing a TC2K Quality Program," Peer-reviewed *Proceedings of the 2003 Annual Conference of the American Society for Engineering Education*, Nashville, Tennessee, June 2003

- Cottrell, David S., "Computer Aided Design for Introducing High School Students to Engineering," Peer-reviewed *Proceedings of the 2002 of the Frontiers in Education Annual Conference*, Boston, Massachusetts, November, 2002
- Cottrell, David S., "Developing a Dynamic Classroom with ExCEED Teaching Workshops – Separate but Equal in New York and Arkansas," Peer-reviewed *Proceedings of the 2002 Annual Conference of the American Society for Engineering Education* (Architectural Division), Montreal, Canada, June 2002
- Cottrell, David S., "Evaluation and Outcomes Assessment During the Semester – Putting Course Learning Objectives to Work," Peer-reviewed *Proceedings of the 2002 Annual Conference of the American Society for Engineering Education* (Architectural Division), Montreal, Canada, June 2002
- Cottrell, David S., "Using Computer Aided Design to Teach Engineering to Both College and High School Students – Bridging the Age Gap," Peer-reviewed *Proceedings of the 2002 Annual Conference of the American Society for Engineering Education* (Architectural Division), Montreal, Canada, June 2002
- Cottrell, David S. "Building Bridges: Computer-Aided Design as a Vehicle for Outreach to High School Students in the New Millennium," Peer-reviewed *Proceedings of the 2001 Annual Conference of the American Society for Engineering Education* (Architectural Division), Albuquerque, NM, June 2001
- Cottrell, David S. "Integrating Design Projects Into an Introductory Course in Graphics Communications," Peer-reviewed *Proceedings of the 2001 Annual Conference of the American Society for Engineering Education* (Engineering Technology Division), Albuquerque, NM, June 2001
- Cottrell, David S. "Integrating Construction Engineering Planning Into a Structural Civil Engineering Program," Peer-reviewed *Proceedings of the 2000 Annual Conference of the American Society for Engineering Education*, St. Louis, MO, June 2000
- Cottrell, David S. "Outcomes Assessment Inside the Classroom: Performance Oriented Teaching," Peer-reviewed *Proceedings of the 2000 Annual Conference of the American Society for Engineering Education* (Mechanics Division), St. Louis, MO, June 2000

#### **Institutional and Professional Service (last five years)**

- Committee Member, School of Engineering, Science, and Technology Committee for Graduate Program Assessment and Review, 2002-2005
- Committee Member, Senate Outreach Committee, 2001-2003
- Chair, Committee for Continuous Quality Improvement (C<sup>2</sup>QI), School of Science Engineering, and Technology, 2002-2004
- Committee Member, Penn State University Commission on Racial / Ethnic Diversity" (UniSCOPE), 2002-2003
- Committee Member, Senate Strategic Planning Committee, two-year term, 2004-2005
- Committee Member, Teaching and Learning Consortium, 2004-2005
- Adhoc-Committee, Review of Engineering Economy Courses at Penn State University at Harrisburg, 2001
- Committee member, student support of Penn State Professional Engineers and Contractors (PSPEC) associated with the Program in Structural Design and Construction Engineering Technology and three student chapters affiliated with Associated Builders and Contractors, Associated General Contractors of America, and The National Society of Professional Engineers, 2000-2005
- Faculty Advisor, Penn State University Harrisburg Student Veteran's Organization, 2004-2005
- Judge, Capital Area Science and Engineering Fair for Central Pennsylvania Science Center, 2001-2005

#### **Professional Development Activities (last five years)**

- Participant in Training Seminar, "Institutional Representative Seminar on Technology Criteria 2000 (TC2K)," sponsored by the Technology Accreditation Commission of ABET, June 2004
- Senior Mentor for "ExCEED" Workshops for Teaching Excellence at the United States Military Academy at West Point sponsored by ASCE "ExCEED" for *Excellence in Civil Engineering Education*, July 2003
- Criteria 2000 (TC2K)," sponsored by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), June 2003
- Attended series of seminars administered by the ITS Training Services, Penn State, to develop expertise to integrate course management system software into academic course administration for all courses taught, January 2003
- Senior Mentor for "ExCEED" Workshops for Teaching Excellence at Northern Arizona University by ASCE, August 2002
- Senior Mentor for "ExCEED" Workshops for Teaching Excellence at the United States Military Academy at West Point sponsored by ASCE, July 2002
- Participant, "Implementing Activity Based Learning and Authentic Assessment in your Courses;" sponsored by the AIM Center and the National Center of Excellence for Advanced Manufacturing Education (NCE/AME), Sinclair Community College, Dayton, Ohio, June 2002
- Participant, "Technology Criteria 2000 (TC2K) Program Evaluator Training," sponsored by the Accreditation Board for Engineering and Technology (ABET), June 2002
- Participant, "Program Assessment Institute" presented by Pacific Crest sponsored by the Teaching and Learning Consortium, Penn State University, May 2002

