UNC CHARLOTTE
The University of North Carolina at Charlotte
9201 University City Boulevard
Charlotte, NC 28223-0001

Office of the Chancellor
Telephone: 704/687-2201
Facsimile: 704/687-3219

March 7, 2003

Dr. Gretchen Bataille
Senior Vice President for Academic Affairs
Office of the President
University of North Carolina
Post Office Box 2688
Chapel Hill, North Carolina 27515-2688

Dear Dr. Bataille:

Enclosed are five copies of a request for authorization to establish a new Master of Science in Mathematical Finance. This program is part of UNC Charlotte's commitment to respond to the needs of our region's large financial services sector. As the banking and finance industries' have become increasingly dependent on mathematically intensive tools, there has been an increase in the demand for workers trained in the discipline of mathematical finance. An M.S. in Mathematical Finance at UNC Charlotte will support the banking and finance industries that are vital to the Charlotte and North Carolina economies.

Thank you for your consideration of this request. Interim Provost Wayne Walcott or I would be pleased to respond to any questions that you may have regarding this request.

Sincerely yours,

J. H. Woodward
Chancellor

Enclosures (5 copies)

cc: Interim Provost Wayne A. Walcott
Dr. Claude C. Lilly III
Dr. Schley R. Lyons
Dr. Thomas L. Reynolds

The University of North Carolina at Charlotte

Master of Science in Mathematical Finance

Request for Authorization to Establish

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: February 28, 2003

Constituent Institution: The University of North Carolina at Charlotte

CIP Discipline Specialty Title: Multi/Interdisciplinary Studies, Other

CIP Discipline Specialty Number: 30.999 Level: B ☐ M ☒ 1st Prof ☐

Exact Title of Proposed Program: Master of Science in Mathematical Finance

Exact Degree Abbreviation (e.g. B.S., B.A., M.A., M.S., Ed.D., Ph.D.): M.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* 2003

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. *Not applicable*

TABLE OF CONTENTS

Executive Summary

The University of North Carolina at Charlotte proposes the creation of a new Master's degree, the Master of Science in Mathematical Finance. This program will be an interdisciplinary program between the Departments of Finance and Business Law, Economics, and Mathematics.

This program will make an important contribution to UNC Charlotte's mission to provide excellent graduate level education of professionals in the Charlotte region. The Mission Statement of UNC Charlotte identifies (1) Business and Finance and (6) Applied Sciences and Technologies as two of its broad areas of concern to the region. This program, a combination of these two major areas of concern, will provide educational and economic advantage to the region.

Charlotte is the nation's second largest banking center and a major financial services hub. This program will fill an important need in Charlotte. Finance in general, and banking in particular, is becoming much more mathematically rigorous. Most financial institutions, and many non-financial corporations that have significant exposure to financial risk, now maintain dedicated staffs of mathematical finance professionals. Given the tremendous importance of mathematical finance to the banking industry, and the especially crucial role that banking plays in both the Charlotte and North Carolina economies, it is a natural step in its evolution for UNC Charlotte to begin offering an M.S. in Mathematical Finance. This proposal has received endorsement and support from Bank of America, Wachovia, and Duke Energy.

The educational objective of the program is to produce graduates with strong foundations in both mathematical modeling and financial economics combined with a keen knowledge of business practices. In particular the program will seek to:

1. create a continuous supply of highly skilled graduates for a variety of high-end financial market positions;
2. prepare students who can teach college level math and finance courses;
3. prepare graduates for entry into a variety of doctoral programs including those in finance, mathematics, and economics.

To accomplish these goals, the curriculum draws upon courses from five disciplines: Financial Economics and Econometrics, Statistics, Stochastic Processes, Numerical/Optimization Methods, and Computational and Empirical Finance. The proposed program will draw its teaching faculty from three departments: the Department of Mathematics in the College of Arts and Sciences, the Department of Finance and Business Law in the Belk College of Business Administration, and the Department of Economics in the Belk College of Business Administration. Each department currently has faculty and facilities in place to support this program and can do so without harming other degree programs. This program will complement and share some courses with the M.S. in Mathematics and M.S. in Economics programs.

The proposed program will require the successful completion of 30 hours of graduate level course work. Electives can be selected to orient the graduate for a career in the retail and management

sectors of the financial services industry, or for the product development, pricing, and risk analysis sector of the industry.

Entrance requirements to the program will be competitive. Students will have to enter with at least a 2.75 grade point average (out of a 4.0 scale), and with at least a 3.0 in their junior and senior year. Students must also score satisfactorily on the GRE or GMAT, and they must have substantial coursework in both finance and mathematics. Students from non-English speaking countries will have to demonstrate proficiency in English through acceptable scores on the TOEFL or MELAB exams.

UNC Charlotte anticipates that students in the program will be a mixture of part-time and full-time students. Initial enrollment in the program is expected to be 10 full-time students and 5 part-time students, with enrollment expected to reach a steady state of 30 full-time students and 20 part-time students after 4 years.

There are no duplicate programs offered in North Carolina at this time. This year a Master of Science in Financial Mathematics program has been established at North Carolina State University, but this program has significant, fundamental differences from the program proposed at UNC Charlotte. Some specialized, related course work can be obtained at Duke University and the University of North Carolina at Chapel Hill, but these Universities do not offer a complete graduate degree in this field.

I. Description of the Program

A. Describe the degree program.

In the past thirty years a revolution has occurred in the theory and practice of finance. Pioneering academic researchers such as Fisher Black and Nobel laureates Robert Merton and Paul Samuelson demonstrated that it was possible to model financial assets using the same mathematical methods that mathematicians and physical scientists use to model physical processes. In particular they demonstrated that combining financial economics theory with advanced probability theory and stochastic calculus allowed one to develop very precise measures of risk for certain financial assets and to develop pricing algorithms for instruments such as stock options, commodity futures contracts, and interest rate swaps. The success of this approach has been overwhelming; it has permitted the creation of new markets and instruments that have come to be crucial to virtually all market participants. This has led to the recognition within the financial community of a new specialty, that of mathematical finance.

With the emergence of mathematical finance as a distinct discipline, students and employers are demanding that universities provide graduate programs that will prepare students to work in this field. Under the traditional graduate business degree, the Master of Business Administration, it is difficult for a student to receive this preparation. MBA degrees are designed to expose students to many functional areas of business, not just finance. It is also usually very difficult for a student in an MBA program to take the significant number of mathematics courses that would be required to become prepared to embark upon a career in mathematical finance. As a result, a growing number of universities are creating and offering interdisciplinary M.S. degrees in mathematical finance. Given the tremendous importance of mathematical finance to the banking industry, and the especially crucial role that banking plays in both the Charlotte and North Carolina economies, it is a natural step in its evolution for UNC Charlotte to begin offering an M.S. in Mathematical Finance.

The program proposed here is designed to prepare graduates for a career in mathematical finance. The primary focus of the program will be to prepare students for careers in the private sector. The program will be sufficiently rigorous, however, to prepare students to enter doctoral programs in finance, mathematics, economics, or mathematical finance. The proposed program will be targeted toward students with undergraduate degrees in mathematics or those with undergraduate degrees in finance, economics, engineering, or computer science who also have a strong mathematical background.

The curriculum of the proposed program spans five disciplines: Financial Economics and Econometrics, Statistics, Stochastic Processes, Numerical/Optimization Methods, and Computational and Empirical Finance. The proposed program will draw its teaching faculty from three departments: the Department of Mathematics in the College of Arts and Sciences, the Department of Finance and Business Law in the Belk College of Business Administration, and the Department of Economics in the Belk College of Business Administration.

The proposed program will require the successful completion of 30 hours of graduate level course work. Electives can be selected to orient the graduate for a career in the retail and management sectors of the financial services industry, or for the product development, pricing, and risk analysis sector of the industry. It is expected that students will be housed in one of the three participating departments.

B. Education Objectives

Objective: The general objective of the program will be to produce graduates with strong foundations in both mathematical modeling and financial economics combined with a keen knowledge of business practices. In particular the program will seek to:

4. create a continuous supply of highly skilled graduates for a variety of high-end financial market positions
5. prepare students who can teach college level math and finance courses
6. prepare graduates for entry into a variety of doctoral programs

C. The relation 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

The program is interdisciplinary and will primarily share courses between the Department of Mathematics in the College of Arts and Sciences and the Department of Finance and Business Law and the Department of Economics in the Belk College of Business Administration. Certain undergraduate courses may receive marginally increased enrollments by students seeking to strengthen their background for admission to the program.

Some of the courses in the proposed program will be used by other graduate programs. In particular, the Financial Economics Theory, Financial Econometrics, Mathematical Economics, Advanced Macroeconomic Theory, and Advanced Microeconomics Theory courses will all be available to students in the M.S. in Economics program. Similarly, the Applied Probability I, Applied Probability II, Analysis I, and the Numerical Solution of Ordinary Differential Equations courses are frequently taken by students enrolled in the M.S. in Mathematics program. Finally, the Derivatives I: Financial Elements of Derivatives and the Risk Management and Fixed Income Derivatives courses will be available to qualified students in the Master of Business Administration program on a case by case basis.

2. Faculty

There are a number of faculty in each department who will be involved in this program.

<u>Mathematics</u>
Full Professors 7 (W. Cai, Klibanov, Papadopoulos, Quinn, Sonin, Wihstutz, Zhu)
Associate Professor 3 (Anderson, Z. Cai, Zhang)
Assistant Professor 2 (Kawszak, Kim)

<u>Finance and Business Law</u>
Full Professors 3 (Nunnally, Ott, Sealey)
Associate Professors 3 (Blenman, Buttimer, Plath)
Assistant Professors 2 (Clark, Halek)

<u>Economics</u>
Full Professors 3 (Amato, Gandar, Zuber)
Associate Professors 3 (McGregor, Lin, Russo)
Assistant Professor 2 (Radchenko, Troyer)

3. Facilities

This program will be housed jointly in the Department of Mathematics, the Department of Finance and Business Law and the Department of Economics. The advising and administrative capabilities of these departments will easily accommodate the additional load. These departments are already well equipped with computer lab facilities that can handle the increased load, although some modest increases in capacity may be necessary in due course. Some strain will be felt in terms of providing suitable office space for those in the program who will have tutoring and instructional duties, although this should ease as various buildings currently planned or under construction come online.

4. Other resources

None.

II. JUSTIFICATION FOR THE PROGRAM

A. Description of the program

1. Relationship to the Institutional Mission

This program will make an important contribution to UNC Charlotte in its mission to provide excellent graduate level education of professionals in the Charlotte region. It will provide educational and economic advantage to the region. The Mission Statement of UNC Charlotte identifies (1) Business and Finance and (6) Applied Sciences and Technologies as two of its broad areas of concern to the region. This program is natural combination of the two.

2. Student Demand

Most of the other programs in the country charge very high tuition and fees and must still turn away qualified students. Students come from all over the world to obtain these highly valued degrees. Many of the kinds of students this program is designed to attract are already acquiring jobs in the private sector at related tasks. This program would be attractive to these students as a means of better preparing for the careers they are seeking.

3. Societal need

The exceptional demand for such a program has been communicated to both the Department of Finance and Business Law and the Department of Mathematics by members of the local business and finance sectors. A number of local financial institutions, notably Wachovia and Bank of America, have stated that they have difficulty recruiting from the highly successful programs at the University of Chicago and Carnegie Mellon University. The reason for this is that graduates of those programs are more interested in going to either Wall Street or the Chicago financial markets. Creating a local supply of well trained mathematical finance graduates would help these firms in recruiting, and both Wachovia and Bank of America have expressed support for UNC Charlotte creating a mathematical finance program. North Carolina-trained North Carolinians are the best answer for North Carolina-based businesses. It

has been a cooperative effort from the beginning in designing this program

While the banking sector has been a major beneficiary of the development of mathematical finance as a field, it has not been the only beneficiary. Insurance companies, pension funds, mutual fund companies, energy companies, and investment banks all rely heavily upon mathematical finance. While the enormous presence of the banking industry in this region is very well known, there are a large number of other firms in the region that would also be potential employers for graduates of this program. These would include: Duke Energy Trading and Marketing (Charlotte, NC), FPL Group Inc (Juno Beach, FL), Progress Energy in the Progress Ventures business unit (Triangle area, NC), Cinergy Power Marketing and Trading (Cincinnati, OH), Louisville Gas & Electric Power Marketing (Louisville, KY), Sonat Power (Birmingham, AL), and Southern Company Energy Marketing (Atlanta).

4. Impact on existing undergraduate and/or graduate academic programs of UNC Charlotte

Currently, a graduate student wishing to study finance at UNC Charlotte would most likely do so through the Master of Business Administration (MBA) program. The UNC Charlotte MBA program, like most MBA programs nationally, is designed to provide the student with a general business degree. Although students can elect to concentrate in finance, this means that, at most, they will be able to take four or five finance classes, with the remainder of their courses in fields such as management or marketing. A student in the Master of Science in Mathematical Finance program, however, would have all of their courses directly relating to mathematical finance. It will be a much more focused, specialized degree.

Because the proposed M.S. in Mathematical Finance is so much more specialized, it is anticipated that it will not be perceived to be a close substitute for the MBA degree. That is, it will not be drawing from the same pool of potential students, nor will it be placing students into the same pool of potential jobs. The MBA degree will draw students who want a general business education, while the M.S. in Mathematical Finance will draw students who want a technical, highly focused program. As a result, it is anticipated that the creation of a M.S. in Mathematical Finance will not significantly affect the MBA program.

The only other program in the Belk College of Business that could be affected to any significant degree is the Master of Science in Economics program. This program currently has an Economics/Finance track, and undoubtedly some students who would have enrolled in that track will elect to enroll in the M.S. in Mathematical Finance. The Economics/Finance track of the M.S. in Economics, is, however less mathematical than the proposed M.S. in Mathematical Finance, and it attracts students who are more interested in general economics and finance careers. As a result, it is anticipated that the most likely affect on the M.S. in Economics program is for there to be some healthy cross fertilization between the programs.

The M.S. in Mathematical Finance may initially also attract students who might have chosen to major in another area of Mathematics or Statistics, but this should not be regarded as a serious concern. Many students who have completed a Master's in Mathematics or Statistics have chosen a career in the financial sector. However, there are enough students interested in other aspects of Mathematics, Statistics, and Mathematics Education to keep those programs viable and healthy. The increased visibility that would be a result of (jointly) housing a Master of Science in Mathematical Finance program may in fact serve as an effective recruiting tool for

each of the Master's programs and the Ph.D. in Applied Mathematics. The program should also increase opportunities for undergraduates to participate in faculty research projects

B. Discussion of potential program duplication and program competitiveness

1. Similar programs offered elsewhere in North Carolina, their location and distance from the proposing institution.

There are no duplicate programs offered in North Carolina at this time. This year a Master's in Financial Mathematics program has been established at North Carolina State University (NC State), but this program has significant, fundamental differences from the program proposed at UNC Charlotte. Some specialized related course work can be obtained at Duke University and University of North Carolina at Chapel Hill. All are about 140 miles, or 2.5 hours, by car from the University of North Carolina at Charlotte.

2. Indicate how the proposed new degree program differs from other programs like it in the University. If program duplicates other UNC programs, explain a) why it is necessary or justified and b) why demand (if limited) might not be met through a collaborative arrangement (perhaps using distance education) with another UNC institution. If the program is a first professional or doctorial 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 does not duplicate any other program offered by UNC Charlotte or the UNC system, although it is similar to the recently established Mathematical Finance program at NC State. The proposed program differs from the NC State program, however, in that it places a greater emphasis on economics and finance, and that it is primarily geared toward the banking industry. Given that Charlotte, the largest U.S. banking center outside of New York, is the home of Bank of America, Transamerica Reinsurance, Royal and Sun Alliance, and Wachovia Bank, it is only logical that a Mathematical Finance program at UNC Charlotte would emphasize banking. Further, the NC State program places a far greater emphasis on the energy, commodity, and natural resource sectors. These industries have financial risks, institutions, trading practices, and regulatory environments that are very different from those of the banking sector. As a result, students attending the two programs will graduate with substantially different, albeit related, skills.

Regionally, there are two other Universities that offer mathematical finance programs. The closest program, both in terms of physical distance and programmatic similarities, is at the Georgia Institute of Technology (Georgia Tech). The Georgia Tech M.S. in Computational Finance is housed in their Mathematics Department and utilizes faculty from both the Finance Department and the Mathematics Department. It does appear, however, that Georgia Tech does not emphasize economics as much as the program proposed here - the program lists no economics faculty as being affiliated with the program. The Georgia Tech program is small, with plans to grow to only 20 or so students. At that size, it is unlikely that their program can produce enough students to fill the demand of the metropolitan Atlanta area, much less provide graduates for the Charlotte region.

The second regional program that offers mathematical finance is Florida State University (FSU). FSU offers both an M.S. in Financial Mathematics and a Ph.D. in Financial

Mathematics. Similar to the program proposed here, the FSU program combines courses in finance, mathematics, and economics. The FSU program, however, also seems to place emphasis on actuarial science, not mathematical finance as it applies to banking. Further, given that FSU is over 500 miles from Charlotte, it is unlikely that FSU can produce enough graduates to meet the need for mathematical finance professionals for the Charlotte banking community.

C. Enrollment

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.

There is no history of UNC institutions with a similar program.

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

It is reasonable to expect a steady-state enrollment in the program of as many as 30 full-time students. The following table assumes that full-time students will require at least 3 semesters, or 1.5 years, to complete the program, and part-time students will require four years to complete the program. The table assumes that 10 full-time students are admitted in Year 1, 15 full-time students are admitted in Year 2 and each subsequent year. The table also assumes that five part-time students are admitted to the program each year.

	Year 1 (2003-04)	Year 2 (2004-05)	Year 3 (2005-06)	Year 4 (2006-07)
Full-time	10	25	30	30
Part-time	5	10	15	20
TOTALS	**15**	**35**	**45**	**50**

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

Full-time 30 Part-time 20 Total 50

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).

The following tables assume that a full-time student will enroll for 9 hours per semester in each of their first 2 semesters in the program, and then for 12 hours in their final semester. The table

assumes that part-time students take 9 hours per year in each of their first three years and 6 hours in their final year.

Year 1	Student Credit Hours		
Program Category	**UG**	**Master's**	**Doctoral**
Category I			
Category II		225	
Category III			
Category IV			

Year 2	Student Credit Hours		
Program Category	**UG**	**Master's**	**Doctoral**
Category I			
Category II		480	
Category III			
Category IV			

Year 3	Student Credit Hours		
Program Category	**UG**	**Master's**	**Doctoral**
Category I			
Category II		585	
Category III			
Category IV			

Year 4	Student Credit Hours		
Program Category	**UG**	**Master's**	**Doctoral**
Category I			
Category II		600	
Category III			
Category IV			

III. PROGRAM REQUIREMENTS AND CURRICULUM

A. Program Planning

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

Top in Country
University of California at Berkeley - Master's in Financial Engineering
Carnegie Mellon University - M.S. in Computational Finance
New York University - M.S. in Mathematics in Finance
Oregon Graduate Institute of Technology - M.S. in Computational Finance
University of Chicago - M.S. in Financial Mathematics
Columbia University - MA in Mathematics (Mathematics of Finance)

Regional
North Carolina State University - M.S. in Financial Mathematics
Florida State University - M.S. in Financial Mathematics
Georgia Institute of Technology - M.S. in Quantitative and Computational Finance

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

In developing this program we were guided by our conversations with Talal T. Hamadah, Senior Vice President, Market Risk Management Group, Wachovia Bank, Charlotte, by our own general awareness of the discipline needs, and by an extensive search through the web sites of the leading US programs. In particular, the programs at Berkeley, Chicago, Georgia Tech, University of Southern California, and Carnegie Mellon were particularly influential. Curriculum guidelines are being envisioned by the International Association of Financial Engineers.

B. Admission. The following lists: (1) admission requirements for proposed the program (indicate minimum requirements and general requirements), and (2) documents to be submitted for admission (listing or sample).

1. Admission requirements

Admission requirements for the Program include:

1. A baccalaureate degree in a related field with a GPA of at least 2.75 out of 4.0 with an average of 3.0 in the junior and senior years.
2. Acceptable scores on each portion of the GRE, or a GMAT score of at least 600, with a minimum score of at least the 85th percentile on the math portion of the GMAT.
3. For applicants from non-English speaking countries, a language requirement score of 550 on the TOEFL or 220 on the new computer-based TOEFL or 85% on the MELAB. Non-native speakers of English, may, at the discretion of either the Graduate School or the Program Committee for the M.S. in Mathematical Finance, be required to enroll in English as a Second Language (ESL) courses at the English Language Training Institute.
4. Specific course work equivalent to the following: introductory course in the Theory of Finance; a standard three-semester sequence in Calculus; Linear Algebra; working knowledge of a suitable programming language; at least one upper-level course in Probability and Statistics. Students lacking this coursework may be admitted subject to the condition that they satisfactorily complete such coursework during the first two semesters that they are enrolled in the program and prior to their taking any program courses where prerequisites are missing.
5. Admission is competitive but efforts will be made to recruit and retain students from the region and students from identifiable minorities.

2. Documents to be submitted include the following

1. a complete application to the Graduate School at UNC Charlotte
2. transcripts from all post-secondary institutions attended
3. GRE score on verbal, quantitative, and analytical aptitude sections, or a GMAT score

4. a personal statement that addresses the applicant's motivation for enrolling in the program
5. three letters of reference

C. Degree Requirements. List the following: (1) total hours required, major, minor; (2) proportion of courses open only to graduate students to be required in the program; (3) grades required; (4) amount of transfer credit accepted; (5) other requirements; (6) language and/or research requirements; (7) any time limits for completion.

1. Total hours required:

Thirty hours of course work beyond the bachelor's degree. The student must complete:

The program core consisting of 24 credits

1. Financial Economic Theory (FINN 6203/ECON 6203)
2. Financial Econometrics (ECON 6219/FINN 6219)
3. Derivatives I: Financial Elements of Derivatives (FINN 6210)
4. Risk Management and Fixed Income Derivatives (FINN 6211)
5. Statistical Techniques in Finance (MATH 6201) or Advanced Business & Economic Forecasting (ECON 6218)
6. Derivatives II: Partial Differential Equations for Finance (MATH 6202)
7. Stochastic Calculus for Finance (MATH 6203)
8. Numerical Methods for Financial Derivatives (MATH 6204)

Completion of 6 credits from Elective Mathematical Finance related courses

1. Directed Study Economics (ECON 6800)
2. Mathematical Economics (ECON 6100)
3. Advanced Macroeconomic Theory (ECON 6201)
4. Advanced Microeconomics Theory (ECON 6202)
5. Graduate Econometrics (ECON 6112)
6. Monetary Theory and Financial Theory (ECON 6235)
7. Applied Probability I (MATH 5128)
8. Applied Probability II (MATH 5129)
9. Analysis I (MATH 5143)
10. Numerical Solution of Ordinary Differential Equations (MATH 5171)
11. Financial Computing (MATH 6105)
12. Special Topics in Finance (FINN 6058)
13. Topics in Economics (ECON 6090)
14. Any MATH/STAT 6200 course level or higher

2. Proportion of courses open only to graduate students

Only four of the elective Math courses in the program (Math 5128, Math 5129, Math 5143, and Math 5171) will be open to select undergraduate mathematics majors.

3. Grades required

Letter grades are used to designate the quality of work completed.

Letter Meaning
(*A*) commendable
(*B*) satisfactory
(*C*) marginal
(*U*) unsatisfactory

A student is expected to achieve *A*s or *B*s in all course work taken for graduate credit and must have a least an average of *B* in order to graduate. More than two *C* grades will result in termination of the student's enrollment in the graduate program. If a student makes a grade of *U* in any course, enrollment will be terminated and the student cannot take any further graduate course work without being re-admitted to the program. Re-admission to the program requires approval of the Dean of the Graduate School upon the recommendation of the Program Director.

4. Amount of transfer credit

No more than 6 credit hours and only courses with a grade of *A* or *B* at an accredited institution. Requires approval of the program committee.

5. Other requirements

Students will be required to pass a comprehensive examination. An examining committee will be appointed by the program director and will be constituted from the programs faculty. The exam may be, at the committee's discretion, either written or oral.

6. Language and/or research requirements

None.

7. Time Limit

University policy requires that no course older than six years may be listed on a master's student candidacy form.

D. List existing courses by title and number and indicate those that are required. Include an explanation of numbering system and describe new courses proposed.

Existing courses (required in parentheses)
1. ECON 6100 Graduate Mathematical Economics
2. ECON 6112 Graduate Econometrics
3. ECON 6201 Advanced Macroeconomic Theory
4. ECON 6202 Advanced Microeconomic Theory
5. ECON 6218 Advanced Business & Economic Forecasting
6. ECON 6235 Monetary and Financial Theory
7. ECON 6090 Topic in Economics
8. ECON 6800 Directed Study in Finance or Economics

9. FINN 6800 Directed Study in Finance
10. FINN 6058 Special Topics in Finance
11. MATH 5128 Applied Probability I
12. MATH 5129 Applied Probability II
13. MATH 5143 Analysis I
14. MATH 5171 Numerical Solutions of Ordinary Differential Equations

New courses Proposed (required in parentheses)

1. FINN/ECON 6203 Financial Economic Theory (required)
2. FINN/ECON 6219 Financial Econometrics (required)
3. FINN 6210 Derivatives I: Financial Elements of Derivatives (required)
4. FINN 6211 Risk Management and Fixed Income Derivatives (required)
5. MATH 6201 Statistical Techniques in Finance (required)
6. MATH 6202 Derivatives II: Partial Differential Equations for Finance (required)
7. MATH 6203 Stochastic Calculus for Finance (required)
8. MATH 6204 Numerical Methods for Financial Derivatives (required)
9. MATH 6205 Financial Computing

See Appendix A for course descriptions.

IV. Faculty

A. List the names of persons now on the faculty who will be directly involved in the proposed program. (Include resumes in appendix or attachment). Provide complete information on each faculty member's education, teaching experience, research experience, publications, and experience in directing student research including number of theses and dissertations directed for graduate programs.

Mathematics:

Name	Rank	Research Interests
Robert Anderson	Associate Professor	Probability and Stochastics
Wei Cai	Professor	Computational and Numerical Analysis
Zongwu Cai	Associate Professor	Statistics
Janusz Kawszak	Assistant Professor	Statistics, Acutarial Science
Hong Joong Kim	Assistant Professor	Computational and Numerical Analysis
Michael Klibanov	Professor	Inverse Problem and Numerical Methods
Alex Papadopoulos	Professor	Statistics
Joseph Quinn	Professor	Probability and Stochastics
Isaac Sonin	Professor	Probability and Stochastics
Volker Wihstutz	Professor	Probability and Stochastics
Zhi Yi Zhang	Associate Professor	Statistics
You Lan Zhu	Associate Professor	Derivatives, Computation, and Option Pricing

Finance:

Name	Rank	Research Interests
Ben Nunnally	Professor	Corporate Finance, Financial Markets, Capital Investments
Steven Ott	Professor	Derivatives, Financial Markets, Real Estate Finance
C. William Sealey	Professor	Banking, Derivatives, Financial Institutions
Lloyd Blenman	Associate Professor	Finance Theory, Derivatives, International Finance
Richard Buttimer	Associate Professor	Derivatives, Real Estate Finance, Fixed Income Finance
Tony Plath	Associate Professor	Banking, Financial Institutions
Steven Clark	Assistant Professor	Mathematical Finance, Derivatives, Corporate Finance
Martin Halek	Assistant Professor	Insurance, Corporate Finance

Economics:

Name	Rank	Research Interests
Ted Amato	Professor	Industrial Organization, Econometrics
John Gandar	Professor	Financial and Sports Economics, Microeconomics
Hwan Lin	Associate Professor	Economic Growth, Public Finance, Microeconomics
Rob Roy McGregor	Associate Professor	Monetary Economics, Econometrics, Macroeconomics
Stanislav Radchenko	Assistant Professor	Time Series, Bayesian Econometrics, Industrial Organization
Ben Russo	Associate Professor	Public Policy, Economic Growth, Macroeconomics
Jennifer Troyer	Assistant Professor	Health Economics, Econometrics, Labor Economics
Rick Zuber	Professor	Financial Economics, Sports Economics

Appendix B contains the vita of the faculty listed above.

B. A projection of 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.

The Department of Mathematics has the expertise to launch the program, and in doing so expects to absorb its part of the program by the present faculty. This may result in a small, temporary reduction in the optional or topics courses available in the graduate program for the

other streams, but this is offset by the fact that the courses offered in this new program have evolved from Topics courses offered in the past and will be available to all Mathematics graduate students. This program will put additional pressure on the part-time instructor budget and recruitment requirements, but this is a problem that is surfacing independent of this program and is not greatly exacerbated by it. In the Department of Mathematics' current list of hiring priorities, a position in Mathematical Finance is listed.

As part of its ongoing effort to increase its emphasis on graduate education, the Belk College of Business has recently hired several new faculty. In particular, recent hires in the Department of Economics and in the Department of Finance and Business Law are sufficient to staff the proposed program.

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

Through the usual evolution and anticipated growth (both graduate and undergraduate), the Department of Mathematics expects to receive new faculty lines in the future and Mathematical Finance will be a consideration when appointment requests are made.

In the near term, no additional resources in the College of Business will be needed.

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

This program will not detract from current activities of the faculty members in the Department of Mathematics. Current research directions have already shifted to this important field and will be supported by the presence of motivated graduate students. The marginal increase in the graduate teaching matrix is a normal evolution of the Department's increasing involvement in graduate education. Until new faculty lines can be secured, there may be a modest increase in the elementary teaching performed by qualified part-time instructors but this too should be offset by the expected increased availability of graduate student teaching assistants.

V. Library

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

Consultation with J. Murrey Atkins Library indicates that in general library holdings are adequate to support the program. Some additions are needed in books and journals. No additional funding requests will be needed to meet these needs. Please see Appendix D for library consultant reports.

B. Improvements needed to library holdings necessary to meet new program requirements for the next five years.

1. Mathematical Finance. An international journal of Mathematics, Statistics and Financial Economics
Blackwell, 350 main St., Malden, MA 02148
ISSN: 0960-1627

4 issues/vol./yr
First Issue 1 1991

2. Risk
Risk Waters Group,
Haymarket House,
28-29 Haymarket,
London SW1Y 4RX,
UK

3. Finance and Stochastics
Springer-Verlag New York Inc.

4. Journal of Financial Economics
NORTH-HOLLAND
Elsevier Science

5. Journal of Empirical Finance
NORTH-HOLLAND
Elsevier Science

6. Games and Economic Behavior
Academic press, 6277 Sea Harbor Dr., Orlando, FL 32887-4900
ISSN: 0899-8256 8 issues/4 vols/yr First Issue 1 1998
http://www.apnet.com/www/journal/ga.htm

7. Sequential Analysis
Formerly Comm. Statistics C. -- Sequential Anal.
Dekker, P.O. Box 5005, Monticello, NY 12701-5185
ISSN 0747-4969
CODEN: SEANEX
4 issues/vol/yr
First issue 3 1984

C. Discuss the use of other institutional libraries

The UNC Charlotte library offers interlibrary loan to its faculty and students**.**

VI. Facilities and Equipment

A. Describe facilities available for the proposed program.

The proposed program will share facilities already available at UNC Charlotte, including the following:

1. Faculty and department offices and classrooms in the Fretwell and the Friday buildings
2. Library resources through the J. Murrey Atkins Library
3. Faculty support center for computing services
4. Computer labs for students
5. Graduate School of UNC Charlotte, which responds to information inquiries, processes

applications for admissions, and monitors progress toward degree completion

B. Describe the effect of this new program on existing facilities

Current facilities are adequate.

C. Indicate any computer services needed and/or available

Current facilities are adequate

D. Indicate sources of financial support for any new facilities or equipment.

None are needed. Additional space will be allocated to the College of Business Administration and the Department of Mathematics as new buildings are constructed through funding approved in the November 2000 bond referendum.

VII. Administration

A. The Graduate School

The executive and administrative affairs of the Graduate School are carried out by the Dean of the Graduate School who acts in cooperation with the deans of the seven colleges of Architecture, Arts and Sciences, Business Administration, Education, Engineering, Health and Human Services, and Information Technology.

B. The Dean of the Graduate School

At the University of North Carolina at Charlotte, the Dean of the Graduate School is the administrative officer with primary responsibility for the supervision of graduate programs. The Dean is responsible for the executive and administrative affairs for The Graduate School in accordance with the policies determined by the UNC Charlotte Graduate Council, the Graduate Faculty, and the Faculty Council. The Graduate School is responsible for monitoring the quality of graduate programs, the final admission of graduate students, appointments to the Graduate Faculty, and supporting the enhancement of research activities essential to the conduct of graduate programs. Consequently, the Dean of the Graduate School will have the primary responsibility for the supervision of the proposed Master's program in Mathematical Finance, along with all other graduate programs at UNC Charlotte. The Graduate Dean acts in cooperation with the Dean of Arts and Sciences, the Dean of the Belk College of Business Administration, the Chair of the Department of Mathematics, the Chair of the Department of Finance and Business Law and the Chair of the Department of Economics.

The Graduate Dean's main duties with respect to this program are:

1. final admission of students
2. approval of programs of study

C. Mathematical Finance Program Committee

A committee will be appointed by the respective Chairs consisting of a Director (usually from the Department of Finance and Business Law), two faculty members each from the Department of Mathematics and the Department of Finance and Business Law, and one from the Department of Economics. This committee will act as the governing body for the program with responsibilities for curriculum and overall program regulations, advising students, recommending admission of new students to the Dean of the Graduate School, and scheduling of program classes (in cooperation with the three department chairs). The Director will certify to the Dean of the Graduate School that a student has completed the requirements for graduation.

D. Mathematical Finance Program Advisory Committee

An advisory committee from the financial business community will be formed to advise the program on its curriculum and program administration, assist with recruiting, and act as liaison between the program and the business community.

E. The Graduate Council

The Graduate Council of UNC Charlotte, whose voting members are elected by the Graduate Faculty from each of the colleges, reviews develops and makes recommendations concerning Graduate School policy. All curricula proposals and all criteria for membership in the Graduate Faculty come before the Graduate Council, which also creates appropriate committees and hears grievances. In addition, the Graduate Council serves in an advisory capacity to the Dean of the Graduate School.

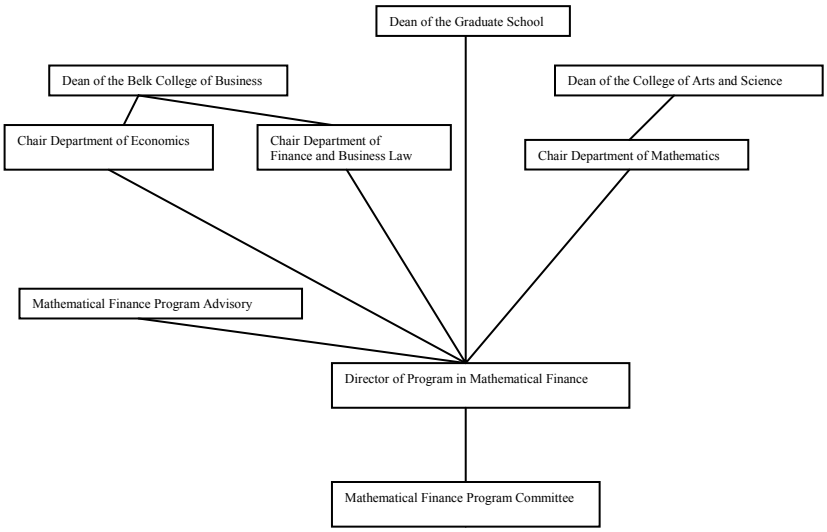
F. The Colleges

The Dean of each College (Arts and Sciences and the Belk College of Business Administration) has administrative responsibility for the supervision of all the departments in the College. The Dean acts in concert with the Chair of each department on matters of personnel.

G. The Departments

Each of the three departments will house students in the program. Each department has a Liaison reporting to the Chair. Each Liaison will work with the Program Committee to handle such routine issues as transfer credit, to assist in student advising, and to monitor the regular offerings of the program's courses which are the responsibility of that unit.

F. Organization Chart



VIII. Accreditation

A. Specific

None. However, the International Association of Financial Engineers is planning a certification in financial engineering. From their web site:

> "This is a reflection of the increasing complexity of today's financial markets, and signifies the coming of age of the financial engineering professional. The growing demands and needs of corporations, public funds, and individual and institutional investors have caused rapid innovation in the financial markets. Today's sophisticated financial markets have spurred the demand for financial professionals with a complex and unique skills set. Quantitative and analytical methods and techniques have become critical to understanding today's financial instruments. The risks and complexities of the financial markets, and the business environment in general, have mandated knowledge of tools traditionally associated with the natural science and engineering disciplines. All the while, traditional disciplines, such as accounting and economics, continue to play an important part in business decisions and market innovation. As a result, a newly formed discipline is evolving that requires a composite mix of skills from historically distinct disciplines. Like other certified professionals, employers need to be able to confidently assess the qualifications of financial engineers, who play a growing role in fields, such as risk management, structuring, etc. The

> certification addresses this need. The requirements for the certification are still in development, and the financial, business, and academic communities are encouraged to provide comments and suggestions for the content, requirements and format of the certification process."

If the IAFE establishes standards for accreditation, UNC Charlotte will investigate accreditation of the proposed program.

B. General:

UNC Charlotte is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (1866 Southern Lane, Decatur, Georgia 30033-4097: telephone number 404-679-4501) to award baccalaureate, master's, intermediate, and doctoral degrees. The Belk College of Business Administration is accredited through the Association to Advance Collegiate Schools of Business (AACSB) (600 Emerson Road, Suite 300 St. Louis, MO. 63141-6762 USA Tel: 314-872-8481 Fax: 314-872-8495)

IX. Supporting Fields

None.

X. Additional Information

None.

XI. Budget

No new faculty positions or SPA positions will need to be budgeted to implement this program during the first three years of operation. Additional resources will derive from increases in student credit hours. Each Department participating in the program already has the faculty and resources to support the proposed program. Please see Appendix E for budget projections for the first three years of program operation.

XII. Evaluation Plans

A. Criteria to be used to evaluate the Program

1. Relevance of content
2. Quality of instruction
3. Quality of graduates
4. Quality of faculty
5. Satisfaction of graduates
6. Satisfaction of employers.

B. Measures used to evaluate program

For students these measures will include the number of graduates, their rate of progress to the degree, performance as students, and success after graduation. Surveys will be made of all

degree recipients one year after graduation to assess their opinions about the program and how it prepared them for positions in industry.

C. Projected productivity levels (Number of Graduates)

The following table is based upon the same assumptions as the student credit hour table presented earlier in this proposal: full-time students complete the program in one and one-half years, while part-time students complete the program in 4 years. In the first year, 10 full-time and 5 part-time students are admitted. In subsequent years 15 full-time and 5 part-time students are admitted. Thus, the first group of 10 full-time students graduate in Year 2, the 15 full-time students admitted in Year 2 graduate in Year 3, and from that point forward 15 full-time students graduate each year. In Year 4 the five part-time students admitted in year 1 graduate, so that the total graduates in that year will be 20 — 15 full time and 5 part time students. Thus, the steady-state graduation rate in year 4 and beyond will be 20.

	Year 1 (2003-2004)	Year 2 (2004-2005)	Year 3 (2005-2006)	Year 4 (2006-2007)	TOTALS
B					
M	0	10	15	20	45
I/P					
D					

D. Recommended Consultant/Reviewers

Rene Carmona
Paul Wythes'55 Professor of Engineering
and Finance
Department of Operations Research and
Financial Engineering
Princeton University — Phone 609-258-2310
Princeton, NJ 08544-5263 — E-mail rcarmona@princeton.edu

Steven E. Shreve, Professor — Phone 412-268-3881
Department of Mathematics — E-mail Shreve@cmu.edu
Carnegie Mellon University
Pittsburgh, PA 15213

Robert Kertz, Professor — Phone 404-894-4311
Director MSQCF Program — E-mail Kertz@math.gatech.edu
School of Mathematics
Georgia Institute of Technology
Atlanta, GA 30332-0160

E. Plan for evaluation prior to fifth year

The Director of the Mathematical Finance program will have primary responsibility in

preparing the one-year and three-year productivity report. The Director will, as a regular part of the annual reporting process, prepare a report on the program status and will submit it to the three department chairs, the Dean of the College of Arts and Sciences, the Dean of the Belk College of Business Administration, and the Dean of the Graduate School.

XIII. Reporting Requirement

Upon solicitation, the Program Director will report on the program's productivity after one year and three years of operation as part of the biennial long-range planning process.

XIV. Reporting Requirement

Proposed date of initiation of proposed degree program: August 2003

This proposal to establish a Master of Science in Mathematical Finance has been reviewed and approved by the appropriate campus committees and authorities

Chancellor _____ **Date** _____

Appendix A

Course Descriptions

ECON 6090 Topics in Economics (1-3) Prerequisite: consent of the department. Topics from various areas of economics. Credit hours will vary with the topic offered. May be repeated for credit as topics vary. *(On demand)*

ECON 6100 Graduate Mathematical Economics (3) Economic problems are analyzed with quantitative techniques. Topics covered include the study of economic growth models, utility maximization, homogeneous functions, dynamic systems, applications of linear programming, and constrained optimization.

ECON 6112 Graduate Econometrics (3) Advanced study of the theory and application of statistics to economic problems. Topics include derivation of least squares estimators: maximum likelihood estimation; and problems of multicollinearity, heteroskedasticity, and autocorrelation.

ECON 6201 Advanced Macroeconomics Theory (3) Prerequisites: Admission to graduate program. Theories of aggregate income determination, inflation, unemployment, interest rates, and economic growth; macro-economic consumption and investment behavior; the business cycle.

ECON 6202 Advanced Microeconomic Theory (3) Prerequisites: Admission to graduate program. Theories of the firm, of the consumer, and of resource owners; determination of price under different market structures; general equilibrium analysis and welfare economics.

ECON 6218 Advanced Business and Economic Forecasting (3) Prerequisite ECON 6112**.** Develops forecasting techniques used in business decision making and techniques used in forecasting macroeconomic variables. Topics include: estimation, identification and prediction using ARMAX, state space, and Box-Jenkins models; spectral analysis; linear filtering**.**

***ECON 6219 /FINN 6219 Financial Econometrics (3)** Prerequisites: ECON 6218 or MATH 6201. Advanced time series with financial applications. Topics covered include time series regressions (univariate and multivariate, stationary and non-stationary) and time series models (including ARMA, ARCH, GARCH, stochastic volatility and factor models). The emphasis will be on model properties, estimators, test statistics, and applications in finance.

***ECON 6203 / FINN 6203. Financial Economic Theory (3)** Prerequisites: Admission to graduate program and permission of program director. Review of financial economic theory using discrete-time models. Topics include: risk measurement; choices under uncertainty; portfolio selection; capital asset pricing model (CAPM); Arrow-Debreu pricing; options and market completeness; the Martingale measure; arbitrage theory; consumption-based CAPM; and valuation of the firm.

ECON 6800 Directed Study in Economics (1-3) Prerequisite: Admission to M.S. program in Economics or Mathematical Finance. Independent study of a theoretical and/or a policy problem in a special area of economics. Topics of the investigation may originate from the student or from the faculty member supervising the study. May be repeated for up to 6 hours of credit with the approval of the program coordinator. *(On demand)*

FINN 6058 Special Topics in Financial Services (3) Prerequisite: FINN 6152. Each year, the subject

matter of this course deals with a different specialized and contemporary topic of interest to students who are preparing for management careers in the financial services industry. Emphasis is placed on the managerial implications of the subject matter as well as the impact on the financial system. Topics covered in this course may vary from semester to semester, and the course may be repeated a maximum of one time for academic credit.

***FINN 6210 Derivatives I: Financial Elements of Derivatives (3)** Prerequisite: FINN 6152 or equivalent, or permission of department. Theory and practice of financial derivatives markets including forwards, futures, and options markets. Topics include the economics of derivatives markets, pricing models for instruments in these markets, strategies for hedging and speculation, as well as regulatory and governance issues.

***FINN 6211 Risk Management and Fixed Income Derivatives (3)** Prerequisite: FINN 6210 or permission of department. Risk management of fixed income portfolios as well as the theory and practice of fixed income markets. Topics include fixed income instruments, term structure models, pricing methods, portfolio management, duration and convexity, securitization, and hedging.

MATH 5128 Applied Probability I (3) Prerequisite: MATH/STAT 3122 and MATH 2171 or consent of the department. Finite and countable Markov chains, Markov decision processes, and optimal stopping. Other topics selected from: queuing theory, inventory models, reliability theory, game theory, recurrent events, information theory, stochastic control, stochastic control with incomplete information, and Kalman filtering.

MATH 5129 Applied Probability II (3) Prerequisite: Math 3128 or consent of the department. Continuation of Math 5128.

MATH 5143 Analysis I (3) Prerequisite: MATH 3141 with a grade of *B* or better, or consent of the department. First course of a two-semester sequence providing a rigorous treatment of continuity, differentiability and integration of functions of one or several real variables.

MATH 5171 Numerical Solutions of Ordinary Differential Equations (3) Prerequisites: CSCI 1100 or 1201 and 1201L, MATH 2241, 2164, and 2171, all with a grade of *C* or better, or consent of the department. Numerical solution techniques for ordinary differential equations such as Runga-kutta, multistep and extrapolation methods. Stiff solvers and stability criteria. Comparative work with modern robust codes and visualization methods.

MATH 6201 Statistical Techniques in Finance (3) This course reviews basic concepts and introduces more advanced techniques from Probability and Statistics which are commonly utilized in mathematical finance. Topics covered include random variables, distributions, conditional expectations, confidence intervals and hypothesis testing, simple and multiple regression, multivariate analysis including factor and canonical correlation analysis, and time series models including ARMA, ARIMA, ARCH, and GARCH**.**

MATH 6202 Derivatives II: Partial Differential Equations for Finance (3) This course deals with those partial differential equations which are associated with financial derivatives based on factors such as equities and spot interest rates.

MATH 6203 Stochastic Calculus for Finance (3) An introduction to those aspects of partial differential equations and diffusion processes most relevant to finance, Random walk and first-step analysis, Markov property, martingales and semi-martingales, Brownian motion. Stochastic differential equations: Ito's lemma, backward and forward Kolmogorov equations, the Feynman-Kac formula, stopping times, Hull and White Models, Cox-Ingersoll-Ross Model. Applications to finance including portfolio optimization and option pricing.

MATH 6204 Numerical Methods for Financial Derivatives (3) This course will introduce students to numerical and computational techniques for solving both European- and American-style financial derivatives. The approach will be the finite difference method and the basic theoretical concepts will be introduced. Final projects will involve implementing the techniques on computers. Some spectral and Monte Carlo methods will also be discussed.

MATH 6205 Financial Computing (3). This lab-oriented course introduces the numerical methods needed for quantitative work in finance, focusing on derivative pricing and fixed income applications. Topics include binomial and trinomial methods, Crank-Nicholson methods for various exotic options, treatment of discrete dividends, numerical methods for stochastic differential equations, random number generators, Monte-Carlo methods for European and American options. The computing class teaches theory and practice of numerical finance as well as the programming skills needed to build software systems in C/C++, Java, Javascript, and Mathematica/Matlab.

Appendix B

Faculty Vita

Department of Mathematics
Faculty

Name and Rank: Robert F. Anderson
Associate Professor

Education: Ph.D. Mathematics, University of Minnesota Mpls., Minn. June 1972

B.S.(1964) and M.S. (1966), Iowa State University, Ames, Iowa

Professional Experience

Regular Positions:
Associate Professor of Mathematics, University of North Carolina at Charlotte, North Carolina, 1983 - present.

Instructor, Assistant Professor of Mathematics, University of Pittsburgh, Pittsburgh, PA 1971-1980.

Visiting and Research Positions:

Assistant Professor of Mathematics, Iowa State University, Ames, Iowa 1982-1983.

Post Doc Carnegie-Mellon University, Pittsburgh, PA National Research Service Award, Psychiatric Statistics 1980-1982.

Assistant Professor of Mathematics, Carnegie-Mellon University, Pittsburgh, PA Jan-May 1979.

Institute de Recherche D' Informatique Et D'Automatique, 105 78153 Le Chesnay Cedex, France July-Dec. 1978. Research.

Assistant Professor, Univ. of Minnesota, Mpls, Minn. Jan-Aug 1975
Leave of Absence Sept-Dec 1974. Activities: Research.

Published Papers

1. Comparison of Two Modes of Order Convergence, (with J. C. Mathews), Pro. A.M.S., Vo 18 (1967) p. 100-104.
2. Diffusions with Second Order Boundary Conditions, Part I, Indiana University Math. Jr., Vo. 25 (1976), p. 367-395.
3. Diffusions with Second Order Boundary Conditions, Part 2, Indiana University Math. Jr., Vo. 25 (1976), p. 403-441.
4. Small Random Perturbation of Dynamical Systems with Reflecting Boundary, (with S. Orey), Nagoya Math. Jr., Vo. 60 (1976), p. 184-216.
5. A Quality Control Problem with Quasi Variational Inequalities, (with A. Friedman), Arch. Rational Mech. Annl.,Vo. 63 (1977), p. 205-252.
5. Small Random Perturbation of Dynamical Systems with Reflecting Boundary, (with S. Orey), Proc. of Symposia in Pure Math., Vo. 31 (1977), p. 1-4.
7. A multi-dimensional Quality Control Problem and Quasi Variational Iequalities, (with A. Friedman), Trans. A.M.S., Vo. 246 (1978), p. 31-76.
8. Quality Control for Markov Chains and Free Boundary Value Problems, (with A. Friedman), Trans. A.M.S., Vo. 246 (1978), p. 77-94.

9 Optimal Inspection in a Stochastic Control Problem with Costly Observations, Part 1, (with A Friedman), Math. of Operations Research , Vo. 2, (1977), p. 155-196.
10. Optimal Inspection in a Stochastic Control Problem with Costly Observations, Part 2, (with A. Friedman), Math. of Operations Research, Vo. 3, (1978), p. 67-81.
11. Optimal Stopping in a Reliability Problem, Stochastic Analysis, Edited M. Pinsky, Academic Press (1978), p. 1-23.
12. Dynamics of Bayes Estimates for the Rate of Poisson Processes with Gamma priors and Convex Loss, Statistics and Probability Letters, Vo. 2 (1984), p. 147-187.
13. Replacement with Non-Constant Operating Cost, SIAM Jr. of Control and Optimization, Vo. 26 (1988), p. 1076-1098.
14. Discounted Replacement, Maintenance, and Repair Problems in Reliability, Math of Operations Research, Vo. 19 (1994), p. 909-945.
15. One Dimensional Random Walk in a Random Medium (with S. A. Molchanov) , pp25-56, Stochastic Models in Geosystems, Vo 85 IMA Volumes in Mathematics and its Applications, Edited by S A Molchanov and W A Woyczynski, Spring Verlag (1997)
16. Martingale Methods in Real Analysis (with S Molchanov) PP66-80, Skorokhod's Ideas in Probability Theory, Vol. 32 Proceeding of the Institute of mathematics of the national Academy of Sciences of Ukraine, Kyiv (2000).

Technical Reports

1. Optimal Stopping with Non-anticipative Cost, (with A. Friedman), (1976).
2. Optimal Stopping in a Reliability Problem, (with J. K. Ghosh), (1978).
3 Optimal Stopping for Poisson Processes and Other Related Models, with W. E. Winkler), (1979).
4 The Silicon Oxidation Problem, A preliminary report, (with Robert E Terrell) (1986)
5 Accelerated Life Testing of Systems Whose Wear is Governed by an ODE, (with T. Goldring and J. Quinn), UNCC-Technical Report (1986).
6 Review of Matters Relevant from the book Stochastic Wave Propagation by Kazimierz for High Frequency Wave Propagation in Random Media Consulting Report (1990).
7. Long Run Average Maintenance Problems, (1990).

Invited Talks

1. "Discounted repair, maintenance and replacement problems for a wear model with random threshold" UK-UT Conference on Control, October 8, 1990, U of Tenn., Knoxville.
2. "Discounted replacement, maintenance and repair in a problem in reliability", Steven Orey Memorial Symposium, October 5, 1991, U of Minn., Mpls.
3. "Ito calculus and its applications" School-Seminar on SPED's and Their Application, May 16-18, 1991, UNC Charlotte, Charlotte.
4. "One dimensional random walk in a random medium", Workshop on Stochastic Models in Geosystems, May 16-20, 1994, IMA, Mpls.
5. "Radar data filtering for high level noise: elementary model", ONR/NAWC Workshop on Acquisition and Tracking of Maneuvering Targets from Image sequence Data, May 16-17, 1995, China Lake, Ca.

Other Activities:

Organizer of the Probability and Statistics Section of Charlotte Mathematics Conference October 17, 1986.

1987-88 Representative, Arts and Sciences Counsel

Member of Organizing Committee, 4th Annual Piedmont Mathematics Conference: The Bonnie Cone Lectures, April 1989

Colloquium Committee 1989-90

Local Organizing Committee, International Conference and School-Seminar on Stochastic Partial Differential Equations and their Applications May 1991.

Hiring Committee chair 1992-93, 1993-94, member 1994-95, 1995-96

Graduate Committee 1993-94, 1994-95

Promotion and Tenure Committee 1994-95

University Honorary Degree Committee 1994-95

Graduate Recruitment Committee 1995-96, chair 1996-97

Undergraduate Coordinator Fall 1996-present.

Undergraduate Committee chair Fall 1996-Present.

Senior Projects one-1993-94, four-1994-95, one-1995-96, one-1996-97, one- 1997-98, one-1998-99.

Master's Orals one-1997-98

Ph. D. Preliminary Exams, Probability 1995-1996, 1996-97, 1999-2000, Real Analysis 1998-99

Ph D. Qualifying Exam, one-1996-97

Ph. D. Thesis Defense, one-1998-99

Funded Research:

1984, Air Force Grant, investigator
1985, UNCC Faculty Grant
1995-1997, ONR Grant, co-investigator

Curriculum Vitae

Wei Cai, Professor

Department of Mathematics, University of North Carolina at Charlotte
Charlotte, NC 28223
Phone: (704) 547-4581, E-mail: wcai@uncc.edu

Education

Brown University, 1989, Ph.D. in Applied Mathematics

University of Science and Technology, China, 1985, M.S. in Applied Mathematics

University of Science and Technology, China, 1982, B.S. in Mathematics

PROFESSIONAL EXPERIENCE

University of North Carolina at Charlotte, 8/1989 – present

Assistant Professor, Department of Mathematics, 8/89-7/94
Associate Professor, Department of Mathematics, 7/94-7/99
Professor, Department of Mathematics, 7/99-present

University of California at Santa Barbara, 1/95-9/96

Assistant Professor V (off-scale), Department of Mathematics, 1/95-1/96
Associate Professor II, Department of Mathematics, 1/96-9/96

NASA Langley Research Center, summers of 1993, 1994

Visiting Scientist

UNIVERSITY AND COMMUNITY SERVICE

University Service

Department – Colloquium Committee, 92
Department – Graduate Committee, 95,97,98
Department – Computer Committee, 93, 94,97,98
Department – MATH2171 Committee, 97

College – ITAG Committee, 1997-99 term

Professional Services

Organizer of a workshop on Spectral Methods at NCSU, 1994

Referee reviewer: Journal of Computational Physics, SIAM Journal of Numerical Analysis, SIAM Journal of Scientific Computing, Mathematics of Computation.

Community Service

High School Mentor – Country Day School, 1993
Charlotte Chinese Academy – School Board, 9/1997 - present

PUBLICATIONS AND RESEARCH

1. Books

   Numerical Methods in Applied Sciences edited by W. Cai, Z.C. Shi, C.W. Shu and J.C. Xu, Science Press, New York, 1996

2. Chapter in books

   Spectral and Multiresolution methods for PDE's, a chapter in a book **Numerical Methods in Applied Sciences** edited by W. Cai, Z.C. Shi, C.W. Shu and J.C. Xu, Science Press, New York, pp 39-59, 1996

3. Articles in refereed journals

   1) Convergence of two nonconforming finite elements, in Journal *of Computational Mathematics*, Academia Sinica, **2**, pp. 63-74, 1986.

   2) The limit problem of the Ziekiewicz finite element, in *Journal of Computational Mathematics*, Academia Sinica, 4**,** pp. 345-353, 1986.

   3) Essentially Non-oscillatory Spectral Method for Shock Wave Calculations, (with D. Gottlieb and C. W. Shu, Mathematics *of Computation*, 52, (1989) pp. 389-410.

   4) Cell averaging Chebychev Method for Hyperbolic Problems, (with D. Gottlieb and A. Harten), Computers *and Mathematics with Applications*, vol. 24, No. 516, pp. 37-49, September 1992.

   5) Uniform High Order Spectral Methods for One and Two Dimensional Euler Equations, (with C.W. Shu), Journal *of Computational Physics*, vol. 104, No. 2, pp. 427-443, 1993.