## **DONALD D. LIOU**

### **Degrees & Professional Registrations**

- Ph.D. in Structural Engineering, University of California at Berkeley, 1978
- M.B.A., Haas School of Business, University of California at Berkeley, 1987
- M.S. in Civil Engineering, University of California at Berkeley, 1972
- B.S. in Civil Engineering, National Taiwan University, Taiwan, 1970
- REGISTERED PROFESSIONAL ENGINEER, California

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

10 years, Department of Engineering Technology, Civil Engineering Technology  
Original appointment July 1995 at the rank of Associate Professor  
Tenured, 2000

### **Related Teaching and Other Work Experience**

- Bechtel Civil, Inc., Hong Kong, Jihe Expressway, Project Manager, 1993-1995
- Bechtel International Inc., Tokyo, Japan, Trans-Tokyo Bay East Kawasaki Island Project, Project Manager/Manager of Instrumentation, 1991-1993
- Bechtel Civil, Inc., San Francisco, California, Project Engineer and Proposal Manager, 1989-1991
- Taipei City Government, Taipei, Taiwan, ROC, Taipei Department of Rapid Transit Systems, Chief Civil and Architectural Engineer and Director of Quality Center, 1987-1989
- Hsu and Associates, Quelin, Quangsi, China, Structural Consultant, 1985-1987
- Bechtel Power Corporation, San Francisco, California, Seismic Engineering Specialist, 1983-1985
- Pacific Engineers and Constructors, Ltd., Taipei, Taiwan, ROC, Dynamic Analysis Group Leader, 1981-1983
- Bechtel Power Corporation, San Francisco, California, Special Structure Group, Senior Engineer, 1977-1981
- URS/Blume, San Francisco, California, Principal Engineer, 1977-1978
- University of California at Berkeley, Research Assistant, 1975-1977
- EDS Nuclear, Inc., San Francisco, California, Associate Engineer, 1973-1974
- University of California at Berkeley, Research Assistant, 1971-1972
- ROC Air Force, Chia Yi Air Base, Construction and Maintenance Unit, Second Lieutenant, 1970-1971

### **Active Membership in Professional and Scientific Societies**

- American Society of Civil Engineers (ASCE), Member
- Association of General Contractors of America, Advisor, UNC Charlotte Student Chapter

### **Honors/Awards/Recognitions**

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

### **Selected Recent Publications/Presentations/Grant Awards**

- "Retrofitting a Missouri Steel Baghouse," *Journal of Performance of Constructed Facilities*, Vol. 18, No. 3, August, 2004, pp 159-164.
- "Engineering 2002 UNC Charlotte Solar House," Green Engineering Conference, Florida, May 2003.
- "Performance of Inclometers 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.
- "Performance of Inclometers in Diaphragm Walls," ASCE Geo-Institute Third International Conference, *ASCE Geotechnical Special Publication No. 90, Geo-Engineering For Underground Facilities*, June 1999, pp 900-911.
- "The Effects of Construction Joints in Mass Flowable Concrete," *ASCE Materials Journal*, Vol. 10, No. 1, February 1998, pp 34-39
- "Barricades on the Roads," *Civil Engineering*, Volume 67, Number 4, April 1997, pp 64-65
- "Construction and Instrumentation of a Large-Sized Diaphragm Wall," 1997 University of Washington Construction Seminar, Seattle, May 1997
- "The Effects of Construction Joints in Mass Concrete," *Proceedings of the Fourth ASCE Materials Engineering Conference*, Volume 1, pp 193-202, Washington D. C., November 1996
- "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*, Beijing, China, October 1996

- “Thermal Cracking in the Diaphragm-Wall Concrete of Kawasaki Island,” *Proceedings of the International RILEM Symposium*, pp 393-400, Munich, Germany, October 1994
- Donald D. Liou,, Kwok T. Lam & Tomas R. Lammers, “International Trends in Bridge Design,”, 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 1989
- Liou, Donald, “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
- PI, “SOLAR DECATHLON 2001-2002: The Generative Urban Dwelling,” National Renewable Energy Laboratory (NREL), Department of Energy (DoE Seed \$5,000, total \$130,000), 2001-2002
- “A Feasibility Study on Using Aluminum in Soft-Ground Traffic Tunnels,” UNC Charlotte Faculty Research Grant, 1996