6) On One-sided Filters for Spectral Fourier Approximations of Discontinuous Functions, (with C.W. Shu and D. Gottlieb), SIAM *Numerical Analysis*, Vol. 29, No. 4, pp. 905-916, August 1992.

7) Coupling of Spectral Methods and H-P Version Finite Element Methods for PDE's on Nonsmooth Domains, (with H.C. Lee and H. -S. Oh), in Journal *of Computational Physics*, vol. 108, No. 2, pp. 314-326, October 1993.

8) Domain decomposition and Computation of 2-D Detonation Waves, *Contemporary Mathematics*, Vol. 180, pp. 459-464, 1994.

9) Direct numerical calculation of neutral stability curve for one-dimensional detonations, (with W.H. Oh, Y.L. Zhu), SIAM *Journal of Scientific Computing*, Volume 17, Number 4, pp. 814-829, July 1996.

10) High-order Numerical Methods for the Computation of Cellular Structure of 2-D Detonation Waves, AIAA *Journal*, Vol. 33, No. 7, PP 1248-1255, (July, 1995).

11) Adaptive Wavelet Collocation Method for the Initial Value Boundary Problem of Nonlinear PDE's, (with J.Z. Wang), SIAM *Journal of Numerical Analysis*, Volume 33, Number 3, pp. 937-970, June 1996.

12) An Adaptive Spline Wavelet ADI (SW-ADI) Method for two-dimensional Reaction Diffusion Equations, (with Wu Zhang), *Journal of Computational Physics*, Vol. 139, pp. 92-126 (1998)

13) A fast wavelet collocation method for high speed circuit simulation (with Dian Zhou), *IEEE transaction on circuits and systems*, Vol. 46, No. 8, pp. 920-930, 1999.

14) An adaptive wavelet method for nonlinear circuit simulation (with Dian Zhou and W, Zhang), *IEEE transaction on circuits and systems*, Vol. 46, No. 8, pp. 931-938, 1999.

15) Higher order mixed current basis functions for electromagnetic scattering of curved surfaces, *Journal of Scientific Computing*, Vol. 14, No. 1, pp. 73-105, 1999.

16) High Order mixed RWG basis functions for electromagnetic applications, revised and submitted to *IEEE transaction on Microwave Theory and Technology*, Vol. 49, No. 7, pp. 1295-1303, July 2001.

17) Fast calculation of dyadic Green's functions for electromagnetic scattering in a multi-layered medium, (with Tiejun Yu) *Journal of Computational Physics*, 165, 1-21, 2000.

18) High Order Window Functions and Fast Algorithms for Calculating Dyadic Electromagnetic Green's Functions in Multilayered Media, (with Tiejun Yu), *Radio Science*, 2001.

19) Inverse Matrix Evaluation for Linear Systems, (with Mohsen Tadi), submitted to *Inverse Problems* **17**, pp. 247-260, 2001.

20) An Inverse Method for Parabolic Equations Based on Quasi-Reversibility, (with Mohsen Tadi, Michael Klibanov COMPUTERS & MATHEMATICS WITH APPLICATIONS 43 (8-9): 927-941, APR-MAY 2002.

21) Level Set-Boundary Element Method for Simulation of Dynamic Powder Consolidation of metels, (with Zhilin Li) *Lecture Notes in Computer Science 1988,* Edited by L. Vulkov, J. Wasniewski, and P. Yalamov*, pp. 527-534, Springer-verlag, 2001.*

22) Adaptive Wavelet ADI Method: Application and Parallelization, (jointly with Xianhe Sun), *Proceeding of 2000 International Conference on Parallel Processing (ICPP),* August 2000, Toronto, Canada.

23) High Order Current Basis Functions for Electromagnetic Scattering of Curved Surfaces, *Discontinous Galerkin Methods, Lecture Notes in Computational Science and Engineering, No. 11*, Edited by B. Cockburn, G.E. Karniadakis, and C. W. Shu, pp. 271-276, Springer-Verlag, 2000.

24) Singularity Treatment and High Order RWG Basis Functions for Integral Equations of Electromagnetic Scattering, *International Journal for Numerical Methods in Engineering*, Vol. 53, No. 1, January 2002.

25) Algorithmic Issues for Computational Electromagnetic Scattering in Layered Media: Green's Function, Basis Function and Fast Solver, accepted in a Special Issue of *Advances in Computational Mathematics: Modeling and Computation of Optics and Electromagnetics*, **16**: 157-174, 2002.

26) An efficient DC-gain matched balanced truncation realization for VLSI interconnect circuit order reduction Zeng X, Zhou D, Cai MICROELECTRONIC ENGINEERING 60 (1-2): 3-15. JAN 2002.

27) S. G. Wang, J. Wang, W. Cai, D. Zhou, X. Zheng, Modeling of RC Interconnet Circuit and its recursive algorithm, Proc. IEEE 2002 International Conference on Control and Automation, Xianmen, China, June 16-19. 2002.

28) W. Cai, S. Deng, Upwinding Embedded Boundary Methods for Maxwell equations, Revised and Submitted to Journal of Computational Phyiscs, May, 2002.

4. Other articles published

Some Recent Results on Spectral Methods for PDE's with Singular Solutions, *Proceeding of International IMACS Conference on Scientific Computing and Modeling*, Banglore, India, December 1992.

5. Paper presented

1. Essentially nonoscillatory spectral methods for Euler Equations, 1990 *SIAM Annual Meeting*, Chicago.

2. High order methods for the computation of Cellular Structure of 2-D detonation waves*, 4th International Conference on Combustion*, St. Petersburg, Florida, December 1991.

3. Recent results on spectral methods for singular solutions, *2nd International ICOSAHOM conference*, mini-symposium talks, Montpellier, France, June 22-26, 1992.

4. Spectral methods for PDE's with singular solutions, Invited talks at *International IMACS Conference on Scientific Computing and Modeling,* December 1992, Banglore, India.

5. Adaptive wavelet collocation methods for Initial value boundary problem for time dependent PDE's, presenter and organizer of Minisymposium on High Order method for shock wave computation, SIAM *Annual Meeting*, 1993, Philadelphia.

6. High order Hybrid method for 2-D detonation waves, SIAM *Annual meeting*, 1993, Philadelphia.

7. Hybrid Numerical Methods for the computation of Cellular Structure of 2-D detonation waves, 5th *International Conference on Combustion*, Garmish-Partenkirchen, Germany, September 29, 1993.

8. Multi-domain Techniques and Computation of 2-D Detonation Waves, 7th *International Conference on Domain Decomposition*, Penn. State University, October 1993.

9. Adaptive wavelet collocation methods and wave propagation, Invited talk at the *129th meeting of Acoustical Society of America*, 31 May - 2 June 1995, Washington D.C.

10. Adaptive wavelet time dependent calculations of laminar flames*, The Third International Congress on Industrial and Applied Mathematics (ICIAM 95*), 3-7 July 1995, Hamburg, Germany.

11. An adaptive Wavelet ADI method for two-dimensional flame propagation, the *17th biennial conference on numerical analysis*, June 24 - 27, 1997, Dundee, Scotland.

12. Present a week of Invited Lectures on Numerical Methods for Detonations and Electromagnetics at *Institute of Applied and Computational Physics*, June 25 - July 1, 1997, Beijing, China.

13. Adaptive Wavelet ADI methods for Combustion, the *3rd ICOSAHOM*, June 22 - 26, 1998, Herzliya, Israel, 1998.

14. Invited Mini-symposium Speaker, Adaptive Wavelet Methods and Applications in Combustions*, SIAM Eighth International Conference on Numerical Combustion*, March 5-8, 2000, Orlando, FL.

15. Inivited Mini-symposium Organizer, High Order Methods in Computational Electromagnetics, *p and finite element methods: Mathematics and Engineering*, May 31-June 2, 2000, St. Louis.

16. Invited Mini-symposium Organizer, Computational Electromagnetics and Applications*, SIAM First Conference on Computational Science and Engineering (CSE00)*, September 21-23, 2000, Washington, D. C.

17. Inivited talk at Courant Institute, April, 2002

18. Invited talk at Dept. of Math., Pen. State University, May, 2002

19. Invited talk at Brown University, April, 2002

20. Invited talk at Michigan State University, May, 2002.

21. Invited Talk at 3rd International Conference on Scientific Computation and Applications, January 6-9, 2003, City University of Hong Kong.

6. Funded research

1) *National Science Foundation Grant*, Advanced Scientific Computation ($58,138, 1990-1991)
2) *National Science Foundation Grant*, Advanced Scientific Computation ($86,384, 1991-1994)
3) *Air Force Grant*, Wavelet Methods for Combustion ($104,000, 1994-97)
4) *Air Force Grant*, Wavelet Methods for Combustion ($126,000, 1996-99)
5) *Advanced Research Project Agency Grant*, Numerical Techniques for Efficient Evaluation and Physical Design of Mixed Signal Modules ($362,000, 1996-99)
6) *National Science Foundation Grant*, Adaptive Wavelet Element Methods for Highly Parallel Computations ($322,384, 1999-2002)
7) *National Science Foundation Grant*, Development of Fast and Accurate Numerical Algorithms for Embedded 3-D RF Components ($162,321, 2000-2003).
8) *National Science Foundation Grant,* Efficient and Performance Guranteed Methods for Order Reduction, ($160,274, 6/15/2001-5/31/2004)

PROFESSIONAL AFFLIATIONS

SIAM

SUPERVISION OF GRADUATE STUDENTS

Undergraduate Student Senior Projects:

Mr. Glen Cox, 1993, Ms. Diana Jou, 1994, Mr. Brent Loomis, 1997

Graduate Students:

Master Students - Mr. H. Lee, Mr. Wenho Oh, Mr. Nanjian Yao, Mr. JianliangLi, Mr. Dahai Guo

Ph.D. Students – Ms. Yijun Yu (8/2001), Mr. Nailong Guo, Mr. Min Cho

Thesis Committee

Mr. Lingyan Wu, Dept. of Mechanical Engineering, Master Thesis under Prof. Kim, 1991; *Ms. Fong Tsui*, Department of Electrical Engineering, Master Thesis under Prof. D. Zhou, 1992; *Mr. Desai*, Dept. of Mechanical Engineering, Master Theiss under Prof. R. Keanini, 1994; *Mr. Brent Loomis*, Department of Mathematics, Master Degree committee, 1997; *Mr. Mat Wyman*, Department of

Mathematics, Master Degree committee, 1998; *Mr. Yingjun Sun*, Department of Mathematics, Ph.D. preliminary examiner, 1998.

RÉSUMÉ of ZONGWU CAI

Zongwu Cai
Department of Mathematics
University of North Carolina at Charlotte
Charlotte, NC 28223
Tel: (704) 687-2650, Fax: Fax: (704) 687-6415
E-mail: zcai@uncc.edu
Home page: http://www.math.uncc.edu/~zcai

EDUCATION:

- 1995 Ph.D. Department of Statistics, University of California, Davis
- 1988 M.S. Department of Mathematics, Zhejiang University, Hangzhou, China
- 1982 B.S. Department of Mathematics, China University of Geosciences, Wuhan, China

ACADEMIC and PROFESSIONAL POSITIONS:

- Associate Professor: Department of Mathematics, University of North Carolina at Charlotte, 2002 — present
- Assistant Professor: Department of Mathematics, University of North Carolina at Charlotte, 1998 – 2002
- Assistant Professor: Department of Mathematics, Southwest Missouri State University, 1995 – 1998
- Instructor, TA and RA: Department of Statistics, University of California, Davis, 1991 - 1995
- Lecturer: Department of Mathematics, Zhejiang University, China, 1988 - 1991
- Applied Statistician: China University of Geosciences, Wuhan, China, 1982 - 1985

RESEARCH INTERESTS:

- Econometric and Financial Time Series
- Nonparametric Curve Estimation and Tests
- Nonlinear Time Series Model Identification
- Data-analytic Modelling
- Survival and Longitudinal Analysis
- Wavelets and Their Applications
- Computational Statistics and Data Mining

PUBLICATIONS:

◇ **Papers Submitted:**

1. Local quasi-likelihood approach to varying-coefficient discrete-valued time series models. Submitted for publication (2001).

2. Local robust regression estimation for time series. Submitted for publication (2001) (with E. Ould-Said).

3. Nonparametric estimation equations for time series data. Revised for *Statistics and Probability Letters* (2002).

4. Local quasi-likelihood method for generalized random curve models with longitudinal data. Revised for *Journal of the American Statistical Association* (2002) (with H. Wu).

5. Nonlinear seasonal time series models. Revised for *Journal of the American Statistical Association* (2001) (with R. Chen).

6. Weighted local linear approach to censored nonparametric regression. Revised for *Statistica Sinica* (2001).

◇ **Papers Accepted:**

7. Adaptive varying-coefficient linear models. Forthcoming in *Journal of the Royal Statistical Society, series B* (2000) (with J. Fan and Q. Yao).

8. Local linear estimation for time-dependent coefficients in Cox's regression models. Forthcoming in *Scandinavian Journal of Statistics* (2000) (with Y. Sun).

◇ **Papers Published:**

9. A two-stage approach to additive time series models. *Statistica Neerlandica*, **56** (2002), No.4, 1-19.

10. Two-step likelihood estimation procedure for varying-coefficient models. *Journal Journal of Multivariate Analysis*, **82** (2002), 189-209.

11. Regression quantiles for time series data. *Econometric Theory*, **18** (2002), 169-192.

12. Estimating a distribution for censored time series data. *Journal of Multivariate Analysis*, **78** (2001), 299-318.

13. Smoothing estimation for discrete-value time series. *Journal of the Royal Statistical Society, series B*, **63** (2001), 357-375 (with Q. Yao and W. Zhang).

14. Weighted Nadaraya-Watson regression estimation. *Statistics and Probability Letters*, **51** (2001), 307-318.

15. Local estimation of a biometric function with covariate effects. In *Asymptotics in Statistics and Probability* (M. Puri, ed) (2000) 47-70 (with L. Qian).

16. Average regression surface for dependent data. *Journal of Multivariate Analysis*, **75** (2000), 112-142 (with J. Fan).

17. Denoised least squares estimators: An application to estimating advertising effectiveness. *Statistica Sinica*, **10** (2000), 1231-1241 (with P.A. Naik and C.L. Tsai).

18. Functional-coefficient regression models for nonlinear time series. *Journal of the American Statistical Association*, **95** (2000), 941-956 (with J. Fan and Q. Yao).

19. Efficient estimation and inferences for varying-coefficient models. *Journal of the American Statistical Association*, **95** (2000), 888-902 (with J. Fan and R. Li).

20. Nonparametric estimation in nonlinear ARX time series models: Projection and linear fitting. *Econometric Theory*, **16** (2000), 465-501 (with E. Masry).

21. Application of a local linear autoregressive model to BOD time series. *Environmetrics*, **11** (2000), 341-350 (with R.C. Tiwari).

22. Berry-Esseen bounds for smooth estimate of a distribution function under association. *Journal of Nonparametric Statistics*, **11** (1999), 79-106 (with G.G. Roussas).

23. Weak convergence for smooth estimator of a distribution function under negative association. *Journal of Stochastic Analysis and Applications*, **17** (1999), 145-168 (with G.G. Roussas).

24. Diagnostics for nonlinearity in generalized linear models. *Journal of Statistical Computation and Simulation*, **29** (1999), 445-469 (with C.L. Tsai).

25. Kaplan-Meier estimator under association. *Journal of Multivariate Analysis*, **67** (1998), 318-348 (with G.G. Roussas).

26. Kernel density and hazard rate estimation for censored dependent data. *Journal of Multivariate Analysis*, **67** (1998), 23-34.

27. The examination of residual plots. *Statistica Sinica*, **8** (1998), 445-465 (with C.L. Tsai and X.Z. Wu).

28. Efficient estimation of a distribution function under quadrant dependence. *Scandinavian Journal of Statistics*, **25** (1998), 211-224 (with G.G. Roussas).

29. Asymptotic properties of Kaplan-Meier estimator for censored dependent data. *Statistics and Probability Letters*, **37** (1998), 381-389.

30. Score tests for heteroscedasticity in wavelet regression models. *Biometrika*, **85** (1998), 229-234 (with C.M. Hurvich and C.L.Tsai).

31. Smooth estimate of quantiles under association. *Statistics and Probability Letters*, **36** (1997), 275-287 (with G.G. Roussas).

---

32. *Statistical Inference under Dependence*. Ph.D. thesis (1995), Department of Statistics, University of California, Davis.

---

33. Strong consistency and rates for recursive nonparametric conditional probability density estimator under (α, β)-mixing conditions. *Stochastic Processes and Their Applications*, **38** (1991), 323-333.

34. Uniform strong estimation under α -mixing, with rates. *Statistics and Probability Letters,* **15** (1992), 47-55 (with G.G. Roussas).

35. Uniform strong convergence and rates for the kernel estimator of a distribution function and a regression function under weakly dependent observations. *Journal of Applied Probability and Statistics*, **9** (1993), 11-17.

36. Asymptotic normality of recursive kernel density estimator under dependent assumptions. *Journal of Applied Probability and Statistics*, **9** (1993), 123–129.

37. On complete convergence of nonparametric regression M-quantiles. *Journal of System Sciences and Mathematics*, **5** (1992), 227–232.

38. Moderate deviations and large deviations for generalized L-statistics. *The Annals of Chinese Mathematics*, **13A** (1992), 364-372.

39. Some remarks on the strong convergence of weighted sums for independent random variables. *Applied Mathematical Journal of University*, **6** (1991), 44-51.

40. Strong consistency and rates for estimator of probability density for weakly dependent random variables. *Journal of System Sciences and Mathematics*, **10** (1990), 360-370.

41. Rate of convergence in the SLLN for dependent random variables. *Journal of Applied Probability and Statistics*, **5** (1989), 256-264.

42. Central limit theorem for integrated square error of double kernel estimator of conditional density. *Journal of Hangzhou University,* **16** (1989), 123-131.

43. Strong approximation and Erdös-Rènyi type laws of sum for independently but non-identically random variables. *Journal of Hangzhou University*, **19** (1992), 240-246.

44. On Chernoff-type large deviations for trimmed U-statistics. *Journal of Hangzhou University*, **18** (1991), 21-26.

45. Convergence properties for stochastic measures of the accuracy of double kernel estimator of conditional probability density. *Journal of Hangzhou University*, **18** (1991), 390-401.

46. A strong law for linear functions of order statistics under dependent assumptions. *Journal of Hangzhou University*, **15** (1988), 378-383.

ACADEMIC HONORS and GRANTS:

- 2002 Recipient of the Faculty Research Summer Fellowship of University of North Carolina at Charlotte
- 2001 Recipient of the Faculty Research Support Grants of University of North Carolina at Charlotte
- 2001 Recipient of the Faculty Research Summer Fellowship of University of North Carolina at Charlotte
- 2000 Recipient of NSF Grant for three years period (2000-2003) for the proposal "Nonparametric Time Series Modeling"
- 2000 Recipient of the Faculty Research Summer Fellowship of University of North Carolina at Charlotte.
- 1999 Recipient of the Faculty Research Summer Fellowship of University of North Carolina at Charlotte.
- 1998 Recipient of the Faculty Research Summer Fellowship of Southwest Missouri State University.
- 1992 Recipient of the Julius R. Blum Memorial Award to the outstanding graduate students, University of California, Davis.
- 1991 Recipient of the Second Award for Excellent Achievements in Research by Zhejiang Province, China.
- 1990 Recipient of the NSF Grant of Zhejiang Province, China.

INVITED COLLOQUIUM TALKS and MANY CONFERENCE INVITED PRESENTATIONS:

- Department of Statistics, Pennsylvania State University, 2002
- Guanhua School of Management, Beijing University, 2002
- Department of Mathematics, Qingdao University, 2002
- Department of Mathematics, China University of Geosciences, 2002
- Department of Statistics, North Carolina State University, 2002
- School of Management, Syracuse University, 2002
- Department of Economics, Cornell University, 2002
- Department of Biostatistics, Rochester University, 2002
- Department of Statistics, University of Illinois at Champaign, 2001
- Department of Statistics, University of South Carolina at Columbia, 2000
- Department of Mathematics, Littoral University, France, 1999
- Department of Mathematics, University of North Carolina at Charlotte, 1998
- Department of Mathematics, Indiana University & Purdue University, 1998
- Department of Statistics, University of Missouri at Columbia, 1998
- Department of Mathematics, University of Maine, 1997
- Department of Statistics, University of California at Davis, 1995
- Department of Mathematics, Southwest Missouri State University, 1995
- Invited presentations by many conferences, meetings, and workshops

PROFESSIONAL ACTIVITIES:

- Local Committee Chair for ENAR/IMS Meeting in March, 2001 at Charlotte, NC
- Member of the American Statistical Association (ASA)
- Member of the Institute of Mathematical Statistics (IMS)
- Member of Econometrics Society
- Member of the International Chinese Statistical Association (ICSA)
- Reviewer for National Sciences Foundation grant proposals
- Referee for the following international journals:

  Econometrica

  Econometric Theory

  Econometric Reviews

  Journal of the American Statistical Association

  Journal of the Royal Statistical Society, Series B

  The Annals of Statistics

  Technometrics

  IEEE Transactions on Information Theory

  Biometrics

  Journal of Multivariate Analysis

  Journal of Time Series Analysis

  Scandinavian Journal of Statistics

  Naval Research Logistics

  Statistica Sinica

  Computational Statistics

  Journal of Statistical Planning and Inference

  Communications in Statistics

  Journal of Nonparametric Statistics

  Statistics and Probability Letters

Computational Statistics and Data Analysis
Statistical Inference for Stochastic Processes
Computers and Mathematics with Applications
Mathematical Sciences Research Hot-Line

Curriculum Vitæ

Janusz Kawczak

Assistant Professor

Department of Mathematics
9201 University City Blvd.
University of North Carolina at Charlotte
Charlotte, NC 28223 USA

(704) 687–2566
(704) 687-6415 FAX

jkawczak@math.uncc.edu
http://www.math.uncc.edu/∼jkawczak

Personal

Date of Birth:	December 2, 1963, Górowo Iławeckie, Poland
Citizenship(s):	Canadian, Polish
Marital Status:	Married, wife Pauline

Education

Ph.D. `Statistics` (1999), The University of Western Ontario, London, Canada.
Thesis: *"Weak Convergence of a Certain Class of Residuals Empirical Processes"*.
Thesis Advisors: Prof Reg Kulperger.

M.Sc. (1993), `Statistics` The University of Manitoba, Winnipeg , Manitoba.

B.Sc.(Hon) (1992), The University of Manitoba, Winnipeg, Manitoba.

M.Math (1988), `Mathematics`, The University of Wrocław, Wrocław, Poland.

Appointments

1999 – present `Assistant Professor--tenure track` UNC at Charlotte, Department of Mathematics.

1998 – 1999 `Lecturer` UNC at Charlotte, Department of Mathematics.

1997 – 1998 `Lecturer` The Univerity of Western Ontario, London, Canada

1994, 1995, 1996 (Summers) `Teaching Assistant` The University of Western Ontario

Professional Experience

1999–present Consulting work for *the Belk Companies*, Charlotte, NC

2002 Consulting work for *the Duke Power*, Charlotte, NC

2001 Consulting work for *the Deutsche Bank*, New York, NY

1999 Consulting First Union Bank on the effect of internet banking in relation to the customers' satisfaction, Charlotte, NC

1994–1995 *STATLAB* University of Western Ontario
Supervisor: Dr Jon Baskerville, *Statistical Consulting for SANDOZ CANADA, University Hospital, Victoria Hospital in London. Co-operating with researchers and graduate students from various departments*

1993–1997 *Teaching Assistant*, The University of Western Ontario Duties included: *Marking papers, working at the Help Center, invigilating exams, helping maintaining LAN and UNIX servers*

1991–1993 *Research Assistant*, University of Manitoba
Supervisor: Dr K. L. Chan, Research in quality control/improvement; multivariate control charts.

Areas of Research Interests

Limit Theory for Empirical Processes, Markov Processes, Time Series, Re-sampling, Computer Simulations, Stochastic Calculus, Stochastic Differential Equations with Applications to Finance, Mathematical Finance, Actuarial Mathematics

Teaching Experience

The University of North Carolina at Charlotte

1999–present `Assistant Professor`
Courses in statistics, probability and actuarial science:
- *Statistical Seminar, STAT 8050*, graduate course
- *Probability Seminar, STAT 7050*, graduate course
- *Multivariate Statistical Methods, STAT 7133/8133*, graduate
- *Theory of Linear Models, STAT 7127/8127*, graduate
- *Stochastic Calculus in Finance, MATH 7124/8124*, graduate
- *Practical Aspects of Financial Modelling, MATH 5040*, graduate
- *Probability and Statistics for Engineering Students, STAT3128*, undergraduate
- *Actuarial Mathematics I, MATH3128*, upper undergraduate
- *Actuarial Mathematics II, MATH3129*, upper undergraduate
- *Introduction to Statistics, STAT1220/STAT1222*, undergraduate

Theses Supervised

⋆ Jin, Xiaodong (Shelton), Ph.D.–currently in progress.
"Applications of Non-linear Time Series to Modelling High Frequency Financial Data".

⋆ Dave Flynn.
"Modelling High Frequency Financial Data". M.Sc., 1999

The University of Western Ontario

1997–1998 `Lecturer.` *Teaching statistics courses to the undergraduate and the graduate level students. The courses are*:
- *Financial Modelling, 520/420*
- *Advanced Financial Modelling, 521/421*
- *Applied Statistical Computing, 304*

1994–1995 (Summer) `Lecturer.` *Teaching actuarial courses at the Summer International Actuarial School in Warsaw, Poland. The teaching required presenting lectures everyday for four hours a day in total of ca. 60 hours in the duration of five weeks. The courses taught were*:
- *Actuarial Mathematics I, II, III*
- *Survival Analysis*
- *Graduation Theory*

1992–1993 *Teaching Assistant* The University of Manitoba
Conducting the lab session for students in the statistical and mathematical courses. Duties included preparation of solutions to the problems posted in the lectures and presenting them during the lab session.

Administrative Positions within University

2000–present Chair of Computing Committee, Department of Mathematics, UNCC. Planning and Budgeting departmental purchasing related to the computer lab and facilities.

2000–present Chair of the Actuarial Program Committee

2000–present Member of the Mathematical Finance Program committee

1999-2000 Member of the departmental committee on library, books, journals acquisitions.

1998-1999 Member of the departmental committee on computing.

1998-1999 Member of the departmental committee on graduate curriculum, graduate students.

Academic Awards and Scholarships

- 2002–2005 (NSF) Principal Investigator of the SCREMS award, $92,000
- Summer 2002 (NSF) Travel Grant, $2,500
- 1995–1997 (NSERC) Natural Sciences and Engineering Research Council of Canada

- 1995–1998 (OGS) Ontario Graduate Scholarship: declined because of NSERC
- 1995–1997 (GTS) Graduate Tuition Scholarship
- 1993–1997 (SUS) Special University Scholarship
- 1991–1997 (GTA) Graduate Teaching Assistantship
- 1991–1992 Summer NSERC Research Summer Grant

Memberships

Bernoulli Society

American Mathematical Society (AMS)

American Academy for Advancement in Science (AAAS)

Institute of Mathematical Statistics (IMS)

American Statistical Association (ASA)

Extra Curricular Activities

Academic Assistance Access (AAA) at *http://www.tutoraid.org*, volunteering as a tutor in verity of subjects regarding post-secondary education (calculus, statistics, finance).

Graduate Students Representative (1994–1996), Department of Statistical and Actuarial Sciences.

Designed and maintained the Dept. internet home page at *http://www.stats.uwo.ca*.

Papers Published, Submitted and in Preparation

J. Kawczak. *Book Review: "Statistics, Probability and Game Theory. Journal of American Statistical Association*, **vol. 94**, no. 448, 1999.

J. Kawczak (with S. Jin) *Birnbaum-Saunders and Lognormal Kernel Estimators for Modelling Durations in High Frequency Financial Data. The Annals of Economics and Finance*, **vol. 4**, 279–300, 2003.

J. Kawczak (with S. Molchanov and A. Al Hakim) *On the Class of Nilpotent Markov Chains, I. The Spectrum of Covariance Operator. Markov Processes and Related Fields*, accepted.

J. Kawczak (with R. Kulperger and H. Yu) *The Empirical Distribution and Partial Sum Process of Residuals from a Stationary ARCH-M Process. The Annals of the Institute of Statistical Mathematics*, accepted.