#### **Institutional and Professional Service (last five years)**

- New Construction Faculty Search Committee, Member, 2005
- Engineering Department Promotion and Tenure Review Committee, Member, 2004 & 2005
- CIET FAIT, ongoing
- Engineering Department Promotion and Tenure Review Committee, Member, 2002 & 2003
- Engineering Technology Department Chair Search Committee, Member, 2002
- Solar Decathlon Advisor 2001-2002, attended Solar Decathlon competition in Washington, D.C., September 2002
- College of Engineering Tenure and Promotion Committee, Member, 2001
- Committee on General Education, Member, 2001
- Attended ET Department Articulation Conference, 1999
- Judge, Charlotte-Mecklenburg Regional Science Fair, 2004
- Central Piedmont Community College, Surveying and Civil Engineering Program Advisory Board, Member, 2000-2004
- Provided expert-witness supports to Mikropul on litigation of the failure of a heavy industrial structure: the sugar-creek steel bag-house in Kansas City, Missouri, 2003
- Structural consultant, retrofit Sugar-Creek steel bag-house in Kansas City, Missouri for designed wind forces, 2001. Provide technical support to Mikropul, 2002
- Thesis committee member for Civil Engineering student, 2000
- Book Review: *Engineering Economy for Decision Making*, Joseph Hartman, 2004
- Book Review: *Fundamentals of Structural Analysis, 2nd Edition*, Leet and Uang, 2004
- Book Review: *Construction Methods and Management, 5<sup>th</sup> Edition*, S.W. Nunnally, 2002
- Book Review: *Structural Analysis*, 1997
- Book Review: *Elements of Structures, 2<sup>nd</sup> Edition*, Morgan and Buckle, 1997
- Book Review: *Structural Steel Drafting*, 1996
- Book Review, *Design of Reinforced Concrete, 4<sup>th</sup> Edition*, Jack C. McCormac, 1996

#### **Professional Development Activities (last five years)**

- Attended “Environmentally Sensitive Construction,” NSF Workshop, Columbia, South Carolina, January 13-14, 2005
- Attended AISC Faculty Workshop, Chicago, September 29, 2004
- Attended International Conference on Sustainable Engineering and Science, Infrastructure, Auckland, New Zealand, July 6-9, 2004
- Attended “Defining the Principles,” ECI Green Engineering Conference, Florida, May 18-22, 2003
- Attended “Design and Installation of Buried Pipes,” ASCE Workshop, Las Vegas, NV, February 7-8, 2002
- Attended UNCC workshops on distance education and e-Learning

## **CARLOS E. 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
- REGISTERED PROFESSIONAL ENGINEER, Colombia

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

4 years, Department of Engineering Technology, Civil Engineering Technology

Original appointment July 2001 at the rank of Associate Professor; received tenure effective July 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
- American Institute of Aeronautics and Astronautics (AIAA), Member
- American Society of Civil Engineers (ASCE), Member

### **Honors/ Awards/Recognitions**

- 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., "Application of the Strain-Compatible Volume-Averaging Method to Viscoelastic Analysis of Composites". Proceedings of the 11<sup>th</sup> 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 10<sup>th</sup> 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 9<sup>th</sup> 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 13<sup>th</sup> 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 4<sup>th</sup> 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)**

- CIET FAIT, Member, ongoing
- University Faculty Employment Status Committee (FESC), Member, ongoing.
- Faculty Council, Alternate, 2003-2004.
- Department of Engineering Technology Faculty Search Committee, Member, 2002, Civil Engineering Technology.
- Department of Engineering Technology ABET Committee, Member, year
- Department of Engineering Technology Faculty Search Committee, Member, 2003, Fire Safety.
- Explore UNC Charlotte, Engineering Technology Department Representative, 2003 & 2004
- Structures Advisor, North Carolina Space Grant Consortium, "Aqueous Diffusion Rates (ADR) Project," 2003
- Session Chair: Tenth International Conference on Composites/Nano Engineering, ICCE/10, New Orleans, LA 2003
- Reviewer: Composites B: Engineering, 2003
- Reviewer: International journal of Solids and Structures (IJSS), 2004.

#### **Professional Development Activities (last five years)**

- 11<sup>th</sup> International Conference on Composites/Nano Engineering, ICCE/11, Hilton Head Island, SC, August 2004.
- 10<sup>th</sup> International Conference on Composites/Nano Engineering, ICCE/10, New Orleans, LA, July 2003
- 9<sup>th</sup> International Conference on Composite Engineering, ICCE/9, San Diego, California, July 2002