J. Kawczak (with R. Kulperger and H. Yu) *Weak Convergence of the Re-ordered Residuals Process from the Autoregressive Model.* Submitted to *The Annals of Statistics.*

J. Kawczak (with S. Molchanov) *Effective Estimation in CLT for the Markov Chain with Döblin Condition: General Case*. Submitted.

J. Kawczak *Random Entropy and Probability Bounds for the Supremum of Empirical Measures*. Submitted.

J. Kawczak. *Modeling Gamma-ray Fluxes Using Extreme Value Theory*. In preparation

J. Kawczak, R. Kulperger and H. Yu. *Equivalent Processes of Total Time on Test, Lorenz and Inverse Lorenz Processes.*. In preparation.

Conference Presentations

J. Kawczak, *Value-at-Risk: Effective Estimation of the Tail Probabilities*, International Conference on Applied Statistics, Actuarial Science and Financial Mathematics, Hong Kong, December 17-19, 2002

J. Kawczak (with S. Molchanov), *Effective Estimation of the Tail Probabilities*, July 2002, Melbourne, Australia

J. Kawczak (with S. Molchanov), *Nilpotent Markov Chains under Doeblin Condition*, Contributed Papers Session: Annual Meeting of the Statistical Society of Canada, Hamilton, 2002.

J. Kawczak, *Extreme Value Theory in Modelling the Sun Fluxes*, invited talk at the Univeristy of Western Ontario, 2000

J. Kawczak, *How to Estimate Extreme Events?*, 5^{th} Bernoulli World Congress, Guanajuato, Mexico, 2000.

J. Kawczak, *Autoregressive Residual Processes and Goodness of fit test*, International Indian Statistical Association, McMaster University, Hamilton, Canada, 1998

J. Kawczak, *On the Weak Convergence of Re-ordered Residual Process*, Contributed Papers Session: 25^{th} Annual Meeting of the Statistical Society of Canada, Fredericton, 1997.

J. Kawczak, R. Kulperger and H. Yu, *Randomly Weighted Empirical Residual Processes with Applications to Random Reordering Processes*, Contributed Papers Session: 24^{th} Annual Meeting of the Statistical Society of Canada, Waterloo, 1996.

Hongjoong Kim

Department of Mathematics
University of North Carolina at Charlotte
376 Fretwell Bldg, 9201 University City Blvd
Charlotte, North Carolina 28223-0001
Phone: (704) 687-2649, Fax: (704) 687-6415
Email: hjkim@uncc.edu
www: http://www.math.uncc.edu/~hjkim

September 30, 2002

Education

- State University of New York at Stony Brook, NY (09/95 – 05/00)
  - Received Ph.D., Department of Applied Mathematics and Statistics, May 2000
  - Received MS, Department of Applied Mathematics and Statistics, December 1997
- Korea University, Seoul, Korea (03/88 – 08/93)
  - Received B.Sc., Department of Mathematics, August 1993

Work Experience

- University of North Carolina at Charlotte, NC (08/02 – Present)
  Tenure-track assistant professor, Department of Mathematics
- University of Southern California, CA (08/00 – 08/02)
  Research Associate (Post-Doc Fellow), Center for Applied Mathematical Sciences
- University of Southern California, CA (08/01 – 12/01)
  Lecturer, Department of Mathematics
- University of Southern California, CA (08/00 – 12/00)
  Lecturer, Department of Mathematics
- State University of New York at Stony Brook, NY (01/96 – 05/00)
  Research Assistant, Department of Applied Mathematics and Statistics
- State University of New York at Stony Brook, NY (09/95 – 12/95)
  Graduate Assistant, Department of Applied Mathematics and Statistics
- Korea University, Seoul (03/94 – 08/95)
  Teaching Assistant, Department of Mathematics

Referee Experience

- *Referee* of the **International Journal of Mathematics and Mathematical Sciences**

Consultant Experience

- *Consultant* at **Florida State University**, December 2002

Talks and Presentations

- *Scale-up of Flow in Porous Media*, SUNY at Stony Brook, 1997
- *Risk Management for Petroleum Reservoir Production: A Simulation-Based Study of Prediction with Confidence Intervals*, National Institute of Statistical Sciences, 2000
- *Risk Management for Petroleum Reservoir Production: A Simulation-Based Study of Prediction with Confidence Intervals*, Duke University, 2000
- *Risk Management for Petroleum Reservoir Production: A Simulation-Based Study of Prediction with Confidence Intervals*, University of Southern California, 2000
- *Computational Demo Presentation*, DARPA Principal Investigator Meeting, San Diego, CA, January, 2002
- *Rapid Identification of Network Abnormality, Including Denial-of-service Attacks, Through Change-point Detection Methods*, Symantec, 2002
- *Numerical Methods for Stochastic Partial Differential Equations*, San Diego State University, 2002
- *Computational Methods for Stochastic Partial Differential Equations*, UC, Irvine, 2002
- *Stochastic Partial Differential Equations and Scientific Computation*, Rice University, 2002
- *Scientific Computational Methods for Stochastic Partial Differential Equations*, University of North Carolina, Charlotte, 2002

Invited Talks

- *New Adaptive Batch and Sequential Methods for Rapid Detection of Network Traffic Changes with Emphasis on Detection of Denial-of-Service Attacks*, The 53rd Session of the International Statistical Institute, 2001
- *A Novel Approach to Detection of Denial-of-Service Attacks Via Adaptive Sequential and Batch-Sequential Change-Point Detection Methods*, The Workshop on Statistical and Machine Learning Techniques in Computer Intrusion Detection, June 2002
- *Fluid Dynamics in Porous Media as a Model for Propagation of Viruses*, The Workshop on Statistical and Machine Learning Techniques in Computer Intrusion Detection, June 2002

Research Experience

While I was working in the Ph.D. program at SUNY at Stony Brook, my research concerned the scaleup of the solutions to the system of hyperbolic and elliptic partial differential equations, which describe the geophysical model of the incompressible two-phase flow in the porous media in oil reservoir fields, and I also constructed numerical algorithms to facilitate this scaleup process. My research also concerned the stochastic modelling of uncertainty with the solutions to the stochastic partial differential equations, and the future prediction of uncertainty using Bayesian analysis. My Ph.D. thesis was written under the supervision of Professor James Glimm. After I received the Ph.D. degree, I worked as a research associate in the Center for Applied Mathematical Sciences, University of Southern California. My current research concerns scientific computation, computational fluid dynamics, stochastic partial differential equations and mathematical modelling of various aspects of the Internet. One of the main research interests focuses on the stochastic Navier Stokes equation driven by the random force. Based on the Wiener Chaos Expansion, Professor Boris Rozovskii and I developed an approach to the moments of the random solution. One of the main results achieved is that we are able to separate the stochastic term from the original system of equations. This enables us to compute the deterministic part of the system in advance, which usually requires heavy computation. This method reduces the usage of the computational resources. In addition, this approach is based on the analytical study of the stochastic partial differential equations so that the error bound for the solutions can be obtained and the mathematical accuracy of the moments can be estimated. I have also contributed to the development of the computational program based on this numerical algorithm. I want to apply this algorithm to various areas. Since this method is flexible with the various types of the partial differential equations, the Euler equation is another interesting area to use this algorithm. This work has been collaborated with Thomas Hou and Haomin Zhou at California Institute of Technology. Another research interest is in the mathematical modelling of the Internet, especially to Internet security. I am working on information assurance on the Internet, which can be used in the detection of abnormality in the information flow. For me, another area of interest is mathematical instantiation of virus movement on the Internet. I have contributed to the development of the real-time intrusion detection program as well.

Computation Experience

- **Hardware**
  Intel Paragon (Super Computer), Sun Sparc, SGI, PC, Mac
- **Operating System**
  Paragon OSF, Solaris, Sun OS, IRIX, Linux, MS Windows, Mac OS
- **Programming Languages**
  C++, C, Tcl, Perl, Sh, Matlab, Maple, Java, Html

Programming Experience

Department of Applied Mathematics and Statistics in the State University of New York at Stony Brook has a software program, which solves various geo-physical problems in gas dynamics, porous media and solids. It is written in C, C++, Fortran and is hundreds of thousands of lines long. When I was in the Ph.D. program there, I participated in the research and the development of the software. Since I came to the University of Southern California as a research associate (Post-Doctoral fellow), I have written two software programs myself alone. One code is for the stochastic partial differential equation problem and another is for the Internet security modelling. Each of them is dozens of thousands of lines long. The former is written in C and C++ and the latter is written in C, C++, Matlab. Since my codes are written on Unix and Linux systems, they are architecture-independent and can be ported to any operating system with ease.

Publications

- J. Glimm, H. Kim, D. Sharp, and T. Wallstrom, *A Stochastic Analysis of the Scale Up Problem for Flow in Porous Media*, Computational and Applied Mathematics, vol.17, pp. 67–79, 1998

- James Glimm, Shuling Hou, Hongjoong Kim, David H. Sharp, and Kenny Ye, *A Probability Model for Errors in the Numerical Solutions of a Partial Differential Equation*, CFD Journal, vol.9, April, 2001

- James Glimm, Shuling Hou, Hongjoong Kim, Yoonha Lee, David H. Sharp, Kenny Ye, and Qisu Zou, *Risk Management for Petroleum Reservoir Production: A Simulation-Based Study of Prediction with Confidence Intervals*, Computational Geosciences, vol.5, pp. 173–197, 2001

- Hongjoong Kim, *Computational Methods for Statistical Solutions of Inverse Problems for Flow in Porous Media*, Ph.D. Dissertation, SUNY at Stony Brook, May 2000

- Hongjoong Kim, *Review as a referee on the article "Hot-pressing process modelling for medium density fiberboard by Noberto Nigro and Mario Storti"*, as a referee of the International Journal of Mathematics and Mathematical Sciences, 2001

- Rudolf B. Blazrk, Hongjoong Kim, and Boris Rozovskii, *New Adaptive Batch and Sequential Methods for Rapid Detection of Network Traffic Changes with Emphasis on Detection of Denial-of-Service attacks*, ISI 53rd Session Proceedings, 2001

- Rudolf B. Blazrk, Hongjoong Kim, Boris Rozovskii, and Alexander Tartakovsky, *A Novel Approach to Detection of Denial-of-Service Attacks via Adaptive Sequential and Batch-sequential Change-point Detection Methods*, Proceedings of the IEEE Systems, Man, and Cybernetics Information Assurance Workshop, June 2001

- Rudolf B. Blazrk, Hongjoong Kim, Boris Rozovskii, and Alexander Tartakovsky, *A Novel Approach to Detection of Denial-of-Service Attacks via Adaptive Sequential and Batch-sequential Change-point Detection Methods*, IEEE Transactions on Systems, Man, and Cybernetics, 2002 (submitted)

- Rudolf B. Blazrk, Hongjoong Kim, Boris Rozovskii, and Alexander Tartakovsky, *A Novel Approach to Detection of Denial-of-Service Attacks Via Adaptive Sequential and Batch-Sequential Change-Point Detection Methods*, Proceedings of the Workshop on Statistical and Machine Learning Techniques in Computer Intrusion Detection, June 2002

- Hongjoong Kim, *Fluid Dynamics in Porous Media as a Model for Propagation of Viruses*, Proceedings of the Workshop on Statistical and Machine Learning Techniques in Computer Intrusion Detection, June 2002

Teaching Experience

- **Calculus I**
  Term: Fall 2002 (08/02 – 12/02)
  Level: Undergraduate course, University of North Carolina at Charlotte
  Topics: Calculus

- **Applied Mathematics**
  Term: Fall 2002 (08/02 – 12/02)
  Level: Undergraduate course, University of North Carolina at Charlotte
  Topics: Applied Mathematics and Partial Differential Equations

- **Methods of Applied Mathematics**
  Term: Fall 2001 (08/01 – 12/01)
  Level: Graduate course, University of Southern California
  Topics: Functional Analysis, Applications

- **Methods of Applied Mathematics**
  Term: Fall 2000 (08/00 – 12/00)
  Level: Graduate course, University of Southern California
  Topics: Functional Analysis, Applications

- **Fundamentals of Large Scale Computing**
  Term: Spring 2000 (01/00 – 05/00)
  Level: Graduate course, State University of New York at Stony Brook
  Topics: Programming Languages and Debugging, Parallel computing

Teaching Philosophy

I believe that teaching is one of the most important factors of being a professor. Through teaching, one can share what he or she has learned with students, and thereby help them to broaden their knowledge. This communication through teaching is an important way of returning what we have received back to society.

I believe that good teaching comes from the experience. While I was in the Ph.D. program in the State University of New York at Stony Brook, I had a chance to teach one graduate course. The class covered the topic of large-scale computation and parallel computing. After I received my Ph.D. degree, I worked as a research associate in the Center for Applied Mathematical Sciences, University of Southern California, where I pursued my desire to teach by also accepting the position of a lecturer for two graduate courses in the Mathematics Department, in the years 2000 and 2001. These courses covered functional analysis and its application.

I have several teaching policies. First, I believe that I should think from the student's viewpoint, and interact with them as if I were taking the class myself. Secondly, I should engage in various ways of interaction with students. Email or the Web is a good tool for employing this policy. The combination of office hours and email exchanges give students more chance to contact me as a professor. They can obtain more help if the lecture note or other information is available on the web. Thirdly, students need more chances to think about the course. To this end, I start the class with the distribution of the lecture notes, so that students can take less time writing and more time discussing class topics. Then I end the class with the distribution of some brief notes for the next class, which intrigue them about the next class. I find all of these strategies help me achieve the most important priority in my teaching which is to help the students to understand the course better and to broaden their knowledge.

References

James Glimm (Thesis Adviser)
Distinguished Professor
Department Chair, Department of Applied Mathematics and Statistics
SUNY at Stony Brook, Stony Brook NY 11794-3600
Director, Center for Data Intensive Computing
Brookhaven National Laboratory, Brookhaven, NY
Email: glimm@ams.sunysb.edu

Woo J. Kim
Professor
Department Director, Department of Applied Mathematics and Statistics
SUNY at Stony Brook, Stony Brook NY 11794-3600
Email: wjkim@notes.cc.sunysb.edu

Alexander Tartakovsky
Associate Director,
Center for Applied Mathematical Sciences
University of Southern California, Los Angeles, CA 90089-1113
Email: tartakov@math.usc.edu

CURRICULUUM VITAE

Michael V. Klibanov
Professor
Department of Mathematics
University of North Carolina at Charlotte
Charlotte, NC 28223
Tel. (704) 687-2645, FAX (704) 687- 6415
E-mail mklibanv@email.uncc.edu

Research Interests:

Inverse Problems for Partial Differential Equations. Applications to imaging, recognition and classification of obscured targets

Education:

1986
Doctor of Science in Mathematics
(This is the second degree after Ph.D. in Russia)
Computing Center of Siberian Branch of Russian Academy of Sciences, Novosibirsk

1977
Ph.D. in Mathematics
Urals State University, Ekaterinburg

1972
M.S. in Mathematics and Applied Mathematics
Novosibirsk State University, Novosibirsk

All three degrees were received from the elite Russian institutions.

Professional Experience:

1994-present
Professor, Department of Mathematics, University of North Carolina at Charlotte

1990-94
Associate Professor, Department of Mathematics, University of North Carolina at Charlotte

1972-1989
Assistant and Associate Professor in Russian educational institutions

Courses Taught:

Calculus, Linear Algebra, Ordinary Differential Equations, Partial Differential Equations, Inverse Problems

Membership: The International Society for Optical Engineering

Citizenship: U.S.A.

Research Grants:

1991-95
Office of Naval Research grant
1993-95
NATO grant
1997-00
National Science Foundation grant
1998-01
Army Research Office grant

Major Research Achievements

In 1981, the Carleman estimates were introduced in the field of inverse problems [1]. Since then this approach is widely exploited in this field. While Carleman estimates were initially for proving the uniqueness and stability results only [1-5], it was shown later that the use of Carleman Weight Functions (CWFs) makes it possible to construct strictly convex objective functions for hyperbolic and parabolic inverse problems [6-8]. Furthermore, the exemplification of the CWF in electromagnetic frequency sounding has led to the concept of convexification [9].

Publications:

More than 90 publications in the field of inverse problems for partial differential equations.

Most Significant Publications:

1. A.L. Buhgeim and M. V. Klibanov, Global uniqueness of a class of inverse problems, *Soviet Math. Dokl.,* 1981, 24, 244-247.

2. M.V. Klibanov, Inverse problems in the ``large" and Carleman bounds, *Differential Equations*, 1984, 20, 755-760.

4. M.V. Klibanov, Inverse problems and Carleman estimates, *Inverse Problems*, 1992, 8, 575-596.

5. M. V. Klibanov, Inverse problems and Carleman estimates in the last two decades, in D. Colton, H. W. Engl, A. Louis, J. McLaughlin and W. Rundell (editors), *Solution Methods For Inverse Problems*, Springer, Vienna/New York, 2000, 119-46.

6. M.V. Klibanov and O.V. Ioussoupova, Uniform strict convexity of a cost functional for three-dimensional inverse scattering problem, *SIAM J. Math. Anal*., 1995, 26, 147-179.

7. M. V. Klibanov, Global convexity in 3-dimensional inverse acoustic problem, *SIAM J. Math. Anal*., 1997, 28,1371-80.

8. M.V. Klibanov, Global convexity in diffusion tomography, *Nonlinear World*, 4, 1997, 247-265.

9. M.V. Klibanov and A. Timonov, A new slant on inverse problems of electromagnetic frequency sounding: ``convexification" of a multiextremal objective function via Carleman weight function, *Inverse Problems,* 2001, 17, 1865-88.

10. A. Timonov, J. Mattsson, P. Krylstedt, and M.V. Klibanov, A sequential approach to inverse modeling in marine electromagnetics: Recovering the sub-bottom conductivity profile from measurements of the electromagnetic field, *Proceedings of 3rd International Conference on Marine Electromagnetics (MARELEC 2001),* Stockholm, Sweden, 11-13 July 2001.

11. A. Timonov and M.V. Klibanov, An efficient algorithm for solving the inverse problem of locating the interfaces using the frequency sounding data, *J. Comp. Physics*, submitted in 2001.

Other Selected Publications:

12. M.V. Klibanov, A class of inverse problems for nonlinear parabolic equations, *Siberian Math. J*., 1986, 27, 698-708.

13. M.V. Klibanov and P.G. Danilaev, On the solution of coefficient inverse problems by the method of quasi-inversion, *Soviet Math. Dokl*., 1990, 41, 83-87.

14. M.V. Klibanov and J. Malinsky, Newton-Kantorovich method for three-dimensional potential inverse scattering problem and stability of the hyperbolic Cauchy problem with time-dependent data, *Inverse Problems*, 1991, 7, 577-96.

15. M.V. Klibanov and P.E. Sacks, Phaseless inverse scattering and the phase problem in optics, *J. Math. Phys*., 1992, 33 (11), 3813-21.

16. M. Kazemi and M.V. Klibanov, Stability estimates for ill-posed Cauchy problems involving hyperbolic equations and inequalities, *Applicable Analysis*, 1993, 50, 93-102.

17. M.V. Klibanov, P.E. Sacks, and A.V. Tikhonravov, The phase retrieval problem (Topical Review), *Inverse Problems*, 1995, 11, 1-28.

18. M.V. Klibanov, T.R. Lucas, and R.M. Frank, A fast and accurate imaging algorithm in optical/diffusion tomography, *Inverse Problems*, 1997, 13, 1341-61.

19. Yu. A. Gryazin, M.V. Klibanov, and T.R. Lucas, Imaging the diffusion coefficient in a parabolic inverse problem in optical tomography, *Inverse Problems*, 1999, 15, 373-97.

20. M.V. Klibanov and T.R. Lucas, Numerical solution of a parabolic inverse problem in optical tomography using experimental data, *SIAM J. Appl. Math*., 1999, 59, 1763-89.

21. M.V. Klibanov and T.R. Lucas, Elliptic systems method in diffusion tomography using back-reflected data, *Inverse Problems*, 2000, 16, 199-221.

22. Yu. A. Gryazin, M.V. Klibanov, and T.R. Lucas, GMRES computation of high frequency electrical field propagation in land mine detection, *J. Comp. Phys*., 2000, 158, 98-115.

23. Y.A. Gryazin, M.V. Klibanov, and T.R. Lucas, Numerical solution of a subsurface imaging problem, *SIAM J. Appl. Math*., 2001, 62, 664-83.

ALEXANDER SPERO PAPADOPOULOS

Professor

EDUCATION:

1972	Ph.D.	Statistic, Virginia Polytechnic Institute
1970	M.S.	Statistics, Virginia Polytechnic Institute
1969	M.S.	Mathematics, University of Rhode Island
1968	B.S.	Electrical Engineering, University of Rhode Island

FIELD: Statistics

PROFESSIONAL EXPERIENCE

1987-present	Professor
1978-1989	Associate Professor University of North Carolina at Charlotte
1976-1978	Assistant Professor University of Charleston
1977-1978	Adjunct Assistant Professor Medical University of South Carolina
1972-1976	Visiting Assistant Professor Keene State College

TEACHING

I have taught a variety of undergraduate and graduate courses. In addition to my regular teaching assignment, I have offered independent study courses to the following graduate students:

Spyridon Damaskos
Nayla Ziady
Xinpei Lu
Cindy Kashawara
John Chantis
N. Elgundi
Deborah Moore
Pat Gray
Ning Qiao
Krishan Gupta
Mat Peeler

During the summer of 1981 I taught the statistics section for a special training course in Health Physics at Duke Power. The course was offered through the office of Continuing Education at UNC Charlotte and was designed for the nuclear plant technicians.

I taught tutorial statistics courses for Royal Insurance company.

I was very much involved in designing, developing and teaching courses in statistics, i.e. applied statistics I and II, time series, nonparametric statistics, linear models.

During the academic year 1985-1986 I coordinated the sections of STAT 122x that were using MINITAB to teach Business Statistics. Dr. David Nixon, the recipient of a grant, and myself taught STAT 122x with the aid of computers.

I had recommended to the department an applied statistics track option to the then MA program. The recommenadtion was approved by the department, college and university.

Directions of theses or projects

1. Patrick Tamer "On Bayes Estimation for Mixtures of two Weibull Distributions under Type I Censoring, (co-director)

2. Xinpei Lu, "Bootstrap Confidence Bounds for the Bilinear Time Series."

3. M. Muha, "Bootstrap Procedures for Time Series Analysis of BOD Data." (co-director)

4. N. Elgundi, " Toward an Air Quality Threshold for Asthma" (co-director)

5. Deborah Moore, "The Burr Distribution as a failure model" (in progress)

6. Ning Qiao, " A goodness of fit test for the Poisson distribution" (in progress)

(Has served on several master's theses committees.)

Grants - Awards

1979, 1986-1988, 1991, 1993, 1997 Grant from Foundation of UNCC

Reassignment of duties leave for the spring semester of the academic year 1986-1987, and for the fall semester of the academic year 1994-1995.

SERVICE

I have served on many departmental and University committees. A list is given below (on some committees I have served several times).

Faculty Selection Committee - Departmental
Placement Committee - Departmental
Affirmative Action Committee - Departmental
Advisory Committee - Departmental
High School Mathematics Contest Committee - Departmental
Graduate Studies Committee - Departmental
Faculty Council - Unoversity
Promotion and Tenure Committee - Departmental
Cirriculum Committee - Departmental
Faculty Executive Committee (Alternate) - University

For several years, with Dr. Nicholas Stavrakas, had done a statistical analysis on the faculty salaries for the benefit of the Provost.

I was the chair of an adhoc committee whose charge was to examine the admission procedures.

I have worked on **many** projects for the Office of Statistics and Applied mathematics (OSAM).

PUBLICATIONS

1.Bayesian Reliability Estimates of the Binomial Model (with C.P. Tsokos), Rep. Stat. Appl. Res., JUSE, Vol. 21, No. 1, 1974.

2.Bayesian Confidence Bounds for the Weibull Failure Model (with C.P. Tsokos), IEEE Trans. Rel., R24, No. 1, pp. 22-26, April 1975.

3.Bayesian Confidence Bounds for the Poisson Failure Model (with A.V.N. Rao), Proceedings on Theory and Applications of Reliability with Emphasis on Bayesian and Non-parametric Methods. Jointly sponsored by the Air Force Office of Scientific Research and the University of South Florida, held from December 15-18, 1975. Published by Academic Press.

4.Bayesian Analysis of the Weibull Model with Unknown Scale and Shape Parameters (with C.P. Tsokos), Statistica, No. 4, 1976.

5.The Burr Distribution as a Failure Model from a Bayesian Approach, IEEE Trans. Rel., Vol. R-27, No. 5, pp. 369-371, December 1978.

6.A Stochastic Model for BOD and DO when the Discharged Pollutants and the flow of the Stream are Random Quantities (with K.M. Bell), Intern. J. Environmental Studies, Vol. 14, pp. 37-42, 1979.

7.Stochastic Model for Prediction of BOD and DO in Streams (with W.J. Padgett), J. Ecological Modeling, Vol. 6, pp. 289-303, 1979.

8.A Bivariate Exponential Failure Model for Life Testing, Statistica, No. 1, pp. 39-58, 1981.

9.A Stochastic Model for BOD and DO in Streams when the Velocity is Random and Distance Dependent, Intern J. Environmental Studies, Vol. 19, pp. 263-267, 1982.

10.Empirical Bayes Confidence Bounds for the Weibull Distribution, J. of Information and Optimization Sciences, Vol. 4, No. 1, pp. 43-47, 1983.

11.A Stochastic Model for BOD and DO with Random Initial Conditions and Distance Dependent Velocity, J. of Mathematical Biosciences, Vol. 67, pp. 19-31, 1983.

12.A General Stochastic Model for Predicting BOD and DO in Streams (with S.D. Damaskos), Intern. J. Environmental Studies, Vol. 21, pp. 229-237, 1983.

13.Bayesian Reliability of the Weibull Failure Model with Bivariate Characterization of the Parameters, METRON, Vol. XLI, No. 1-2, pp. 95-112, 1983.

14.Bayesian Confidence Bounds for a Generalized Failure Model, J. of Information and Optimization Sciences, Vol. 5, No. 3, pp. 261-268, 198415. Faculty Salaries, A

Case Study: Sex Discrimination or Occupation Segregation? (with N.M. Stavrakas), J. of Information and Optimization Sciences, Vol. 6, No. 2, pp. 183-191, 1985.

16.Estimation for Mixtures of two Exponential Life Distributions Based on Arbitrarily Right-Censored Samples (with W.J. Padgett), IEEE Trans. on Rel., R-35, No. 1, pp. 102-105, April 1986.

17.Estimation for the Distribution of BOD and DO, (with K. Chen) J. of Mathematical Biosciences, Vol. 83, pp. 97-104, 1987.

18.Nonparametric Estimation of the Distribution of BOD and DO (with K. Chen), J. of Ecological Modeling, Vol. 41, pp. 183-241, 1988.

19.Bayesian Bootstrap Lower Confidence Interval Estimation of the Reliability and Failure Rate, (with R.C. Tiwari), J. of Statistical Computation and Simulation, Vol. 32, pp. 185-192, 1989.

20.On Bayes Estimation for Mixtures of two Weibull Distributions under Type I Censoring, (with K. Chen and P. Tamer) Microelectronics and Reliability, Vol. 29, No. 4, pp. 609-617, 1989.

21.Bayesian Approach to Life Testing and Reliability Estimation Under Competing

Exponential Failure Distributions, (with R. Tiwari), Microelectronics and Reliability, Vol. 29, No. 6, pp. 1039-1050, 1989.

22.A Hierarchical Approach to the study of the Exponential Failure Model, Communications in Statistics (Theory and Methods), Vol. 18, No. 12, pp. 4375-4392, 1989.

23.The Logarithmic Series Distribution as a Failure Model from the Bayesian Point of View (with A. Kyriakoussis), Microelectronics and Reliability, Vol. 30, No. 1, pp. 133-139, 1990.

24.Bayesian System Reliability of the Generalized Exponential Model, (with K. Chen), METRON, Vol. XLVII, No. 1-4, pp. 241-251, 1989.

25.Bayesian Analysis of System Reliability Using the Burr Distribution, (with K. Chen), J. of Information and Optimization Sciences, Vol. 10, No. 3, pp. 509-518, 1989.

26.Bootstrap Procedures for Time Series Analysis of BOD Data, (with R. Tiwari and M. Muha), J. of Ecological Modeling, Vol. 55, pp. 57-65, 1991.

27.Comparison of Bayesian Nonparametric Estimates of the Reliability with Rival Estimates, (with R. Tiwari), Microelectronics and Reliability, 32 (1992), 233-240.

28.The Zero-Truncated Negative Binomial Distribution from the Bayesian Approach, (with A. Kyriakoussis), Microelectronics and Reliability, 32(1992), 259-264.

29.Hierarchical Confidence Bounds for the Exponential Failure Model, Microelectronics and Reliability, Vol 33, No. 5, pp 719-727, 1993

30.The Zero-Truncated Binomial Failure Model from the Bayesian Point of View, (with A. Kyriakoussis), submitted.

31.Bayesian Approach for BOD and DO when the discharged pollutants are random (with R.C. Tiwari), Ecological Modeling, 71, pp 245-257, 1994

32.The Zero-Truncated Poisson Failure Model from the Bayesian Approach, (with A. Kyriakoussis), Brazilian Journal of Probability and Statistics, 7, pp. 83-94, 1993.

33. On the Bayes Estimators of the Probability of "Success" and Reliability Function of the Zero-Truncated Binomial and Negative Binomial Distributions (With A. Kyriakoussis), Vol 55, Series B, Pt. 2, pp 171-185 1993.

34. Some Robustness Issues in the Bayesian Analysis of a Weibull Failure Model, (with R. M. Hoekstra), J. Statist. Comput. Simulation, Vol 2, pp. 85-94, 1995.

35. Outlier Detection and trimmed means for Poisson data, (with K. W. Chen), Vol 17, No 3, pp. 557-568, Sept. 1996.

36. Hierarchical Bayes Estimation for the Exponential-Multinomial model in Reliability (with R.C. Tiwari and J.N. Zalkikar), Vol 45, No. 3, pp. 477-484, Sept. 1996.

37. Comparison of the Least Squares and Toral Least Squares Lines (with K.W. Chen), METRON, Vol 3, No. 3-4, pp. 93-101, 1996.

38. Comparison of the Linear Least Squares and Nonlinear Least Squares Spheres (with K.W. Chen) Microelectronics Reliability, Vol 36, No 1, pp 37-46, 1996.

39. Shortest Bayes Credibility Intervals for the Lognormal Failure Model (with K.W. Chen), Microelectronics Reliability, Vol 37, No. 12, pp. 1859-1863, 1997.

40. On the Test of Liu and Chow's procedure for Assessing Equivalence in Variability of Bioavailability, (with K.W. Chen and S.C. Chow), Communications in Statistics - Simulation A, 26(3), pp 1129-1138, 1977.

41. On the Characterization and Goodness-of-Fit Test of Some Discrete Distribution Families, (with Gang Li and A. Kyriakoussis) accepted for publication by J. of Statistical Planning and Inference.

42.The Burr type XII distribution as a failure model under various loss functions (with Deborah Moore) Microelectronics Reliabilility, vol 40, pp 2117-2122, 2000

43. On the Kolmogorov-Smirnov Test for the Poisson Distribution with Unknown Parameter (with Ning Qiao) to appear in Journal of Interdisciplinary Mathematics, 2001

44. A Note on Goodness of Fit Test Using Moments (with Gang Li), to appear in statistica, 2001

45. Random Sums from the Bayesian Point of View (with A. Kyriakoussis) to be submitted

Reviewing and Refereeing

I have refereed papers for the following journals

IEEE Transactions on Reliability
Communications in Statistics
Journal of Statistical Planning and Inference

I have also reviewed books for several publishing companies.

VITA

Joseph E. Quinn, Professor of Mathematics

Date of Birth: October 15, 1944
Marital Status: Married
Wife: Joan E. Two daughters Michele 30 and Megan 18

Education: B.S. in Mathematics, University of Dayton 1966
M.S. in Mathematics, Michigan State University 1968
Ph.D. in Mathematics, Michigan State University 1970

Employment History:

- 1970-71, Assistant Professor of Mathematics, Loyola University of New Orleans.
- 1971-75, Assistant Professor of Mathematics, UNC-Charlotte.
- 1975-76, Visiting Lecturer (this was a 2/3 teaching and 1/3 research position), University of Georgia.
- 1976-77, Assistant Professor of Mathematics, UNC-Charlotte.
- 1977-82, Associate Professor of Mathematics, UNC-Charlotte.
- 1982-(March 1984) Professor of Mathematics, UNC-Charlotte.
- March 1984-July 1984, Visitor, University of Paris (Paris VI).
- 1984-85, Professor of Mathematics, UNC Charlotte.
- 1985-1994, Professor and Chairperson, Department Mathematics, UNC Charlotte.
- Feb. 1991 to July 1991, Interim Director of the Research Institute at the North Carolina Super Computing Center.
- July 1994-June 1995, Acting Chair, Department of Computer Science, UNC-Charlotte.
- July 1995 to December 1998, Chair, Department of Computer Science, UNC-Charlotte.
- January 1999 to present, Professor of Mathematics and Adjunct Professor of Computer Science
- January 1997 to December 2000, Consultant on Information Technology, Zayed University, United Arab Emirates
- January 2001 to June 2002, Partner and Consultant, NuTech Solutions, responsible for coordination of international data mining efforts and project lead for data mining efforts for large clients on auction prices for off-lease vehicles and for credit card fraud detection

Previous Research: 16 research publications, an edited volume, 5 preprints and technical reports, and two research summaries. These publications are in a range of mathematical areas including Functional Analysis, Topology (continua theory), Infinite Dimensional Topology, Probability, and Stochastic Processes. The research summaries played a role in strategic planning for various programs at NCSC.

Recent Scholarship and works in progress:

- "Community: a Context for Education" a review of Astin's book "What Matters in College." Appeared in the Clarion Winter Book Review in February of 1999.
- Panel discussion on "Technology Choices and Challenges" at Pope Center for Higher Education Policy Conference "Higher Education: Lament and Renewal", October 1999.
- Four workshops on creating virtual community in courses using electronic conferencing.
- Learning styles and student success in cross-cultural online forums, Proceedings of the International Congress on German as a Second Language, University of Dortmund, October 1999 joint with Boyd Davis.

- Figotin, A. Gordon, S. Molchanov, J. Quinn, and N. Stavrakas, Occupancy Numbers in Testing Random Number Generators, Siam J. Applied Math., V. 62, No. 6, p.p. 1980 – 2011 (2002).
- Shannon Entropy and the Design of True Randomizers, talk by Alex Gordon (delivered by J. Quinn) to Monte Carlo 2000, July 3-5, 2000.
- Figotin, A. Gordon, S. Molchanov, J. Quinn, and N. Stavrakas, Generalized quantum statistics and testing of randomizers with and without asymptotic assumptions, Monte Carlo Methods and Applications, V 7, No 1 - 2, p. 167 (R) (2001).
- Theorems for generalized quantum statistics and the testing of randomizers with and without asymptotic assumptions, talk to Monte Carlo 2000, July 3-5, 2000, Monte Carlo, Monaco (based on joint work with Alex Gordon, Stas Molchanov, Nick Stavrakas, and Alex Figotin).
- Random Number Generators based on alpha radiation: mathematical and computation aspects, under preparation.
- Algorithmic generation of normal numbers with specified convergence rates, under preparation.
- Analyzing online discourse with applications to the interpretation of online focus groups. This is a natural language processing project that will lead to papers and, we expect, to a commercial product—a computer program for the automatic analysis of online focus group sessions. Work is joint with Boyd Davis (a linguist) and Peyton Mason (a marketing professional).

Grants:

- UNC-Charlotte Faculty Research Grants 1972, 73, 78, 79, 82.
- NSF Grant (co-investigator) for support of the Spring Topology Conference in 1974. This was an international conference with around 300 participants.
- AFOSR Grant for " Markovian Shock Models, Deterioration Processes, Stratified Markov Processes and Replacement Policies"(with Abdel-Hameed) This grant was renewed for five years running from 1980 to 1984. Total funding exceeded $210,000.00.
- NCBS&T Development Award, 1988-89 (With Paul DeHoff). Amt. Funded $30,000. This was a block grant which supported young researchers in the areas of mathematics, biology, chemistry and engineering.
- NCBS&T Development Award, 1989-90. Amt. Funded $28,000. This was a block grant which supported young researchers in the areas of chemistry, earth science and engineering.
- Wrote the mathematics section of a Department of Education proposal for Patricia Harris Fellowships. The PI for this grant was Robert Carrubba, Dean of the Graduate School. The grant was funded for one fellowship in mathematics and one in engineering.
- SUCCEED Grant for establishing a conferencing facility to support the administration of the SUCCEED coalition, 1997. Amt. Funded $16,990.
- SUCCEED Grant "Effectiveness of Asynchronous Learning Methods for Various Classes of Students," 1997. Amt. Funded $5,000.
- SUCCEED Grant: Technology Based Curriculum Delivery, 1998, Amt. Funded $22,000.
- SUCCEED Grant: Technology Based Curriculum Delivery, 1999, Amt. Funded $23,000.
- Co-investigator on Naval Postgraduate School Grant for a Coevolutionary Model for the POM Game, awarded in August of 2001 to NuTech Solutions, Inc. $31,000.
- NuTech Grant for work on Modeling of Living Systems and other R&D projects: Fall 2001, $18,000.

Administrative Experience:

- Chair, Department of Mathematics, UNC-Charlotte 1985 to 1994. Built graduate and research programs, including the Ph.D. in Applied Mathematics.

  Originated the Office of Applied Math and Statistics (OSAM).

  Founded the ELTI Foreign Teaching Assistants Orientation and Training Program.

- Interim Director of the Research Institute at the North Carolina Supercomputing Center (NCSC) January 1991 to August 1991. Helped to develop a vision to develop parallel computing capabilities at the Center. Managed a team of computational scientists. Participated in budget exercises and strategic planning for the Micro Electronics Corporation of North Carolina.

- Chair, Department of Computer Science at UNC Charlotte 1994 to 1998.
  Guided the development of an interdisciplinary Ph.D. in Information Technology. Also wrote proposal for a School/ College of Information Technology that has been formed.

Selected Professional Activities

Carolina Scholar of the Pope Center for Higher Education Policy, 1998 to 2000.

Associate Editor of the Naval Research Logistics, since Sept. 1986.

Treasurer of Charlotte Chapter of Sigma Xi, 1998 to 2002.

Consultant on Establishing a College of Information Systems and other matters at Zayed University in the UAE.

Partner, NuTech Inc., responsible for developing a data mining team in Charlotte that will deal with US projects, January 2001 to June 2002.

Patents: Random number generator based on alpha decay. European patent has been granted, US patent is in process.

Advisory Council for PDH Inc. (Precision Digital Hardware). This company is developing the randomizer that my colleagues and I invented.

Updated: October, 2002

Curriculum Vitae

ISAAC M. SONIN
Professor

EDUCATION

1960-1965	M.S. in Mathematics, Moscow State University, Summa Cum Laude
1966-1968	Moscow State University, Department of Mechanics and Mathematics (Graduate Work)
1970	PhD., Probabiity and Statistics, Moscow State University

PhD. Thesis: On some classes of degenerating diffusion processes and parabolic equations
PhD. Advisor: Professor Mark Freidlin

PERSONAL INFORMATION

Address: 7319 Oakwood Ln.
Charlotte, NC 28215
Date of Birth: December 3, 1942
Place of Birth: Moscow, Russia
Marital Status: Married, two sons

FIELD: Probability/Operations Research/Mathematical Economics/Financial Mathematics

TOPICS OF RESEARCH

Optimal stopping problems and their applications.

Sequential control problems with incomplete information (many armed bandit problems in discrete and continuous time), sequential statistical analysis.

Markov decision processes and dynamic programming, the structure of optimal strategies and algorithms.

Nonhomogeneous Markov chains and their applications in economics and operations research, the Decomposition-Separation theorem.

Optimal investment and resource allocation under uncertainty, multistage parallel projects, optimal selection of projects having block structure, replacement problems, models of economic dynamics with R&D, growth rate and internal rates of return.

PROFESSIONAL EXPERIENCE

1969 - 1991	Research Scientist, Senior Research Scientist, Central Economics Mathematical Insitute, Russian Academy of Sciences
1991 - present	Professor University of North Carolina at Charlotte

PROFESSIONAL AFFILIATIONS

Member of American Mathematical Society, Bernoulli Society for Mathematical Statistics and Probability, Society for the Advancement of Economic Theory, Game Theory Society.

VISITING POSITIONS

1989 (1 month) Northwestern University, Department of Economics

1990 (1 month) Northwestern University, Department of Managerial Economics and Decision Sciences

1991-1992 Department of Mathematics, UNC at Charlotte

1995 (1 month) Melbourne University, Department of Statistics

2001 (2 months) Carnegie Mellon University, Department of Mathematics and Center for Computational Finance

2001 (1 month) Strasbourg University, Department of Mathematics

UNIVERSITY and COMMUNITY SERVICE

University Service:

Department - Advisory Committee, 1991-1996,
High School Math Committee, 1992-pres.,
Chairman of the Library Committee, 1993-1994,
Chairman of the Colloquium Committee 1995-1996,
Undergraduate Committee, 1997-2002.,
Faculty Selection Committee 2000-2001,
Math Finance Advisory Committee, 2001-2002.
Actuarial Program Committee, 2002-pres.

College College Course and Curriculum Committee, 1994-1996.
College of Art and Sciences Council, 1995-1996.

PUBLICATIONS

I. BOOKS

1a. Sequential Control with Incomplete Information (with E.L. Presman), 1982, Science, Moscow (in Russian).

1b. Sequential Control with Incomplete Information: The Bayesian Approach to Multi-Armed Bandit Problems (with E.L. Presman), Academic Press, New York, 1990.

II. PAPERS IN REFEREED JOURNALS

2. On a class of degenerative diffusion processes. Theory Probability Appl., 1967, **12**, pp. 490-496.

3. On some classes of uniqueness for degenerating parabolic equations. Uspehi Math. Nauk, 1970, **25**, no. 1, pp. 197-198.

4. On uniqueness classes for degenerating parabolic equations, Mathematics of the USSR - Sbornik, 1971, **14**, pp. 453-469.

5. The best choice problem for a random number of objects (with E.L. Presman), Theory Probability Appl., 1972, **17**, pp. 657-668.

6. The points of equilibrium in the generalized game best choice problem (with E.L. Presman), Theory Probability Appl., 1975, **20**, pp. 770-781.

7. The game settings in the bests choice problem. Cybernetics, 1976, pp. 246-251.

8. The optimal choice problem under incomplete information (with V.I. Arkin and E.L. Presman), Econom. and Math. Methods, 1975, **11**, pp. 439-452 (in Russian).

9. The stochastic models of economical dynamics with R&D (with V.I. Arkin and E.L. Presman), In: Studies on Modelling of R&D and Control of Economic Processes, Central Econom. Math. Inst. Press, Moscow, 1976, pp. 56-106 (in Russian).

10. A model of resource allocation under incomplete information, In: Studies on Modelling R&D and Control of Economic Processes, Central Econom. Math. Inst. Press, Moscow, 1976, pp. 161-201 (in Russian).

11. The game setting of optimal stopping. The existence and uniqueness of equilibrium points (with E.L. Presman), In: Stochastic Control Problems in Economics, Moscow, Science, 1977, pp. 123-148 (in Russian).

12. The choice of decision moments in game setting (with E.L. Presman), In: Stochastic Control Problems in Ecnomics, Science, Moscow, 1977, pp. 149-184 (in Russian).

13. The two-armed bandit problems in continuous time (with E.L. Presman), In: Stochastic Processes and Control, Science, Moscow, 1978, pp. 154-204 (in Russian).

14. The asymptotic behavior of value functions in the two-armed bandit problems (with E. L. Presman), In: Stochastic Models and Control of Economic Processes, Econom. Math. Inst. Press, Moscow, 1978, pp. 142-168 (in Russian).

15. The asymptotic behavior of value functions in the many-armed bandit problems (with E.L. Presman), In: Stochastic Methods in the Problems of Control of Economic Processes, Central Econom. Math. Inst. Press, Moscow, 1979, pp. 97-132 (in Russian).

16. The estimation of an annual profit in stochastic setting (with G.V. Pristavko). In: The Stochastic Methods in the Problems of Control of Economic Processes, Central Econom.

Math. Inst. Press, Moscow, 1979, pp. 145-162 (in Russian).

17. On a problem of stochastic control with incomplete data. In: Stochastic Models and Control, Central Econom. Math. Inst. Press, Moscow, 1980, pp. 185-198 (in Russian).

18. The models of optimal control of a set of multistage programs under uncertainty (with G.V. Pristavko). In: Stochastic Models and Control, Central Econom. Math. Press, Moscow, 1980, pp. 105-150 (in Russian).

19. The research and development on the competition base (with L.L. Veger, A.D. Vainstein, and G.V. Pristavko), Notices of the Academy of Sci. of the USSR Ser. Economics, 1981, no. 2, pp. 215-220 (in Russian).

20. The economic effect under uncertainty (with G.V. Pristavko). In: The Economic theory of R&D, Science, Moscow, 1982, pp. 121-156 (in Russian).

21. The existence of uniformly nearly optimal Markov strategies in controllable countable state chains. In: Models and Methods of Stochastic Optimization, Central Econom. Math. Inst. Press, Moscow, 1983, pp. 213-232 (in Russian).

22. Stationary strategies in dynamic programming with a countable state space (with E.A. Feinberg). In: Studies on Math Econom. and Control Theory, Central Econom. Math. Inst. Press, Moscow, 1983, pp. 137-172 (in Russian).

23. Stationary and Markov policies in countable state dynamic programming (with E.A. Feinberg). Lecture notes in Math., 1983, **1021**, pp. 111-129.

24. Two and many-armed bandit problems with infinite horizon (with E.L. Presman). Lecture Notes in math., 1983, **1021**, pp. 526-540.

25. Sufficient classes of strategies in controllable countable Markov chains with total criterion (with E.A. Feinberg). Soviet. Math. Dokl., 1984, **29**, pp. 308-311.

26. On the relation of reliability of equipment and its period of work (with I.A. Aliev). Econom. and Math. Methods, 1984, **20**, pp. 352-355 (in Russian).

27. Incomplete information in mechanisms of control of economics (with V.I. Arkin, N.J. Petrakov, and others). In: The Modelling of Control Processes in Economics, Science, Moscow, 1984, pp. 167-318 (in Russian).

28. Persistently nearly optimal strategies in stochastic dynamic programming (with E.A. Feinberg). In: Statistics and Control of Stochastic Processes, (Steklov Seminar 1984), Optimization Software, New York, 1985, pp. 214-229.

29. The models of project selection under self-financing and indexes of effectiveness (with V.A. Tsarkov). In: Studies on Stochastic Optimization and Mathematical Economics, Central Econom. math. Inst. Press, Moscow, 1986, pp. 175-196 (in Russian).

30. Theorem on separation of jets and some properties of random sequences. Stochastics, 1987, **21**, pp. 231-250.

31. Stochastic model of management of parallel multistage programs (with G.V. Pristavko). Econom. and Math. Methods, 1987, **23**, pp. 677-686 (in Russian), Matekon XXIV, Summer 1988, pp. 72-90.

32. A model of program selection under presence of common blocks (with P.K. Katyshev). In: Mathematical Models of Control under Uncertainty, Central Econom. Math. Inst. Press, Moscow, 1987, pp. 49-78 (in Russian).

33. The estimation of annual economic effect in deterministic and stochastic cases (with G.V. Pristavko). Econom. and Math. Methods, 1988, **24**, pp. 155-166 (in Russian).

34. The separation of jets and some asymptotic properties of random sequences. Lecture Notes in Control and Inform., 1988, **103**, pp. 275-282.

35. A model of R&D program design in the presence of common blocks (with P.K. Katyshev). In: Probability and Mathematical Economics, Central Econom. Math. Inst. Press, Moscow, 1988, pp. 83-108 (in Russian).

36. The asymptotic behavior of nonhomogeneous Markov chains and redistribution of incomes. In: Probability and Mathematical Economics, Central Econom. Math. Inst. Press, Moscow, 1988, pp. 171-182 (in Russian).

37. Separation of jets and a generalization to the nonhomogeneous case of a theorem on decomposition of a finite homogeneous Markov chain into ergodic components. Soviet Math. Dokl., Vol. 39, no.1, 1989, pp. 27-31.

38. The allocation of expenditures between projects on realization of common blocks (with P.K. Katyshev). In: Studies on Mathematical Economics. Central Econom. Math. Insti., Moscow, 1991 (in Russian).

39. Any nonhomogeneous Markov chain with bounded number of states can be decomposed into asymptotically disconnected components with mixing property. Theory Probability Appl., 1991, **36**, no. 1, pp. 65-77.

40. On an extremal property of Markov chains and sufficiency of Markov strategies in Markov decision processes with the Dubins-Savage criterion. Annals. of Operations Research, 1991, **29**, pp. 417-426.

41. Growth rate, internal rates of return and turnpikes in an investment model. Economic Theory **5**, 383-400, 1995.

42. The ``Join the Club" interpretation of some graph algorithms (joint with H. Reiter), College Math. Journal, 27, 54-58, 1996.

43. Increasing the reliability of a machine reduces the period of its work. J. Appl. Prob. 33, 217-223, 1996.

44. Notes on Equivalent Stationary Policies in Markov Decision Processes with Total Rewards (joint with E. Feinberg), Math. Meth. Oper. Res., (1996) 44: 205-221.

45. The Asymptotic Behaviour of a General Finite Nonhomogeneous Markov Chain (The Decomposition-Separation Theorem), Institute of Mathematical Statistics, Lecture Notes-Monograph Series, v. **30**, Statistics, Probability and Game Theory, papers in Honor of David Blackwell, eds. T. S. Fergusson, L. S. Shapley and J. B. MacQueen, 337-346, 1996.

46. On Some Asymptotic Properties of Nonhomogeneous Markov Chains and Random Sequences with Countable Number of Values, pp. 297--313, in Statistics and Control of Stochastic Processes, The Liptser Festschrift, Proceedings of Steklov Mathematical Institute Seminar, Editors Y. Kabanov, B. Rozovskii, A. Shiryaev, World Scientific, 1997.

47. The Elimination Algorithm for the Problem of Optimal Stopping, Math. Meth. Oper. Res., **49**, pp.111-123, 1999.

48. The State Reduction and Related Algorithms and their Applications to the Study of Markov Chains, Graph Theory and the Optimal Stopping Problem, Advances in Mathematics, **145**, pp. 159-188, 1999.

49. I. M. Sonin and J. R. Thornton, Computational properties of algorithm ``REFUND" for the fundamental/group inverse matrix of a Markov chain. Proc. of the Third Int. Conf. on the Numerical Solution of Markov Chains, Saragoza, Spain, PUZ. pp. 131-148, 1999.

50. Growth rate, internal rates of return and financial bubbles. Publ. of Central Econom. Math. Inst., RAS, Moscow, pp. 1-33, 2000.

51. Recursive Algorithm for the Fundamental/Group Inverse Matrix of a Markov Chain from an Explicit Formula, SIAM J. on Matrix Analysis and Appl., **23**, 1, pp. 209-224, 2001.

III. CONFERENCE PROCEEDINGS (REFEREED)

1. Some problems of optimal choice under incomplete information (with V.I. Arkin and E.L. Presman). Abstracts of 1-st Conference on Optimal Planning and Control of Economics, Moscow, 1972, Sect. 3, pp. 156-157.

2. Stochastic problems of optimal choice (with V.I. Arkin and E.L. Presman). Abstracts of the National Conference on Applied Probability and Statistics, Kishinev, 1972, pp. 17-18 (in Russian).

3. On some problems of control of changes in technology (with V.I. Arkin and E.L. Presman). Ibid., pp. 19-20 (in Russian).

4. The models of economical dynamics with R&D (with V.I. Arkin and E.L. Presman). Proceedings of VI-th National Conference on Control, 1974, pp. 9-11 (in Russian).

5. The points of equilibrium in the game problems of optimal stopping (with E.L. Presman). Proceedings of 3-rd Soviet-Japan Symposium on Probability Theory and Mathematical Statistics, Tashkent, 1975, pp. 118-119.

6. The two-armed bandit problems in continuous time (with E.L. Presman). Abstracts of 2-nd International Vilnius Conference on Probability Theory and Mathematical Statistics, Vilnius, 1977, **2**, pp. 120-121.

7. On a model of resource allocation. Abstracts of the USSR-Poland Symposium on Mathematical Methods in Planning and Control in Economics, Moscow, 1977, pp. 245-246.

8. The asymptotic behavior of the value function in a problem of sequential control with incomplete data (with E.L. Presman). Ibid., pp. 189-190.

9. Many-armed bandit problems in discrete and continuous time (with E.L. Presman). Abstracts of 3-rd International Vilnius Conference on Probability Theory and Mathematical Statistics, Vilnius, 1981, **3**, pp. 277-278.

10. "Markov policies in infinite horizon dynamic programming problems with bounded value functions" (with E.A. Feinberg). Abstracts of IV-th Soviet-Japan Symposium on Probability Theory and Mathematical Statistics, Tbilisi, 1982, **1**, pp. 209-210.

11. Two and many-armed bandit problems with infinite horizon (with E.L. Presman). Ibid., **2**, pp. 171-172.

12. Sequential control with incomplete information in the frame of the theory of adaptive systems (with V.I. Arkin and E.L. Presman). Summary of the Proceedings of the Workshop on Adaptation and Optimization, 1982, Moscow, pp. 23-24.

13. Persistently nearly-optimal strategies in countable state Markov decision chains with the total reward criterion (with E.A. Feinberg). Abstracts of International conference ``Stochastic Optimization", Kiev, 1984, pp. 74-76.

14. The problems of optimal control with incomplete data (with E.L. Presman). Ibid., pp. 194-196.

15. The optimal control of Markov chains: stationary strategies. Proceedings of 18-th Symposium on Probability Theory and Mathematical Statistics, Bakuriani, 1984, p. 44 (in Russian).

16. The theorem on separation of jets and some properties of random sequences. Proceedings of 190th Symposium on Probability Theory and Mathematical Statistics, Bakuriani, 1985, pp. 45-46 (in Russian).

17. The theorem on separation of jets and properties of random sequences of martingale type. Abstracts of 4-th International Conference on Probability Theory and Mathematical Statistics, Vilnius, 1985, **3**, pp. 149-150.

18. The existence of barriers for random sequences. Proceedings of 20-th Symposium on Probability Theory and Mathematical Statistics, Bakuriani, 1986, p. 51 (in Russian).

19. The theorem on separation of jets and related problems. Proceedings of 1-st World Congress of Bernoulli Society, (Tashkent, 1986), Moscow, 1990, **3**, Sect. 11, p. 153.

20. On the asymptotic behavior of finite nonhomogeneous Markov chains. Abstracts of 5-th International Vilnius Conference on Probability Theory and Mathematical Statistics, Vilnius, 1989, **2**, pp. 159-160.

21. Projects selection in the presence of common blocks (with P.K. Katyshev). Abstracts of World Congress of International Econometric Society, Barcelona, 1990.

22. The sufficiency of Markov strategies in Markov Decision Processes. Abstracts of EURO XII/TIMS XXXI Joint International Conference on Operations Research/Management Sci., Helsinki, 1992.

23. Markov functionals in Markov Decision Processes. SIAM Conference on Control and Its Applications, Minneapolis,1992.

24. Replacement Models and optimal cycling in Markov Decision Processes. Abstracts of 34th ORSA/TIMS Joint National Meeting, San Francisco, 1992.

25. Cycles in Markov Decision Processes and Replacement Models. Abstracts of Conference on Applied Probability, INRIA/ORSA/TIMS, Paris, 1993.

26. Markov strategies for maximizing the probability of visiting. Abstracts of 37th Joint National Meeting, Boston, 1994.

27. The asymptotic behavior of finite nonhomogeneous Markov chains in forward and backward time. Short Communications. International Congress of Mathematicians. Zurich, 1994.

28. Two Simple Theorems in Optimal Stopping Problems, Applied Probability Conference INFORMS, Atlanta Georgia, June 95

29. Equivalent Stationary and Locally Stationary Policies in Stochastic Dynamic Programming, (joint with E. Feinberg), INFORMS Conference,Washington, DC May, 1996.

30. The Elimination Algorithm and its Applications, (joint with J. Thornton)., Ninth INFORMS Applied Probability Conference, Boston MA, June 1997.

31. The elimination algorithm and its application to the optimal stopping problem, 36th IEEE Conference on decision and control, December 1997, San Diego, CA.

32. The elimination algorithm for the optimal stopping problem: properties and applications, 10th INFORMS Applied Probability Conference, Ulm, Germany, 1999.

33. Recursive Computation of the Fundamental/Group Inverse Matrix of a Markov Chain, 5th World Congress of the Bernouilli Society for Math. Statistics and Probability, Guanajuato, Mexico, 2000.

34. The Existence and Uniqueness of Nash Equilibrium point in an m-player Game "Shoot Later, Schoot First !", First World Congress of the Game Theory Society, Bilbao, Spain, 2000.

35. The Optimal Stopping of "Seasonal" Observations, 11th INFORMS

Applied Probability Conference, New York, USA, 2001.

VOLKER WIHSTUTZ
Professor

EDUCATION

1975	Ph.D.	University of Bremen (Thesis on Stochastic Differential Equations. Advisor: L. Arnold)
1969	Diploma in Math.	University of Frankfurt (Thesis on Banach-Schauder Theory. Advisor: G. Köthe)

FIELD: Stochastic Dynamical Systems

PROFESSIONAL EXPERIENCE

1992-	Professor University of North Carolina at Charlotte
1987.1992	Associate Professor University of North Carolina at Charlotte
1986.1987	Visiting Associate Professor Northwestern University
1986	Visiting Professor Université de Provence
1985.1986	Visiting Researcher Courant Institute
1982.1987	Research Associate University of Bremen
1976.1980	Assistant University of Bremen
1969.1971	Planning and Development Staff University of Frankfurt

GRANT SUPPORT

1990NSF - $7,546	"Special Month and Conference on Stochastic Flows"
1991NSF - $8,980 (Post doctoral support)	"Simplicity of the Lyapunov Spectrum"
1991.1993NSF - $47,380	"Asymptotics of Lyapunov Spectrum and Stabilization, by Noise"

1994.1997NSF -$60,000

"Large Noise Asymptotics and Numerics for Degenerate Stochastic Differential Systems"

PUBLICATIONS

Papers:

1. Über Stabilität und Wachstum von Lösungen linearer Differentialgleichungen mit stationären zufälligen Parametern, Dissertation, Bremen 1975.
2. On the stability and growth of real noise parameter excited systems, in: G. Kallianpur and D. Kölzow (eds), Measure Throey-Applications to Stochastic Analysis, Lecture Notes in Mathematics 695, Springer 1978, 211-217 (with L. Arnold).
3. Ergodic theory of linear parameter excited systems, in: M. Hazewinkel and J.C. Willems (eds), Stochastic Systems-The Mathematics of Filtering and Identification and Applications, Reidel, Dordrecht 1981, 205-218.
4. Stationary solutions of linear systems with additive and multiplicative noise, Stochastics 7 (1982), 133-155 (with L. Arnold).
5. Wide sense stationary solutions of linear systems with additive noise, SIAM J. on Control and Optimization 21 (1983), 413-426 (with L. Arnold).
6. Stabilization of linear systems by noise, SIAM J. on Control and Optimization 21 (1983), 451-461 (with L. Arnold).
7. When does a linear system with stationary input have a stationary output? In: G. Schuëler (ed.), Proceedings of the International Workshop on Stochastic and Structural Mechanics, Innsbruck, November 1982, Universität Innsbruck 1983.
8. Analytic expansion of Lyapunov exponents associated to the Schrödinger operator, in: S. Albeverio, Ph. Combe and M. Sirugue-Collin (eds), Stochastic Aspects of Classical and Quantum Systems, Lecture Notes in Mathematics 1109, Springer 1985, 177-188.
9. Quantitative results on Lyapunov exponents, Universität Bremen, Stochastic Analysis and Applications 3 (1985), 93-118.
10. Asymptotic expansion of the Lyapunov exponent and the rotation number for the Schrödinger operator with random potential, M. Metivier and E. Pardoux (eds), Stochastic Differential Systems, Differential Systems, Filtering and Control, Springer Lecture Notes in Control and Information Sciences 69 (1985), 113-120.
11. Representation, positivity and expansion of Lyapunov exponents for linear stochastic systems, J.E. Cohen, H. Kesten and C.M. Newman (eds), Random Matrices and Their Applications, AMS Contemporary Mathematics, Vol. 50, (1986), 93-106.
12. Asymptotic analysis of the Lyapunov exponent and rotation number of the random oscillator and applications, SIAM J. Appl. Math 46, (1986), 427-450 (with L. Arnold and G. Papanicolaou).
13. Lyapunov exponents. A survey, in: Lecture Notes in Mathematics 1186 (1986), 1-26.
14. Parameter dependence of Lyapunov exponents for linear stochastic systems. A survey, in: Lecture Notes in Mathematics 1186 (1986), 200-215.

14a. L. Arnold and V. Wihstutz (eds), Lyapunov Exponents, Springer Lecture Notes in Mathematics 1186 (1986).
15. Comportement qualitatif des solutions des équations différentielles stochastiques, in: Stabilité asymptotique des systemes différentiels a perturbation alétoire (E. Pardoux, ed.), CNRS, Paris 1986, p. III, 1-19.
16. Dévelopement asymptotique des exposants de Lyapunov, in: Stabililté asymptotique (E. Pardoux, ed.), CNRS, Paris 1986, p. III, 1-15.
17. Lyapunov exponents and rotation number of two-dimensional linear stochastic systems with small diffusions, SIAM J. Appl. Math. 48, (1988), 442-457 (with E. Pardoux).
18. Lyapunov exponents of nilpotent Ito systems, in Stochastics 25, (1988), 43-57 (with M. Pinsky).
19. Noise induced rotation, Zeitschrift f. Angew. Math. Mech., Festschrift P. Sagirov, 70 (1990), 247-253.
20. Lyapunov exponents for white and real noise driven two-dimensional systems, Maths of Random Media: AMS Lectures in Applied Mathematics 27 (1991, 201-214 (with M. Pinsky).
21. Lyapunov exponents of real noise driven nilpotent systems and harmonic oscillators, Stochastics and Stochastic Reports 35 (1991), 93-110 (with M. Pinsky).
22. Lyapunov exponents and rotation numbers of linear systems with real noise, Proceedings of the Singapore Probability Conference 1989, Walter de Gruyter Verlag, 1992, 109-119 (with Pinsky).
23. The growth and energy of a free particle of small mass. Diffusion Processes and Related Problems in Analysis, Vol II: Stochastic Flows, Birkhäuser 1992, 259-282.
24. Lyapunov exponents of linear stochastic systems with large diffusion term, Stoch. Proc. Applic. 40 (1992), 289-308 (with E. Pardoux).
25. Stabilization of companion form systems by mean zero noise, Stochastics and Stochastic Reports 49 (1994), 1-25 (with J. Kao).
26. Stabilization by random vibration ASME Design Engineering 84 (1995), 881-892.
27. Large noise asymptotics of invariant measures with applications to Lyapunov exponents, Stochastics and Stochastic Reports 59 (1996), 71-142, (with L. Arnold and A. Eizenberg)
28. The order of convergence of invariant measures associated with stabilizing versus destabilizing noise, Zeitschrift f. Angene. Math. Mech. 76 (1996), 29-31.
29. Numerics for Lyapunov exponents of hypoelliptic linear stochastic systems, Field Inst. Communications 9 (1996), 203-217.
30. Review on S.P. Meyn and R.L. Tweedie, Markov Chains and Stochastic Stability.
31. Perturbation Methods for Lyapunov exponents, in H. Crauel and M. Gundlach (eds): Stochastic Dynamics, Springer-Verlag 1999, Chapter 9, 209-239.
32. Characterization of stochastic processes which stabilize linear companion form systems; Stoch. Proc. Applic. 89 (2000), 49-68.
33. Communication Structure of discretized degenerate diffusion processes and approximation of Lyapunov exponents, J. Monte Carlo Methods and Applications, Dec. 2000.

34. On stabilizing the double oscillator by random vibration. Submitted, Aug.2002

INVITED TALKS AT COLLOQUIA AND SEMINARS (selected, since 1987)

1. ”Perturbation methods for nilpotent Ito-systems: Le mauvais cas,” University of Bremen, Bremen, FR Germany.
2. ”Lyapunov Exponents – A generalization of Eigenvalues,” U. of South Carolina, Columbia, SC.
3. ”Interplay of Noise and Energy. The random Schrödinger Operator revisited,” U. of Texas, Austin, TX.
4. ”Noise Induced Rotation,” Institute of Dynamical Systems, University of Bremen, Bremen, FR Germany.
5. “The Art to Discover the Impact of Noise,” University of Bremen, Bremen, FR Germany.
6. “Lyapunov Exponent for Nilpotent Ito Systems,” 17th Conference on Stochastic Processes and their Applications,” Rome, Italy.
7. “Asymptotic Expansion and Exact Formulas for Rotation Numbers of Noisy Systems,” Iowa Stata University, Ames, IA.
8. “Does a system like $y'' + cy = 0$ rotate for negative c, if c is noisy?” Center of Dynamical Systems and Nonlinear Studies, Georgia Institute of Technology, Atlanta, GA.
9. “Lyapunov Exponents – Generalization of Eigenvalues and the Law of Large Numbers,” School of Mathematics, Georgia Tech., Atlanta, GA.
10. “Asymptotics of the Localization Length and the Density of States Associated with Standing Waves,” University of South Carolina, Clemson, SC.
11. “The Dynamics of a Free Particle in a Random Potential,” Universität Bremen, 1989.
12. “Stability properties of stochastic systems,” series of lectures, Universita di Torino, Italy, 1990.
13. “Noise induced phenomena,” series of lectures, Politecnico di Torino, Italy, 1990.
14. “Stabilization of linear systems by noise,” Universita di Roma, La Sapienza, Italy, 1990.
15. “Non-uniqueness breaking of invariant measures,” Institute of Dynamical Systems, Bremen, Germany, 1991.
16. “The inverse pendulum can be stabilized by noise,” University of North Carolina at Chapel Hill, 1991.
17. INRIA Sophia Antipolis, France, 1992.
18. INRIA Lorraine, Metz, France, 1992.
19. State University of Iowa, Ames, IA, 1992.
20. University of Southern Illinois, Carbondale, IL, 1993.
21. University of Bremen, 1993.
22. Institute for Mechanics, University of Hannover, 1993.
23. U Karlsruhe, U. Ampbery, U. Bremen (Germany), 1994.
24. Université de Provence, Marseille, France, 1994.

25. Universities Roma I, Torino, Politechnical U. Torina (Italy), Fall 1994.
26. U. Kyoto, Kyoto Institute of Technology, 1996.
27. U. Bremen, Germany, 1997.
28. Case Western RU, Cleveland, Ohio, 1997
29. U. Kannazawa, U. Kyoto (Japan), 2000.

INVITED TALKS AT CONFERENCES (since 1987)

1. Workshop on "The Road Vehicle System and Related Mathematics," Institute for Scientific Interchange, Torino, Italy, June 1987: "Effects of Small and Large Noise on the Stability of Dynamical Systems."
2. Conference on "The Parisi-Wu Stochastic Quantization" American Physical Society, U. of Texas, Austin, March 1988: "Lyapunov Exponents of Stochastic Dynamical Systems."
3. 10th Midwest Probability Meeting, Mini-conference on Lyapunov exponents, Evanston, IL, October 1988: "Noise Induced Phenomena."
4. 17th Midwest Differential Equation Conference, Iowa State U., Ames, IA, 1988: "Noise Induced Long Term Behavior of Simple Differential Equations."
5. American Mathematical Society Summer Seminar on the "Mathematics of Random Media," Virginia Tech., Blacksburg, VA, 1989: "Real Noise Driven Linear Stochastic Systems."
6. Conference on "Diffusion Processes," Northwestern U., Evanston, IL, 1989.
7. SIAM Conference on "Dynamical Systems," Minisymposium "Dynamical Systems and Stochastic Processes," Orlando, FL, 1990.
8. Conference on "Lyapunov Exponents," Oberwolfach, Germany, 1990.
9. Workshop on "Probabilistic Methods in Differential Equations," Technion, Haifa, Israel, 1991.
10. Conference on "Nonlinear and Random Vibrations," Oberwolfach, Germany, 1991.
11. Workshop on "Stochastic Analysis," Oberwolfach, Germany, 1992.
12. A.M.S. Meeting Knoxville, 1993, Special Session on "Stochastic Processes," Knoxville, TN, 1993.
13. Conférence Internationale: Stabilité Stochastique, Stabilisation Stochastique, INRIA, Lorraine, Metz, France, 1993.
14. Conference on "Applied Probability in Engineering, Computer and Communication Sciences," Paris, 1993.
15. A.M.S. Summer Research Institute on "Stochastic Analysis," Cornell University, Ithaca, NY, 1993.
16. International Symposium on Nonlinear Dynamics and Stochastic Mechanics Fields Institute, Waterloo, Ontario, 1993.
17. Conference on Numerics for perturbed dynamical systems, State University Ames, IA, April 1994.
18. Annual Meeting of Italian Probabilists, Trento, Italy (1-hour address), September 1994.
19. Conference on Stochastic Analysis and Stochastic Numerics, Nancy, France, October 1994.

20. International Conference on Random Dynamical Systems, Urbana-Champaign, IL, February 1995.
21. Conference on Stochastic Numerics, Purdue University, Lafayette, IN, March 1995.
22. International Conference on Industrial and Applied Mathematics (ICIAM), Hamburg, Germany, June 1995.
23. International Conference on Stochastic Analysis, Gregynog, Wales, June 1995.
24. 15th Conference on Mechanical Vibration, Boston, Mass., September 1995.
25. Conference on Nonlinear and Stochastic Systems, Oberwolfach, Germany, September 1995.
26. Conference on Stochastic Numerics INRIA Sophia Antipolis, France, March 1996.
27. Conference on Numerics for Dynamical Systems, Ames, IA, April 1996.
28. Conference on Stochastic Dynamical Systems, Oberwolfach, Germany, August 1996.
29. Conference on Stochastic Analysis, Princeton U, Princeton, NJ, March 1997.
30. Conference on Random Dynamical Systems, Breman, Germany, April 1997.
31. Numerics for Oseledec's Multiplicative Ergodic Theorem. Fall School Deutsche Forschungsgemeinschaft (series of lectures), Schloss Etelsen, Germany, October 1997.
32. Conference on Stochastic Dynamical Systems, Oberwolfach, August 1998.
33. International Conference on Industrial and Applied Mathematics (ICIAM), Edinburgh, Scotland, July 1999.
34. International Conference on Monte Carlo Methods, Monte Carlo, Monaco, July 2000.
35. Workshop on Computational Stochastic Differential Equations. Warwick, UK, February 2001.
36. Conference on Nonlinear and Stochastic Systems and their Numerics, Oberwolfach Germany, July 2002.
37. Symposium on Nonlinear Stochastic Dynamics, International Union of Theoretical and Applied Mechanics, Urbana-Champaign, IL, Aug 2002.

OTHER INVITATIONS

Visiting Professor (since 1987)

(1) Institut Dynamische Systeme, Universität Bremen, 1989, 1992, 1993
(2) Northwestern University, Evanston, IL, 1989
(3) Universita di Torino, 1990
(4) INRIA Sophia Antipolis, France, 1992
(5) INRIA Sophia Antipolis, France, (Series of lectures), Fall 1994.
(6) Distinguished Visitors, U Clemson, SC, January 1996.
(7) University Kyoto, Japan, May 1996.

PROFESSIONAL SERVICE

Organization of Conferences:

(1) Workshop "Lyapunov Exponents," Bremen 1984 (with L. Arnold).
(2) 4th Piedmont Mathematics Conference "Stochastics Differential Equations," University of North Carolina at Charlotte, 1989.
(3) Special Month and Conference on "Stochastic Flows," University of North Carolina at Charlotte, 1990.
(4) Conference on "Stochastic Numerics," University of North Carolina at Charlotte, 1992.
(5) Organizing Committee for the Annual Midwest Probability Colloquium 1994, 1998, 1999.
(6) International Conference on Random Dynamical Systems, Bremen, Germany, April 1997 (co-organized with W. Kliemann).
(7) Special session: on Stochastic Process and Control (co-organized with A. Yushkevich) at the AMS Regional Conference (SE), UNC-Charlotte, October 1999.
(8) Mini Symposium: Random Number Generators and Simulation of Stochastic Differential Equations, at the International Conference on Monte Carlo Methods, Monte Carlo, Monaco, July 2000.

Editing:

1. Lyapunov exponents, Springer Lecture Notes in Mathematics, #1186 (1986) (with L. Arnold).
2. Diffusion Processes and Related Problems in Analysis: Stochastic Flows. V. Wihstutz, ed. Birkhäuser (Progress in Probability, Volume 27), 1992 (with M. Pinsky).

Reviewing: Zentralblatt für Mathematik, Mathem. Reviews

Refereeing: Regularly for several Math. Journals, and NSF

PROFESSIONAL SOCIETIES

DMV - Deutsche Mathematiker Vereinigung
EMS – European Mathematical Society
AMS – American Mathematical Society
SIAM – Society for Industrial and Applied Mathematics

ZHIYI ZHANG
Mathematics Department, UNC Charlotte
Charlotte, NC 28223
T: (704)687-4549
F: (704)687-6415
E: zzhang@uncc.edu

ACADEMIC EXPERIENCE:

1.	Associate Professor	UNC Charlotte, 1996-Current
2.	Assistant Professor	UNC Charlotte, 1990-1996

OTHER PROFESSIONAL EXPERIENCE:

1.	Statistical Advisor	OSAM, UNCC, 1990-Current
2.	Statistical Advisor	Katz Healthcare Services, NC, 97-Current
3.	PSC Member	Water Environmental Research Foundation, DC
4.	Member	Expert Panel, Office of Water, US EPA, 96-98
5.	Statist. Consultant	Ortho Pharmaceutical Corporation, J\& J, 88-89

EDUCATION:

1.	Ph.D. in Statistics	Rutgers University, 1990
2.	M.S. in Statistics	Rutgers University, 1987
3.	B.A. in Mathematics	Hunter College, CUNY, 1985

GRANT SUPPORT:

1.	1997-1998	US EPA Grant, $90,000	PI
2.	1996-1998	NIST ATP Grant, $1.1 M	Co-PI
3.	1995	ONR Research Grant, $50 K	Co-PI
4.	1991-1994, 1997	UNCC Faculty Res. Grant.	PI

INVITED PRESENTATION:

1. Quantifying the Impact of Maintenance Activities on SSO via Statistical Modelling, Water Environmental Federation's Collection Systems Rehabilitation and O\& M Specialty Conference, 1999
2. Sanitary Sewer Overflow - a US EPA project, The 4th ICSA Statistical Conference, 1998
3. Est. in Location-Scale Models with Censored Data, The First Northern Illinois University Symposium on Statistical Science, 1996
4. Stopping Sanitary Sewer Overflows, US EPA conference on SSOs, Washington DC, 1995
5. Evaluation of Drug Efficacy in Incomplete Mixed Models, Robert Wood Johnson Pharmaceutical Research Institute, 1990

PUBLICATIONS:

1. Recovery of interblock information in BIBDs with interaction, with Arthur Cohen, Journal of Statistical Planning and Inference, Vol. 31, No. 3, pp.373-386, 1992.

2. The robustness of ANOVA with respect to interactions in some orthogonal block designs, Communications in Statistics - Theory and Methods, Vol. 21, No. 1, pp.233-240, 1992.

3. Recovery tests in BIBDs with very small degrees of freedom for interblock errors, Statistics and Probability Letters, Vol. 15, No. 3, pp.197-202, 1992.

4. A spectral form of dispersion model in block designs with arbitrarily unequal block sizes, Statistics and Probability Letters, Vol. 15, No. 4, pp.313-319, 1992.

5. Effects of prenatal litter size in inbred mice on morphometric characters with different developmental patterns, Growth, Development \& Aging, with Larry Leamy, Vol. 57, No. 1, pp.13-23, 1993.

6. On improving omnibus tests in Meta-analysis using vote-counts, Communications in Statistics - Simulation and Computation, Vol. 23, 3, pp. 803-812, 1994.

7. Combining Wilcoxon tests with censored data: an application to well water contamination, Environmetrics, with L.R. Korn, E.A. Murphy, Vol. 5, No. 4, pp.463-472, 1994.

8. Weighted combination of Wilcoxon tests with interlaboratory lifetime data, Sankhya Series A, Vol. 58, Part 2, pp. 311-327,1996.

9. A simple quantile approach to the two-sample problem under a location-scale model with random right censorship, Journal of Nonparametric Statistics, with G. Li, Vol. 6, pp.323-335, 1996.

10. On robust estimation of effect size under semiparametric models, Psychometrika, with N. Schoeps, Vol. 62, No. 2, pp. 201-214, 1997.

11. The effect of patient characteristics on response to focal laser treatment for diabetic macular edema, Ophthalmology, with D.J. Browning, J.M. Benfield, and A.Q. Scott, Vol. 104, No. 3, pp. 466-472, 1997.

12. The risk of missing angle neovascularization by omitting gonioscopy in central retinal vein occlusion, Ophthalmology, with D.J. Browning, A.Q. Scott, C. B. Peterson, and J. Warnock, Vol. 105, No. 5, pp. 776-784, 1998.

13. Quantifying the impact of maintenance activities on SSO via statistical modeling, Water Environmental Federation Conference Proceedings (Compact Disk), with A.E. Gallaher, Collection Systems Rehabilitation and O\&M Specialty Conference, Salt Lake City, Utah, August 1-4, 1999.

14. Measurement precision of body composition variables using the lunar DPX-L densitometer, Journal of Clinical Densitometry, with G.M. Kiebzak, L.M. Pierson, L.J. Leamy, Vol. 3, No. 1. pp.35-41. 2000.

15. Control sanitary sewer overflows by preventive maintenance - a battle against nature, Environmetrics, with I.F. Samples, Vol. 11, pp. 449-462, 2000.

16. A minimum distance estimation approach to the two-sample location-scale problem, Lifetime Data Analysis, with Q. Yu, 8, 289-305, 2002.

17. Flow data, I/I ratio, and autoregressive error models, part I, (submitted,), 2001.

SELECTED CONSULTING ACTIVITIES:

1. Nutech Solutions, Inc., Response Model, Investment Attrition Model, 2001.
2. Bank of America, Response Model, Balance Diminishment Model, 2000-2001.
3. First Union National Bank, ATM Queuing Model, Credit Risk Model, 1996-2001.
4. GE Capital, Credit Risk Model, 1992-1995.
5. The Franklin Mint, Response Model, 1988.

COMMITTEE DUTIES:

1. Departmental Tenure and Promotion Committee (98-00).
2. Chair, Mathematics Search Committee (97-99).
3. University Competitive Grants Committee (96-97).
4. Assistant Professors' representitive to the Advisory Committee (91-95).
5. Math Education Committee (94-95).
6. High School Math Committee (94-95, 96-97).

COURSES TAUGHT:

Undergraduate:	Elementary Statistics I, II
	Engineering Statistics
	Statistical Techniques
	Calculus I, II
Graduate:	Introduction to the Theory of Statistics
	Applied Statistical Methods
	Multivariate Analysis
	Statistical Consulting I, II
	Statistical models in Financial Industry

CURRENT RESEARCH INTERESTS:

1. Non- or Semi-parametric two-sample location-scale models.
2. Environmental data modeling.
3. Financial data modeling.

Curriculum Vitae

You-lan Zhu

Present Address: Dept. of Mathematics, UNC at Charlotte, 9201 University City Boulevard, Charlotte, NC, 28223, USA

E-mail Address: yzhu@math.uncc.edu

Education: Department of Engineering Mechanics and Mathematics, Qinghua University, Beijing, China, studied Mathematics of Computation, 1957-1963.

Field: Numerical Methods for Partial Differential Equations, Computational Finance and Computational Fluids.

Professional Experience

Mid Aug. 1990 - present	Department of Mathematics University of North Carolina at Charlotte
July 1990 - Mid Aug. 1990	Stanford University
Dec. 1989 - June 1990	University of Heidelberg
Mid May 1989 - Nov. 1989	Computing Center, Academia Sinica
Mid Apr. 1989 - Mid May 1989	IMA, University of Minnesota
Oct. 1988 - Mid Apr. 1989	University of Heidelberg
Apr. 1988 - Sep. 1988	Computing Center, Academia Sinica
Dec. 1987 - Mar. 1988	University of Heidelberg
Mid Dec. 1986 - Nov. 1987	Computing Center, Academia Sinica
Mid Sep. 1986 - Mid Dec. 1986	IMA, University of Minnesota
Mid Apr. 1986 - Mid Sep. 1986	Computing Center, Academia Sinica

Mid Jan. 1986 - Mid Apr.k 1986	University of Heidelberg
June 1985 - Mid Jan. 1986	Computing Center, Academia Sinica
Apr. 1985 - May 1985	California Institute of Technology
July 1981 - Mar. 1985	Computing Center, Academia Sinica
Apr. 1981 - June 1981	Uppsala University
July 1980 - Mar. 1981	Computing Center, Academia Sinica
Apr. 1980 - June 1980	University of California, Berkeley
Jan. 1980 - Mar. 1980	California Institute of Technology
May 1979 - Dec. 1979	Courant Institute, NYU
May 1978 - Apr. 1979	Computing Center, Academia Sinica
Sep. 1963 - Apr. 1978	Institute of Computing Technology, Academia Sinica

Awards : Awarded Chinese National Natural Sciences Award (Grade 3) in early Eighties

Publications

Books and Proceedings:

1. You-lan Zhu et al., Difference methods for initial-boundary value problems and flow around bodies, Science Press, Beijing, China, 1980 (in Chinese); the English edition with some supplements, Springer-Verlag, Heidelberg and Science Press, Beijing, 1988.

2. F.G. Zhuang and Y.L. Zhu (Eds.), Lecture Notes in Physics, Vol. 264, Proceedings of the Tenth International Conference on Numerical Methods in Fluid Dynamics, Springer-Verlag, Heidelberg, 1986.

3. You-lan Zhu and Ben-yu Guo (Eds.), Lecture Notes in Mathematics, Vol. 1297, Proceedings of the First Chinese Conference on Numerical methods for Partial Differential Equations, Springer-Verlag, Heidelberg, 1987.

Papers:

1. You-lan Zhu, Computation of steady inviscid supersonic flow around bodies - review, Applications of Computers and Applied Mathematics, 1977, No. 1-2 (in Chinese).

2. You-lan Zhu et al., A numerical method for initial-boundary value problems of hyperbolic systems and its applications, Acta Mathematicae Applagatae Sinica, 1977, No. 3 (in Chinese).

3. You-lan Zhu et al., Three-dimensional inviscid flow around blunt bodies, Acta Mechanica Sinica, 1977, No. 4 (in Chinese).

4. You-lan Zhu et al., Difference schemes for initial-boundary value problems of hyperbolic systems and examples of application, Scientia Sinica, 1987, No. 2 (in Chinese); Scientia Sinica, Special Issue II, 1979 (in English).

5. You-lan Zhu, Stability of difference schemes for pure-initial value problems with variable coefficients, Mathematicae Numericae Sinica, 1978, No. 1 (in Chinese).

6. You-lan Zhu, A block-double-sweep method for non-complete linear algebraic systems and its stability, Mathematicae Numericae Sinica, 1978, No. 3 (in Chinese).

7. You-lan Zhu, Difference schemes for initial-boundary value problems of the first order hyperbolic system and their stability, Mathematicae Numericae Sinica, 1979, No. 1 (in Chinese).

8. Xi-chang Zhong and You-lan Zhu, An implicit line method for flows around blunt bodies, Mathematicae Numericae Sinica, 1979, No. 3 (in Chinese).

9. You-lan Zhu et al., Numerical calculation of supersonic flow around combined bodies, Acta Mechanica Sinica, 1979, No. 2 (in Chinese).

10. You-lan Zhu and Bing-mu Chen, A numerical method with high accuracy for calculating the interactions between discontinuities in three independent variables, Scientia Sinica, 1980, No. 8 (in Chinese); Scientia Sinica, Vol. 23, No. 12, 1980 (in English).

11. You-lan Zhu, An application of uncentered schemes to the computation of unsteady flows, Journal of Numerical Methods and Computer Applications, 1980, No. 4 (in Chinese).

12. You-lan Zhu and Bing-mu Chen, Difference methods for initial-boundary value problems and computation of flow around bodies, Computers & Fluids, Vol. 9 (1981) (in English).

13. You-lan Zhu and Bing-mu Chen, An accurate method for calculating the interactions between discontinuities in three-dimensional flow, Lecture Notes in Physics, Springer-Verlag, Heidelberg, Vol. 141, 1981 (in English).

14. You-lan Zhu, Stability and convergence of difference schemes for linear initial-boundary-value problems, Mathematicae Numericae Sinica, 1982 No. 1 (in English).

15. You-lan Zhu, A block-double-sweep method for a class of difference equations and its stability, Mathematicae Numericae Sinica, 1982, No. 3 (in English).

16. You-lan Zhu and Bing-mu Chen, An accurate numerical method of solving nonlinear hyperbolic systems, Proceedings of the 1980 Beijing Symposium on Differential Geometry and Differential Equations, Science Press, Beijing, China, Gordon and Breach, Science Publishers, Inc., New York, 1982 (in English).

17. You-lan Zhu et al., Some new developments of the Singularity-separating difference method, Lecture Notes in Physics, Springer-Verlag, Heidelberg, Vol. 170, 1982 (in English).

18. You-lan Zhu, Implicit difference schemes for the generalized nonlinear Schrodinger systems, journal of Computational Mathematics, Vol. 1, No. 2 (1983) (in English).

19. Bing-mu Chen and You-lan Zhu, Numerical calculation of inviscid supersonic flow field around bent-nose cones, Acta Aerodynamica Sinica, 1983, No. 2 (in Chinese).

20. Xiong-hua Wu, Dun Huang and You-lan Zhu, Numerical computation of the flow with a shock wave passing through a strong explosion center, Journal of Computational Mathematics, Vol. 1, No. 3, (1983) (in English).

21. Xiong-hua Wu and You-lan Zhu, Numerical solution of multimedium flow with various discontinuities, journal of Computational Mathematics, Vol. 1, No. 4 (1983) (in English).

22. Xiong-hua Wu, Yong Wang, Zhen-huan Teng and You-lan Zhu, Numerical Computation of flow field with deflagration and detonation, Journal of Computational Mathematics, Vol. 2, No. 3 (1984) (in English).

23. Lin-an Ni, Xiong-hua Wu, Yong Wang and You-lan Zhu, Quantitative comparison among several difference schemes, Journal of Computational Mathematics, Vol. 3, No. 1 (1985) (in English).

24. Quan-sheng Xu and You-lan Zhu, Solution of two-dimensional Stefan problem by the singularity-separating method, Journal of Computational Mathematics, Vol. 3, No. 1 (1985) (in English).

25. You-lan Zhu et al., Accurate solution of several complicated problems, Lecture Notes in Physics, Springer-Verlag, Heidelberg, Vol. 218, 1985 (in English).

26. Xiong-hua Wu and You-lan Zhu, A scheme of singularity-separating method for the nonconvex problem, Computers & Fluids, Vol. 13, 1985 (in English).

27. Xiong-hua Wu and You-lan Zhu, Numerical results of the flow field with a shock wave passing through a 'strong explosion' center at the late stage, Proceedings of International Conference on Nonlinear Mechanics, Shanghai, 1985 (in English).

28. Youg Wang and You-lan Zhu, Numerical tests on convergence of the random choice method, Journal of Computational Mathematics, Vol. 4, No. 2 (1986) (in English).

29. Yi Wang and You-lan Zhu, Numerical solution for the Stefan problem with certain singularities, Journal of Computational Mathematics, vol. 4. No. 2 (1986) (in English).

30. Wen-an Yong and You-lan Zhu, Stability of implicit difference schemes with variable coefficients, journal of Computational Mathematics, Vol. 5, No. 3 (1987) (in English).

31. You-lan Zhu and Wen-an Yong, On stability and convergence of difference schemes for quasilinear hyperbolic initial-boundary-value problems, Lecture Notes in Mathematics, Vol. 1297, 1987 (in English).

32. You-lan Zhu, A method for solving the 'nonconvex' Riemann problem, Report, The Computing Center, Academia Sinica, 1987 (in English).

33. You-lan Zhu, A class of discontinuities caused by '-function', Proceedings of Holt's Symposium, Williamsburg, USA, 1988 (in English).

34. Xiong-hua Wu and You-lan Zhu, Computation of flow field in tubes with rapidly changed cross-section-areas, Proceedings of International Conference on Numerical Methods in Fluids, Oxford, England, 1988 (in English).

35. Xiong-hua Wu and You-lan Zhu, Application of the singularity-separating method to computing problem of solid propellant combustion in a closed vessel, Report, Heidelberg University, West Germany, 1988 (in English).

36. Xiong-hua Wu and You-lan Zhu, Using the singularity-separating method to research how to decrease the pressure on the end of tube, Report, Heidelberg University, West Germany, 1988, (in English).

37. You-lan Zhu, Bing-mu Chen, Xiong-hua Wu and J. Warnatz, Computation of nonequilibrium gas flow past blunt bodies, Report, Heidelberg University, West Germany, 1989 (in English).

38. You-lan Zhu and Bing-mu Chen, Some computed results of non-equilibrium gas flow with a complicated model, Proceedings of the Third International Symposium on Computational Fluid Dynamics, Nagoya, Japan 1989 (in English).

39. Zhan-bo Chen and You-lan Zhu, Psuedo-null supermatrix method for stability analysis of multidimentional difference schemes with variable coefficients, Heidelberg University SFB 123 Report No. 579, 1990 (in English).

40. Zhan-bo Chen and You-lan Zhu, Psuedo-null supermatrix and convergence analysis of difference schemes for initial-boundary-value problems

of two-dimensional linear hyperbolic equations, Heidelberg University SFB 123 Report No. 580, 1990 (in English).

41. Wen-an Yong and You-lan Zhu, Convergence of difference methods for nonlinear problems with moving boundaries, Science in China (Series A), Vol. 33, No. 5 (1990) (in English).

42. Xiong-hua Wu, You-lan Zhu and Bing-mu Chen, A general numerical method for solving Riemann problems, Journal of Computational Mathematics, Vol. 9, No. 4, 1991.

43. Xiaonan Wu and You-lan Zhu, A highly accurate numerical method for two and three dimensional shock reflection problems, Fluids and Computers, Vol. 25, 1996. pp. 295-317.

44. Taehoon Park and You-lan Zhu, Shock interactions in non-equilibrium hypersonic flow, Journal of Computational mathematics, Vol. 15, 1997, pp. 345-364.

45. You-lan Zhu and Ying-jun Sun, The singularity-separating method for two-factor convertible bonds, Journal of Computational Finance, Vol. 3, 1999, pp. 91-110.

46. Xiaonan Wu and You-lan Zhu, A highly accurate numerical method for flow problems with interactions of discontinuities, Vol. 20, 2002, No.1, Journal of Computational Mathematics.

47. Taehoon Park and You-lan Zhu, Computation of nonequalibrium hypersonic flow over concave corners, accepted by Journal of Computational Mathematics.

48. You-lan Zhu, Hongliang Ren and Hanping Xu, Improved effectiveness evaluating American options by the singularity-separating method, working paper, University of North Carolina at Charlotte (1996).

49. You-lan Zhu and Anahid Abifaker, Application of the singularity-separating method to double moving barrier options with rebates, working paper, University of North Carolina at Charlotte (1999).

50. You-lan Zhu, Evaluation of discretely sampled Asian options by finite difference method, working paper, University of North Carolina at Charlotte (2000).

51. Zhi-zhong Sun, Ning-ning Yan and You-lan Zhu, Convergence of second-order difference schemes and extrapolation algirithm for degenerate patabolic equations, working paper, University of North Carolina at Charlotte (2001).

52. You-lan Zhu, Bin-mu Chen, Hongliang Ren and Hanping Xu, Application of singularity-separating method to American exotic option pricing, Advance in Computational Mathematics (2002, to appear).

53. You-lan Zhu and Jinliang Li, Numerical solutions for American options on assets with stochastic volatilities, working paper, University of North Carolina at Charlotte (2002).

54. You-lan Zhu, Xiaonan Wu and I-Liang Chern, Derivative Securities and Finite Difference Methods, course material, University of North Carolina at Charlotte (2002).

Department of
Finance and Business Law
Faculty

BENNIE H. NUNNALLY, JR.

Professor of Finance

Business Address
The University of North Carolina at Charlotte
Belk College of Business Administration
Department of Finance and Business Law
Charlotte, NC 28223
Telephone: (704) 687-2875
Fax: (704) 687-6987
Email: bhnunnal@email.uncc.edu

Residence Address
5031 Ridgetop Trail
Charlotte, NC 28215-8739
Telephone:(704) 598-1184

Education

D.B.A. Finance; The University of Virginia, Charlottesville, VA, 1982.

M.B.A. Finance Concentration; Atlanta University, Atlanta, GA, 1973.

B.S. Business Administration; Virginia Union University, Richmond, VA, 1972.

Professional Experience

The University of North Carolina at Charlotte 1979 to present

Chairperson-Department of Finance and Business Law
The University of North Carolina at Charlotte 1988-1997

Morris Visiting Professor of Business Administration
Darden Graduate Business School, University of Virginia 1995-1996

Acting Assistant Professor-McIntire School of Commerce
The University of Virginia 1978-1979

Lecturer-Evening College: School of Business
The University of Akron 1974-1975

Business Experience

Construction Accountant (Capital Budgeting)
The B.F. Goodrich Company, 1973-1975

Publications and Research

Books

Corporate Lease Analysis; A Guide to Concepts and Evaluation, with D.A. Plath and H.W. Johns, Quorum Books, Westport, CT, May 1991.

Cases in Finance, 2nd ed., with D.A. Plath, Richard D. Irwin, Burr Ridge, IL, 1997.

Financial Management: A Practical Approach, 2nd ed., with G.W. Kester, Kendall/Hunt Publishing Co., Dubuque, Iowa, 1998.

Book Chapters

"Financial Statement Analysis: A Practical Guide," in Cases in Strategic Management and Business Policy by Ginter and Swayne, Prentice-Hall, 1990.

"Financial Statement Analysis, and the Break-Even Concept," in Cases in Strategic Marketing, 2nd ed. by Swayne and Ginter, Prentice-Hall, 1993.

Journal Articles (Refereed)

"A 1982 Survey of Corporate Leasing Analysis", With Thomas O'Brien, Financial Management, Vol. 12, No. 13, summer 1983.

"The Accuracy of Earnings Forecasts," with Robert Stokes, Southern Business Review, Fall 1986.

"Problems Facing Black-Owned Businesses," with R.W.Hornaday, Business Forum, Vol. 12, No. 4, Fall 1987.

"Leasing Versus Borrowing: Evaluating Alternative Forms of Consumer Credit," with D.A. Plath, Journal of Consumer Affairs, Vol. 23, No. 2, Winter 1989.

"Measuring the Effective Cost of Consumer Credit: Is Leasing Cheaper than Borrowing?" with D.A. Plath, Financial Services Review, 1992.

"Teaching with Cases to Graduate and Undergraduate Students," with Benton Gup, Robert Bruner, and Lawrence Pettit, Financial Practice and Education, Fall/Winter 1999.

"Banking and Bank Regulation in Nigeria," with D.A. Plath, Journal of International Banking Regulation, Vol.2, #3, fall 2000.

"Ridgetop Family Restaurant Associates" (case addressing valuation of a closely held business), Journal of Financial Education, Spring 2001.

"Modern Investments, Inc.' (case addressing the yield curve and interest rate forecasting), with Tim Michael, Journal of Finance Case Research, Vol.2. #2, spring 2001.

"Will African-Americans Benefit From Privatized Social Security", with M.D.Evans, Journal of Legal, Ethical and Regulatory Issues", Vol.5, #2, 2002.

"Case Teaching and the Integrative Process", with M.D. Evans, Journal of Financial Education, Forthcoming.

National Proceedings and Meetings (Refereed)

"Capital Budgeting and Strategic Planning: A Two Company Study." Financial Management Association Meeting, 1983.

"Tobin's Q As A Growth Proxy in Stock Valuation," with M. Sehgal, Financial Management Association Meeting, 1988.

"International Investment and Taxation: A Two Country Study," with H.W. Johns, Association for Global Business Meeting, Atlanta, GA, Nov. 1991.

"Teaching with Cases to Graduate and Undergraduate Students," with R. Bruner, B. Gup, L. Pettit, Financial Management Association Meeting, 1997.

" A Survey of Risk Adjustments in Capital Budgeting", with Tim Michael, Financial Management Assoc. meeting, Seattle, WA, 2000.

Regional Proceedings (Refereed)

"An Objective Method for Finding Risk-Adjusted Hurdle Rates: A Synthesis," with Thomas O'Brien, Proceedings, S.E. American Institute for Decision Sciences, 1982.

"Bank Branch Profitability and Strategic Planning." S.E. American Institute for Decision Sciences Meeting, Savannah, GA, 1984. (Selected as best finance paper)

"Earnings Forecast Accuracy," with Robert Stokes, Proceedings, Eastern Finance Association, 1985.

"Factoring, Borrowers and Lenders: An Update." S.E. Decision Sciences Institute, 1986.

"An Empirical Investigation of Large Bank Dividend Payout Ratios," with W.F. Kennedy, Proceedings, Eastern Finance Association, 1986.

"Risk Considerations in Capital Budgeting Practices for the New Millennium: A Fortune 1000 Survey," with Timothy B. Michael, Eastern Finance Association Meeting, April 2000, Myrtle Beach, SC.

"Case Teaching and the Integrative Process", with M.D. Evans, Eastern Finance Assoc. Meeting, April, 2002.

"Behavioral Finance: Affect upon African-Americans in Privatized Social Security", with M.D. Evans, Eastern Finance Assoc. Meeting, April 2002.

Working Papers

"Risk Adjusted Discount Rates: From Modigliani-Miller to Real Options: A Synthesis".

"African-American Entrepreneurship: Ownership Characteristics and Enterprise Value".

Referee/Editorship

Journal of Financial Education. (Referee, On-going); Journal of Finance Case Research (Assoc. Editor-2001-Present)

Course Development

Business 3224, Advanced Financial Management, case course in business finance, 1984.

Management 6154, Topics in Financial Management, Use of popular and academic writing to examine current topics in business finance, 1986.

Continuing Education

From 1997 to the present I have taught the following continuing education courses each fall: *Financial Statement Analysis; Mergers and Acquisitions; Valuing a Closely-Held Business.* Beginning in fall of 2001 *Engineering Economics* (Time Value of Money and Capital Budgeting) was added to the list of on-going continuing education courses that I will teach.

Honors Courses

From spring 1995 to the present I have been asked, each spring, to teach Honors 1701 for the University Honors Program. From fall 1997 to the present, I have been asked, each fall, to teach finn 3120-Honors.

University and Community Service (Selected list)

University

Chair: Council on Race Relations, 1998-Present.

Chair: Provost's Survey Committee, 1999.

Provost Search Committee, fall 2002

College

Nominating Committee, 1998-1999; Reappointment, Promotion, and Tenure Committee, 1999-2000.

Reappointment, Promotion and Tenure Committee, member; 2001-2002.

Faculty President, 2002-2004

Department

Personnel Committee, 1998-1999.

Honors Thesis Supervisor 1999-Present.

Head, United Way Drive, 1984-1985. Head, Arts and Science Council Drive, 2002.

Community

Various Projects with African-American Entrepreneurs in Charlotte, usually via the Charlotte Chamber of Commerce, 1998-present. (re:Lawrence Toliver, Charlotte Chamber).

Treasurer: Metrolina Vietnam Veterans Association, 1995-1999.

Awards

Freedoms Foundation Award – Valley Forge, Pennsylvania with Robert Hornaday and Stella Nkomo, for the Black Enterprise Summer Training (B.E.S.T.) Program, 1988.

Finalist: 1998 Nationsbank Award for Excellence in Teaching; UNCC.

STEVEN H. OTT
John Crosland, Sr., Distinguished Professor
of Real Estate and Development
Department of Finance and Business Law
University of North Carolina at Charlotte
http://www.uncc.edu/shott/

EDUCATION

University of Wisconsin-Madison, 1988-1992. Ph.D. in Business.

University of Wisconsin-Madison, 1987. Master of Science in Business.

University of Wisconsin-Whitewater. 1974-1978. Bachelors of Business Administration.

ACADEMIC EXPERIENCE

John Crosland, Sr. Distinguished Professor of Real Estate and Development, UNC-Charlotte, 2002-Present.

Associate Professor and Director of the Program in Real Estate, UNC-Charlotte, 1999-2002.

Associate Professor, Holder of the Kentucky Real Estate Professorship and Director of the Center for Real Estate Studies University of Kentucky, 1998-1999.

Assistant Professor and Director of the Center for Real Estate Studies University of Kentucky, 1992-1998.

PROFESSIONAL EXPERIENCE

Kenneth Leventhal and Company, a real estate consulting firm. 1987-1988.

Madison Real Estate Group, a real estate developer. 1984-1987.

Grant Thornton International, a public accounting firm. 1980-1984.

TEACHING-COURSES TAUGHT

Real Estate (Undergraduate)
Real Estate Finance (Undergraduate)
Real Estate Finance and Investment (MBA, Executive MBA)
Real Estate Capital Markets (MBA)
Real Estate Development (MBA)
Investments (Undergraduate and MBA)
Seminar in Financial Theory (Ph.D.)
Seminar in Corporate Finance (Ph.D.)
Corporate Finance (Undergraduate)

PUBLICATIONS AND RESEARCH

Refereed Papers Published or Accepted for Publication

Optimal Valuation of Noisy Real Assets, co-authored with Paul D. Childs and Tim Riddiough, *Real Estate Economics,* Fall 2002, Vol. 30, (3), 385-414.

Optimal Valuation of Claims on Noisy Real Assets: Theory & an Application, co-authored with Paul D. Childs and Tim Riddiough, *Real Estate Economics,* Fall 2002, Vol. 30, (3), 415-444.

Real Options and Real Estate: A Review and Valuation Illustration. *Real Estate Valuation Theory*, an American Real Estate Society Monograph, 2002, Volume 8, 411-423.

Valuation and Information Acquisition Policy for Claims Written on Noisy Real Assets, co-authored with Paul D. Childs and Tim Riddiough, *Financial Management,* Summer 2001, Vol. 30 (2), 45-75.

Real Options and Development: A Model of Regional Real Estate Supply and Demand, co-authored with Ha-Chin Yi, *Real Estate Finance*, Spring 2001, Vol. 18 (1), 47-55.

The Role of Uncertainty in Investment: An Examination of Competing Investment Models Using Commercial Real Estate Data, co-authored with Tim Riddiough, and Steven Holland, *Real Estate Economics,* Spring 2000, Vol. 28, (1) 33-64.

Agency Costs, Underinvestment, and Optimal Capital Structure: The Effect of Growth Options to Expand, co-authored with David C. Mauer, in M. J. Brennan and L. Trigeorgis (eds.), *Project Flexibility, Agency, and Competition: New Developments in the Theory and Application of Real Options*, 2000, Oxford University Press, pp. 151-179.

On the Optimal Structure of Financial Incentives for Enterprise Zones and Other Locational Development Programs, co-authored with David C. Mauer, *Journal of Urban Economics,* 1999, 45, 421-450.

Capital Budgeting For Interrelated Projects: A Real Options Approach, co-authored with Paul D. Childs, and Alexander Triantis, *Journal of Financial and Quantitative Analysis,* September 1998, 33 (3) 305-334. This paper was reprinted in the book: *Real Options and Investment Under Uncertainty: Classical Readings and Recent Contributions,* edited by E. Schwartz and L. Trigeorgis, MIT Press.

Bias in the Empirical Approach to Calculating Risky Bond and Mortgage Yields, co-authored with Paul D. Childs and Tim Riddiough, *Journal of Real Estate Finance and Economics,* May 1997,14(3), 263-282.

The Pricing of Multi-Class Commercial Mortgage-Backed Securities, co-authored with Paul D. Childs and Tim Riddiough, *Journal of Financial and Quantitative Analysis* 31(4) December 1996, 581-603.

Refereed Papers Published or Accepted for Publication (Continued)

Uncertain Outlays in Time-to-Build Problems, co-authored with Howard E. Thompson. *Managerial and Decision Economics* 1996, 17 (1), 1-16.

The Value of Recourse and Cross Default Clauses in Commercial Mortgage Contracting, co-authored with Paul D. Childs and Tim Riddiough. *Journal of Banking and Finance*. 1996, 20 (3), 511-536.

Investment Under Uncertainty-The Case of Replacement Investment Decisions, co-authored with David C. Mauer. *Journal of Financial and Quantitative Analysis*, December 1995, 30 (4), 581-605.

The Wealth Effects of Real Estate Transactions: The Case of REITs, co-authored with Willard McIntosh, and Youguo Liang. *Journal of Real Estate Finance and Economics* May 1995, 10 (3), 299-307.

Real Estate Investment Trusts: A Review of the Financial Economics Literature, co-authored with Jack Corgel and Willard McIntosh. *Journal of Real Estate Literature,* 1995, 3 (1), 14-43.

Working Papers/Work in Progress

Effects of Noise on Optimal Exercise Decisions: The Case of Risky Debt Secured by Renewable Lease Income

Interactions of Corporate Financing and Investment Decisions: The Effect of Growth Options to Replace or Expand

Investment Performance and the Cost of Capital: The Case of Real Estate Investment Trusts

On demand: Cross-country evidence from commercial real estate asset markets.

Defined Benefit vs. Defined Contribution? Determining the Optimal Benefit Plan Choice Using a Real Options Framework.

Conference Presentations

American Finance Association, 1996
American Real Estate and Urban Economics, 1994, 1995,1996, 1997, 1998
Canbridge-Maastricht Real Estate Symposium
Eastern Finance Association, 1993
European Finance Association, 1995, 1996, 2001
Financial Management Association, 1994, 1995, 1996, 2001
International Conference on Real Options, 1997, 1999, 2000
International Real Estate Society, 2001
Southern Finance Association, 1999
University of South Carolina Berlinberg Scholar Series, 2001
Western Finance Association, 1997

Research Grants and Awards

Research grant awarded for 2001 ($59,500) by the TIAA-CREF Institute, for "Defined Benefit vs. Defined Contribution? Determining the Optimal Benefit Plan Choice Using a Real Options Framework."

Research grant awarded for 2000 ($10,000) by the Center for Applied Real Estate Education and Research, University of South Carolina, for "Using the Real Options Approach to Explain and Predict Development: An Econometric Model of Real Estate Supply and Demand in South Carolina."

Research grant awarded for 2000 ($12,000) by the Real Estate Research Institute for "The Cost of Capital for Real Estate Investment Trusts".

Postdoctoral Award 1998, Homer Hoyt Advanced Studies Institute, Weimer School of Advanced Studies in Real Estate and Land Economics.

Ashland Oil Summer Research Grant for 1996 ($6500) for "On the Optimal Structure of Financial Incentives for Enterprise Zones and Other Locational Development Programs."

Research grant awarded for 1996 ($12,000) by the Real Estate Research Institute for "Leasing Risk, Financing Risk, and Capital Structure Decisions."

Research grant awarded for 1995 ($10,000) by the Real Estate Research Institute for "Property Diversification, Risk and Return in CMBS Investment."

Research grant awarded for 1994 ($10,000) by the Real Estate Research Institute for "Determinants of Real Estate Development Activity, An Empirical Investigation of the Real Option Model."

Kentucky Real Estate Commission Education Grants for the 6 fiscal years beginning 6-30-94 and made annually through the year ending 6-30 99 totaling $254,372.

Selected Applied Research/Consulting/Executive Education

Valuation Model for REIT Callable Convertible Preferred Stock for AEW Capital Management.

Cost of Capital Analysis for two divisions of Duke Energy Corporation.

Preparation of "A Framework for the Analysis and Evaluation of Venture Capital and Business Acquisition Investments" for East Kentucky Power Cooperative, Inc.

Preparation of a Capital Budgeting Manual for Morgan Stanley Group, Inc.

Preparation of a Report on Investment in Senior Housing for Prudential Real Estate Investors.

Selected Applied Research/Consulting/Executive Education (continued)

A Review of Helium-3 Resources and Acquisition for Use as Fusion Fuel, co-authored with other members of the Fusion Technology Institute. Published in July 1992 issue of *Fusion Technology*.

Economic and Capital Budgeting Analysis of the Use of Lunar Helium-3 as a Fuel in the U.S. Policy, co-authored with Howard E. Thompson, working paper, University of Wisconsin at Madison.

Member of the faculty at the Colorado Graduate School of Banking—1996-2000. Taught "Managing the Investment Portfolio."

Member of the faculty at the Graduate School of Banking at Louisiana State University—1998-2002. Taught "Financial Markets."

Economic impact study for JDN Development Company, an Atlanta based REIT that analyzed the economic effects of a new retail shopping center in Lexington, Kentucky.

Mortgage pricing and interest rate spread numerical analysis performed for The Analysis Group, a Boston based real estate consulting firm.

Taught "Real Estate Finance" for the Executive MBA Program, UNC-Chapel Hill, Summer 2002

Taught Real Estate Financial Analysis for the public planning communities of the Charlotte region, September 2002. Participants included planners, planning staff and town managers.

Review/Referee Services for Academic Journals

Financial Management
Global Finance Journal
Journal of Applied Business Research
Journal of Financial Research
Journal of Real Estate Finance and Economics
Journal of Real Estate Portfolio Management
Journal of Real Estate Research
Journal of Urban Economics
Managerial and Decision Economics
Management Science
Real Estate Economics
Real Estate Finance
Review of Financial Studies
Quarterly Review of Economics and Finance

Editorial Boards

Journal of Real Estate Portfolio Management

SERVICE

Service Performed as Director for the Center for Real Estate Studies, University of Kentucky.

Tour of the State of Kentucky to promote the 1992 Kentucky Housing Affordability Index.
Presentation at a regional meeting of the Mortgage Bankers Association.
Attended and addressed the Kentucky Association of Realtors at their 1993 quarterly meetings.
Presentation on the Lexington real estate market to the Community Bank Board of Directors and Investment Committee.
Presentation on the Lexington real estate market to the Lexington Home Builders Association.
Presentation on the local real estate market to Old Kentucky Home Realtors.
Presentation to the Fayette Comprehensive Plan Update Commission.
Presentation at the quarterly meeting of the Lexington Apartment Association.
Presentation at a regional meeting of the Mortgage Bankers Association.
Presentation on "Trends in Real Estate Finance" at a meeting of Robert Morris Associates, a regional bankers' association, in Lexington.
Presentation on Real Estate Investment Trusts to the National Association of Investors.
Presentation on "Trends in Real Estate Finance" to the Appraisal Institute.
Presentation on Center for Real Estate Studies to the Kentucky Real Estate Educators Conference.
Presentation on "Trends in Real Estate" at a meeting of the Kiwanis Club of Lexington.
Presentation at a regional meeting of the Lexington Mortgage Bankers .
Presentation on the Center for Real Estate Studies to the Commercial Property Association of Lexington.
Presentation to REACH Board and operating committee on the Low-Income Housing Tax Credit.
Presentation on Real Estate Investment Trusts to the National Association of Investors.
Presentation at a regional meeting of the Lexington Mortgage Bankers Association.
Presentation to the Commercial Property Association of Lexington.
Presentation to the Lexington Board of Realtors--Commercial Property division.

Applied Research Completed for the UK Center for Real Estate Studies.

The 1993 Kentucky Housing Affordability Index
An Analysis of the Multi-family Housing Market for the Lexington/Fayette MSA.
An Analysis of the Demand for Residential Housing and Land in Fayette County: The Next 20 Years.
The Economic Impact of the Construction Industry in Fayette County
The 1994 Kentucky Housing Affordability Index
An Analysis of the Demand for Residential Housing and Land in the Lexington-Fayette MSA: The Next 20 Years.
Methods for Determining the Value of a Real Estate Brokerage Firm
An Analysis of the Residential Housing Market for Madison County: The Next 5 Years.
An Analysis of the Residential Housing Market for Northern Kentucky: The Next 5 Years.
An Analysis of the Residential Housing Market for McCracken County: The Next 5 Years.
The 1995 Kentucky Housing Affordability Index

An Analysis of the Residential Housing Market for Louisville, Kentucky
The 1996 Kentucky Housing Affordability Index
The 1997 Kentucky Housing Affordability Index
A Hands-on Guide to Careers in Real Estate
1998 Analysis of the Multi-family Housing Market for the Lexington/Fayette MSA.

Other University Service

University of Kentucky

Recruiting Coordinator for Finance Area, 1992-93, 1993-94 and 1995-96.
Member of the Visiting Scholars Committee, 1993.
Speaker on "Real Estate Trends" at the annual Economic Roundtable sponsored by the Lexington Chamber of Commerce and the UK College of Business and Economics (1993-1998).
Member of the Faculty Development subcommittee, Computer Advisory Committee, Service Committee and the School of Management Ph.D. Studies Committee, 1995-96.
Member of the School of Management Ph.D. Review Committee, 1997.
Member of the International Business and Management Center Advisory Board 1996-1997.
Member of the School of Management Recruiting Committee 1997
Member of the School of Management Review Committee, 1998.
Member of the School of Management Undergraduate Studies Committee, 1998.

University of North Carolina-Charlotte

Member, Belk College MBA Committee, 2002
Chair, Department of Finance and Business Law Recruiting Committee, 2002
Chair, Graduate Affairs and Research Committee, 2000-2001, 2001-2002
Member, Belk College Review Committee (RPT), 2000-2001
Member, Department Chair of Economics Search Committee, 2001
Faculty Advisor, MBA Student Orientation Team, 2001

Community Service

Formed and a member of the Advisory Board to the Program in Real Estate, UNC-Charlotte, 1999-present.

Member of the Urban Land Institute Executive Committee, Charlotte Regional District, 2000-2002.

Member of the Urban Land Institute Regionalism Committee, Charlotte Regional District, 2002.

Member of the operating committee for Resources, Education and Assistance for Community Housing (REACH), a Lexington based nonprofit organization established to provide housing assistance to low-income families and individuals, 1997-1999.

Member of the board of Directors for First African Senior Apartments, a Lexington based nonprofit organization established to rehabilitate an historic Lexington school to be used for low-income senior housing, 1998-1999.

Curriculum Vitae

CALVIN WILLIAM SEALEY

I. PERSONAL DATA

Home Address:	4048-E Bannockburn Pl. Charlotte, NC 28211
Home Telephone:	704.366.3652
Office Address:	University of North Carolina-Charlotte College of Business Administration Department of Finance and Business Law 9201 University City Blvd. Charlotte, NC 28223
Office Telephone:	704.687.2024
email:	cwsealey@email.uncc.edu
Place and Date of Birth:	Asheville, North Carolina June 27, 1946
Citizenship:	Canada, United States
Height:	Six feet
Weight:	175 lbs.
Marital Status:	Married, no dependents

II. EDUCATIONAL DATA

Universities:

1. University of North Carolina at Asheville, 1965-1969
   Degree: Bachelor of Arts
   Major: Economics

2. University of Georgia, 1969-1970
   Degree: Master of Arts
   Major: Economics

3. University of Georgia, 1971-1974
   Degree: Doctor of Philosophy
   Major: Economics and Finance

Areas of Major Interest:

1. Banking Theory and Practice
2. Financial Institutions and Capital Markets
3. Corporate Finance

Title of Master's Thesis: "The Origins of Seasonality in the Money Supply".

Title of Doctoral Dissertation: "An Aggregate Model of Commercial Bank Loan Portfolio Behavior Under Conditions of Market Disequilibrium".

III. UNIVERSITY POSITIONS AND APPOINTMENTS

Academic and Administrative Appointments:

1. **UNIVERSITY OF NORTH CAROLINA at CHARLOTTE**

Positions:	The Torrence E. Hemby, Sr., Distinguished Professor in Banking (1996 - Present)
	Chair, Department of Finance and Business Law (1997 - Present) and the Interim Chair of the Department of Economics (2000- 2001)
	Director, Center for Banking Studies (1998 – 2000)
Courses Taught:	Commercial Bank Management (MBA level)

2. **MCGILL UNIVERSITY**

Positions: The Bank of Montreal Chair of Banking and Finance (1988 - 1996)

Associate Dean - MBA Program
(1990 - 1992)

Finance Area Chairperson (1983 - 1992)

Professor of Finance (1985 - 1988)

Associate Professor Of Finance (1980 - 1985)

Courses Taught: Theory of Finance (undergraduate and graduate levels), Corporate Finance, Capital Markets and Institutions, Canadian Financial Institutions, Advanced Finance Seminar, Applied Investments, Ph.D. Seminar in Banking and Financial Services.

3. **UNIVERSITY OF BRITISH COLUMBIA**

Position: Visiting Assistant Professor of Finance (1978 -1980)

Courses Taught: Financial Institutions I, Financial Institutions II, and a graduate level course in Financial Institutions.

4. **ARIZONA STATE UNIVERSITY**

Position: Assistant Professor of Finance

Dates: 1976 - 1978

Courses Taught: Corporate Finance, Financial Markets and Institutions, and a doctoral seminar in Financial Institutions and Markets.

5. **UNIVERSITY OF RICHMOND**

Position: Assistant Professor of Economics

Dates: 1974 - 1976

Courses Taught: Intermediate Micro Theory, International Trade and Finance, Statistics, Labor Economics, and Principles of Economics.

Visiting Appointments:

1. **UNIVERSITY OF NEW SOUTH WALES**

Position: Visiting Professor of Finance
Dates: February 1993 - July 1993

2. **UNIVERSITY OF GENEVA**

Position: Visiting Professor of Finance
Dates: April 1992 - July 1992

IV. RESEARCH

Recent Research Grants:

Principal Investigator, Social Sciences and Humanities Research Council of Canada, 1992 - 1995, extended to 1996, $42,000, "Deposit Insurance Pricing, Bank Failure and Bank Regulation: Theoretical and Empirical Perspectives". J.-C. Duan and A. Moreau, Co-investigators.

Principal Investigator, Fonds pour la Formation de Chercheurs et l'Aide á la Recherche, 1993 - 1996, $72,000, "Deposit Insurance Pricing, Bank Failure and Bank Regulation: Theoretical and Empirical Perspectives". J.-C. Duan and A. Moreau, Co-investigators.

Principal Investigator, Fonds pour la Formation de Chercheurs et l'Aide á la Recherche, 1996 - 1999, $125,000, "Systemic Risk and Derivatives Activities in the Banking System". S. Nagarajan, Co-investigator.

Principal Investigator, Financial Services Exchange, 2001-2003, $25,000, "Alternative Regulatory Mechanisms for an Insurance Market with Moral Hazard and a Guaranty Fund". Co-investigators, J. Gandar and C. Lilly.

Publications:

"Inputs, Outputs and a Theory of Production and Cost for Depository Financial Institutions," with J. T. Lindley, *Journal of Finance*, September, 1977.

"A Spectral Analysis of Aggregate Commercial Bank Liability Management and Its Relationship to Short-Run Earning Asset Behaviour," with J.L. Eatman, *Journal of Financial and Quantitative Analysis*, December, 1977.

"A Further Reconsideration of Optimal Reserve Management at Commercial Banks," *Southern Economic Journal*, July, 1977.

"Commercial Bank Portfolio Management with Multiple Objectives," *Journal of Commercial Bank Lending*, February, 1977.

"Changing Seasonal Movements in Interest Rates and Their Implications for Interest Rate Forecasting," *Business Economics*, Fall, 1977.

"Financial Planning with Multiple Objectives," *Financial Management*, Winter, 1978.

"Utility Maximization and Programming Models for Capital Budgeting," *Journal of Business Finance and Accounting*, Autumn, 1978.

"Linear Planning Problems with Multiple Objectives," with J.L. Eatman, *Journal of Management and Textile Science*, Winter, 1978.

"Credit Rationing in the Commercial Loan Market: Estimates of a Structural Model Under Conditions of Disequilibrium," *Journal of Finance*, June, 1979.

"A Multi-Objective Linear Programming Model for Commercial Bank Balance Sheet Management," with J.L. Eatman, *Journal of Bank Research*, Winter, 1979.

"Interest-Bearing Demand Deposits, Bank Cost and Economic Efficiency," *Journal of Economics and Business*, Winter, 1979.

"Deposit Rate-Setting, Risk Aversion and the Theory of Depository Financial Intermediaries," *Journal of Finance*, December, 1980.

"Valuation, Capital Structure and Shareholder Unanimity for Depository Financial Intermediaries," *Journal of Finance*, June, 1983.

"Credit Lines and Compensating Balances," with R. Heinkel, *Symposium on Money, Banking and Insurance*, Refereed Proceedings, University of Karlsruhe, Karlsruhe, Federal Republic of Germany, August, 1985.

"Asymetric Information and a Theory of Compensating Balances," with R. Heinkel, *Journal of Banking and Finance*, June, 1985.

"Portfolio Separation for Shareholder Owned Depository Financial Intermediaries," *Journal of Banking and Finance*, December, 1985.

"Finance Theory and Financial Intermediation," *Bank Structure and Competition*, Federal Reserve Bank of Chicago, 1987.

"The Pricing of European Options on Discretely Traded Assets," with J. Duan and A. Moreau, *Advances in Investments and Portfolio Management*, Volume I, 1990.

"Deposit Insurance and Risk-Shifting Behavior at Commercial Banks," with J. Duan and A. Moreau, *Bank Structure and Competition*, Federal Reserve Bank of Chicago, 1990.

"Some Implications of Traded Options on the Pricing of the Underlying Stock," with J. Duan and A. Moreau, *International Review of Finance and Economics*, Volume 1, 1992.

"Fixed-Rate Deposit Insurance and Risk-Shifting Behavior at Commercial Banks," with J. Duan and A. Moreau, *Journal of Banking and Finance,* Volume 16, 1992.

"Spanning with Index Options," with J. Duan and A. Moreau, *Journal of Financial and Quantitative Analysis*, Volume 27, 1992.

"Regulating Bank's Interest Rate Risk When Interest Rates are Stochastic and Equity has Limited Liability," with J. Duan and A. Moreau, *Bank Structure and Competition*, Federal Reserve Bank of Chicago, 1992.

"Forbearance, Prompt Closure, and Incentive Compatible Bank Regulation," with S. Nagarajan, *Bank Structure and Competition*, Federal Reserve Bank of Chicago, 1993.

"Incentive Compatible Deposit Insurance Pricing and Bank Regulatory Policies," with J. Duan and A. Moreau, *Research in Finance*, Volume 11, 1993.

"Spanning and Efficiency in an Economy with Collective and Individual Risk," with A. Moreau, *Journal of Quantitative Finance and Accounting*, Volume 3, 1993.

"A Note on the Implications of Traded Options on the Pricing of the Underlying Stock: A Reply," with J. Duan and A. Moreau, *International Review of Finance and Economics*, Volume 3, 1994.

"Deposit Insurance and Bank Interest Rate Risk: Pricing and Regulatory Implications," with J. Duan and A. Moreau, *Journal of Banking and Finance*, 1995.

"Forbearance, Deposit Insurance Pricing, and Incentive Compatible Bank Regulation," with S. Nagarajan, *Journal of Banking and Finance*, 1995.

"Banks' Deposit Insurance Liabilities: Exogenous vs. Managerial Determinants," with J. Duan, *Bank Structure and Competition*, Federal Reserve Bank of Chicago, 1995.

"State Contingent Bank Regulation," *Blackwell Dictionary of Finance*, with S. Nagarajan, 1996.

"Determinants of Banks' Deposit Insurance Liabilities: Exogenous vs. Managerial Influences," with J. Duan, *Research in Finance*, Volume 15, 1997.

"Subordinated Debt, Moral Hazard and Bank Regulation," with S. Nagarajan, *Bank Structure and Competition*, Federal Reserve Bank of Chicago, 1997.

"State Contingent Bank Regulation and the Fair Pricing of Deposit Insurance," with S. Nagarajan, *Journal of Banking and Finance,* 1998.

"Managing Banks' Duration Gaps When Interest Rates Are Stochastic And Equity Has Limited Liability," with J. Duan and Y. Yan, , *International Review of Finance and Economics*, 1999.

Working Papers And Work In Progress:

"Can Delegating Bank Regulation to Market Forces Really Work," with S. Nagarajan.

"Stochastic Interest Rates and Hedging with Derivatives: A Monte Carlo Study," with J. Duan and Y. Yan.

"The Relationship Between Bank Capital and Lending Risk," with S Mazumdar and Y. Yan.

"Alternative Regulatory Mechanisms for an Insurance Market with Moral Hazard and a Guaranty Fund," with J. Gandar and C. Lilly.

V. PROFESSIONAL ACTIVITIES

Refereeing Activities:

Journal of Finance; Journal of Money, Credit and Banking; Journal of Economics and Business; Journal of Financial Research; Journal of Financial and Quantitative Analysis; Journal of Banking and Finance; Journal of the American Real Estate Association; Financial Review; Journal of Risk and Insurance; Financial Management; Review of Quantitative Finance and Accounting; Journal of Financial Services Research; International Review of Finance and Economics; Journal of Financial Intermediation; and Studies in Economics and Finance.

Editorial Associations:

Associate Editor - *International Review of Finance and Economics*

Memberships:

American Finance Association
Financial Management Association

Papers Presented at Meetings of Academic and Professional Associations:

Atlantic Economic Association, 1975
Southern Economic Association, 1975
Western Economic Association, 1976
Financial Management Association, 1976
Southern Economic Association, 1976
Financial Management Association, 1977
Southern Economic Association, 1977
Econometric Society, 1977
Southern Economic Association, 1978
Western Finance Association, 1980
Financial Research Foundation of Canada, 1982
European Finance Association, 1982
Symposium on Operations Research, 1983
European Finance Association, 1983
Symposium on Money, Banking and Insurance, 1984
Symposium on Operations Research, 1985
European Econometric Society, 1986
Financial Management Association, 1986
Conference on Bank Structure and Competition, 1987
Administrative Sciences Association of Canada, 1989
European Finance Association, 1989
European Econometric Society, 1989
Northern Finance Association, 1989
Conference on Bank Structure and Competition, 1990
Conference of the French Finance Association, 1990
Northern Finance Association, 1990
Conference on Quantitative Finance and Accounting, 1990
Financial Management Association, 1990
Conference of the French Finance Association, 1991
European Finance Association, 1991
Financial Management Association, 1991
Southern Finance Association, 1991
Conference on Bank Structure and Competition, 1992
European Finance Association, 1992
Symposium on Reform of Financial Institutions, 1992
Financial Management Association, 1992
Conference on Bank Structure and Competition, 1993
Conference on the Australian Institute of Bankers, 1993
Financial Management Association, 1993

Southern Finance Association, 1993
European Finance Association, 1994
Northern Finance Association, 1994
Conference on Bank Structure and Competition, 1995
French Finance Association, 1995
European Finance Association, 1995
American Finance Association, 1996
Financial Management Association, 1996
Eastern Finance Association, 1997
Conference on Bank Structure and Competition, 1997
International Financial Management Association, 1999
International Symposium on Insurance: Mathematics and Finance, 2002
American Risk and Insurance Association, 2002

Revised 5 March 2003

Lloyd P. Blenman

Associate Professor of Finance

Work Address
University of North Carolina-Charlotte
Belk College of Business
Department of Finance
Charlotte, NC 28223
lblenman@email.uncc.edu
Tel: 704-687-2823
Fax: 704-687-6**967**

Education

Ph.D.- Ohio State University
M.A. -University of Western Ontario
B. Soc. Sc.- University of Guyana

Teaching Experience

Assoc. Professor of Finance - University of North Carolina at Charlotte (July 1999)
Assoc. Professor of Finance - University of Mississippi **(Tenured)(**Jan. 1995-June 1999)
Asst. Professor-Morgan State University, 1992-1994
Asst. Professor of Finance, University of Mississippi, 1988-1992
Lecturer/ Asst. Professor, SUNY- Geneseo, 1986-1988

Professional Experience

Manager- International Division - Guyana National Cooperative Bank

- Managing L/C, FX and Collections Departments
- Documentary Credits, Correspondent Banking, Import /Export Finance
- Country Credit Agreements
- Setting of All Fee Structures
- Managing Foreign Exchange Deposits

Asst. Manager-International Division - Guyana National Cooperative Bank

- Letters of Credit and Collections
- Foreign Exchange Trading

Refereed Journal Publications

Blenman, L. P. and Leo Bin and Dar-Hsin Chen, "Valuation Impact of Currency Crises: Evidence From The ADR Market", **International Review of Financial Analysis**, (accepted)

Blenman, L. P, and Dar-Hsin Chen and Chang-Wen Duan, "Exchange Listing Changes: Volatility and Liquidity Effects In Taiwan", **International Journal of Banking and Finance**, (accepted)

Blenman, L. P., "On The Information Content of Synthetic Forward Trades", **European Journal of Finance**, (accepted).

Blenman, L. P. and Dar-Hsin, Chen, "Optimal Spread Determination: A Dealer's Perspective", **International Journal of Finance**, 2001, 2021-2044.

Blenman, L. P. and Thatcher, J. S., "Synthetic Trades, Market Turbulence and Calendar Day Patterns: The Case of The Dollar /Sterling Markets", **Financial Review**, 2001, Vol. 33,177-2001.

Blenman, L. P., "Non-Reversed Trade and Equilibrium in Forward Exchange Markets", with Jian Guo Chen, **Quarterly Review of Economics and Finance**, Vol. 41, 2001, 259-277.

Blenman, L. P., Ayadi, F. and Chatterjee, A., "Return Seasonalities in The Emerging Stock Markets: A Case of Selected Eurasian Countries", **Journal of Global Business**, 2000, Vol. ll, 5-14.

Blenman, L. P., "Non-Reversed Trades: Further Implications For Currency Trading", **International Review of Economics and Finance,** Vol. 9, 2000, 243-255.

Blenman, L. P., Ayadi, F and Chatterjee, A., "Is The US Secondary Mortgage Market Segmented From Other Financial Markets?", **Global Business and Finance Review**, Vol. 5, 2000, 73- 79.

Blenman, L. P., "Interest Rate Parity and the Behavior of the Bid-Ask Spread", with Henock Louis and J. Thatcher, **Journal of Financial Research,**Vol. 22, 1999, 189-206.

Blenman, L. P. and Henock Louis, "Do Targeted Banks Overpay", **International Journal of Finance**, Vol. 11, 1999, 1349-1372.

Blenman, L. P., Ayadi, F. and Obi, P., "Stock Return Characteristics in A Thin Incipient Stock Market", **Journal of Applied Business Research**, Vol. 14, 1998, 113-121.

Blenman, L. P. and Thatcher, J. S., "Arbitrageur Heterogeneity, Investor Horizon and Arbitrage Opportunity: An Empirical Investigation ", **Financial Review**, Vol. 32, 1997, 225-247.

Blenman, L. P., and Ayadi, 0. F., "Cross-Currency Option Pricing", **Global Finance Journal,** Vol. 8, No.1, 1997, 159-166.

Blenman, L.P., "Some Properties of No-Arbitrage Forward Currency Prices", **International Review of Economics and Business**, Vol. 44, 1996, 805-816.

Blenman, L. P., "Contemporaneous, Non-Contemporaneous Currency Exchanges and Arbitrage Activity", **International Journal of Finance**, Vol. 8, 1996, 15-32.

Blenman, L. P.," An Analysis of the Effects of Market Constraints on Simple Multi-Currency Arbitrage Strategies", **Economia Internazionale**, Vol. 32, No.4, 1995, 475-495.

Blenman, L. P., Cantrell, R. P., Fennell, D. F., Reneke, J. A., Wang, L. F. S., and Womer, N. K., "An Alternative Approach to Stochastic Calculus For Economic and Financial Models", **Journal of Economic Dynamics and Control**, Vol. 19, No.3, 1995, 553-568.

Blenman, L. P. and Thatcher, J. S., "Arbitrage Opportunities in Currency and Credit Markets: New Evidence", **International Journal of Finance**, Vol. 7, No. 3, 1995, 1123-1145.

Blenman, L. P., "Tests of Covered Interest Parity: A Note", **Applied Economics Letters,** Vol. 1, 1995. 49-50

Blenman, L. P.,"A Model of Covered Interest Arbitrage Under Market Segmentation", **Journal of Money, Credit and Banking**, November 1991, 706-717.

Blenman, L. P., "Price Forecasts and Interest Rate Forecasts: An Extension of Levy's Hypothesis", **Journal of Futures Markets**, December 1990, 605-610.

Other Journal Publications

Blenman, L. P., "Financial Regulations and Monetary Regulations After 1992: A Review", **Journal of Public Choice**, November 1993, 675-678.

Blenman, L. P., "A Note on Interest Rate Parity: Seven Expressions", **Financial Management**, November 1992, 8-9.

Book Chapters

Blenman, L. P. and Dar-Hsin Chen, "Optimal Foreign Exchange Spreads: A Dealer's Perspective", in "**Global Financial Markets: Issues and Policies**", Greenwood Press, USA 2002, (forthcoming).

Blenman, L. P., "Pricing of Forward and Futures Contracts with Heterogeneous Consumers", in **New Advances in Financial Economics**, Elsevier Science Publishing Co., Inc., 1995, 225-239.

Refereed Conference Proceedings

Blenman, L. P., Ayadi, F and Chatterjee, A., "Is The Secondary Mortgage Market Segmented From Other Financial Markets?", in the 1999 Proceedings of the **Association of Global Business**.

Blenman. L. P., Ayadi, F. and Obi, P., "Return Performance in Emerging Stock Markets", in the 1994 Proceedings of the **Global Business Association**, Houston, TX.

Blenman, L. P. and Thatcher, J. S.,"An Empirical Investigation of Arbitrage Opportunities", 1993 Proceedings of the **Urban Business Association**, Baltimore, MD.

Blenman, L. P., Young-Sik, K. and Lin, S., "An Evaluation of Constant Proportion Portfolio Rules", 1993 Proceedings of the **Urban Business Association**, Baltimore, MD.

Blenman, L. P., "An Integrated View of Interest Parity Theory", 1993 Proceedings of the **Urban Business Association,** Baltimore, MD.

Papers Under Journal Review

"Eurodollar Futures Pricing With a New Two-Factor Interest Rate Model", with Jian Guo Chen.

"Exchange Listing Transfers, Market Liquidity and Returns Performance in The Taiwanese Stock Market", with Dar-Hsin Chen and Chan-Wen Duan.

"Volatility Persistence and Market Anomalies in Latin American Equity Markets", with Amitava Chatterjee and Felix Ayadi..

Working Papers

- Rational Foreign Exchange Quotes and Synthetic Forward Trades
- A Three Variables Contingent Claims Residential Mortgage Valuation Model, with A. Amitava
- Portfolio Theory, Currency Substitution and Optimal Money Demands
- Financial Economic Modeling: On The Use of the Ito versus Stratonovich Calculus
- The Effect of IPO Lockup Agreements on Stock Prices: An Empirical Analysis on the Taiwan Stock Exchange**,** with Dar-Hsin Chen and Leo Bin
- Exercise Price Uncertainty and Option Pricing: The Fisher Model Revisited
- Speculation and Foreign Exchange Risk Premium: An Expected Utility Approach
- International Asset Pricing with Incomplete Information and Market Segmentation
- Exercise Price Uncertainty, Risk Scaling Options and Payoff Allocations, with Steven P. Clark
- Market Anomalies: The Case of the British Pound with Henoch Louis
- "Equilibrium in Foreign Exchange and Eurocurrency Markets", with Jian Guo Chen,

Honors and Awards

McGraw-Hill Prize For The Best Paper in Multinational Finance at the 1998 Eastern Finance Association Meetings.

University of Mississippi Award For the Best Paper in the School Of Business 1991.

Nissan Fellow Award Morgan State University, 1993.

Canadian International Development Agency Scholarship, 1974-1976.

Association Membership

American Finance Association
American Economic Association
Eastern Finance Association
Midwest Finance Association
Southern Finance Association

Presentations Before Professional Societies

"Exchange Listing Choice and Shareholder Wealth: The Case Of The Taiwan Stock Market", with Dar-Hsin Chen, presented at the International Banking and Finance Conference in Crete August 2002, presented at 2002 Eastern Finance Association Meetings in Baltimore, MD April 2002 and at Midwest Finance Association Meetings in Chicago, IL March 2002.

"Bid-Ask Spreads, Synthetic Trades and Forward Market Equilibrium", with J. G Chen, presented at 2001 Global Finance Association Meetings in Los Angeles, CA, 2001.

"An International Asset Pricing Model With Investment Barriers on Equity", presented at 2000 Eastern Finance Associations Meeting in Myrtle Beach, SC, April 2000.

An Extended Model of Serial Covariance Bid-Ask Spread", with Dar-Hsin Chen presented at the PACAP Conference in September 2000.

"Rational Currency Quotes and Synthetic Currency Trading", presented at the 1999 Financial Management Association Meetings in Orlando, Fl, October 1999, at the 1999 Midwest Finance Association Meeting in Nashville, TN, March 1999 and at the Eastern Finance Association Meeting in Miami, FL, April 1999.

"Synthetic Trades, Market Turbulence and Calendar Day Patterns: the Case of the Dollar/Sterling Markets", presented at 1998 FMA Meetings in Chicago, IL October, 1998 and at the Eastern Finance Association Meetings in Williamsburg, VA, April 1998.

"Optimal Foreign Exchange Spreads: A Dealer's Perspective", presented at 1998 FMA Meetings in Chicago, IL October 1998.

"Interstate Banking, Takeover Threat and Merger Premiums", presented at the Midwest Finance Association Meetings in Chicago, IL, March 1998 and at the Southern Finance Association Meetings in Baltimore, MD, November 1997.

"Interest Rate Parity and the Behavior of the Bid-Ask Spread", presented at the Southern Finance Association Meetings in Baltimore, MD, November 1997.

"Calendar Day Effects and Quasi-arbitrage Opportunities: Interbank Foreign Exchange Market Revisited", presented at the 1997 Midwest Finance Association Meetings in Panama City, Florida, April 1997.

"An International Asset Pricing Model With Investment Barriers on Equity", presented at Midsouth Academy of Economics and Finance Meeting in Atlanta, Feb. 1996.

"Return Performance in Emerging Stock Markets", presented at the 1994 Global Business Association Meetings in Houston, TX.

"A Model of Call Option Pricing With Exercise Price Uncertainty", presented at the 1993 Eastern Finance Association Meetings in Richmond, VA.

"Arbitrageur Heterogeneity, Investor Horizon and Arbitrage Opportunities: An Empirical Investigation", presented at the 1993 Midwest Finance Association Meetings in Indianapolis, IN.

"Constant Proportion Trading Rules and Portfolio Performance", presented at the 1993 Southwestern Finance Association Meetings in New Orleans, LA., and at the 1993 Eastern Finance Association Meetings in Richmond, VA.

"Arbitrage Opportunities in Currency and Credit Markets: New Evidence", presented at the 1993 Eastern Finance Association Meetings in Richmond, VA.

"Exercise Price Uncertainty and Option Pricing: The Fischer Model Revisited", presented at the 1992 Southern Finance Association Meetings in Jacksonville, FI.

"International Asset Pricing With Incomplete Information and Market Segmentation", presented at the 1992 Southern Finance Association Meetings in Jacksonville, FI.

"An Alternative Approach To Stochastic Calculus For Economic and Financial Models", presented at 1992 Eastern Finance Association Meetings in Tampa, Fl. and at the 1992 Midwest Finance Association Meetings in Chicago, IL.

"Pricing of Forward and Futures Contracts with Heterogeneous Consumers", presented at the 1992 Eastern Finance Association Meetings in Tampa, Fl; at the 1992 Southern Finance Association Meetings in Jacksonville, Fl and at the 1988 New York State Finance Association Meetings in Rochester, NY.

"International Asset Pricing With Incomplete Information and Market Segmentation", presented at the 1991 Financial Management Association Meetings in Chicago, IL.

"A Model of Covered Interest Arbitrage Under Market Segmentation", presented at the 1990 Midwest Finance Association Meetings in Chicago, IL.

"Path-Dependency, Market Constraints and Multipoint Arbitrage", presented at the 1990 Southern Economic Meetings in New Orleans, LA.

"Synchronous and Non-synchronous Currency Exchanges: A Disaggregated View of Interest Parity Theory", presented at the 1990 Southeastern Economic Theory and International Trade Meetings in Gainesville, Fl.

"Hedging Interest Rate Risks in Financial Intermediaries", presented at the 1987 New York State Finance Meetings in Rochester, NY.

Invited Lectures

"Rational Currency Quotes and Synthetic, Currency Trading", DePaul University, Chicago, IL and Ohio State University, Columbus, OH, Spring 1998, University of Alabama, Tuscaloosa, Al, Fall 1998 and University of Tennessee, Knoxville, TN, Spring 1999.

"Synthetic Trades, Market Turbulence and Calendar Day Patterns: The Case of The Dollar/Sterling Market", University of Tennessee, Knoxville, TN Autumn 1997, Louisiana State University, Baton Rouge, LA Autumn 1997, University of Southern Mississippi, Hattiesburg, MS Autumn 1997.

"Arbitrageur Heterogeneity, Investor Horizon and Arbitrage Opportunities: An Empirical Investigation", University of Southern Mississippi, Hattiesburg MS, Spring 1994.

"Arbitrage Opportunities in Currency and Credit Markets: New Evidence", University of Mississippi, Oxford, MS, Spring 1994.

"International Asset Pricing with Incomplete Information and Market Segmentation", University of Memphis, Memphis, TN, Spring 1992.

"A Model of Call Option Pricing with Exercise Price Uncertainty", University of Alabama, Tuscaloosa, AL, Winter 1991.

"Recent Developments in International Capital Markets", Florida State Bank Examiners Association) Tallahassee, Fl. 1988.

Chaired Sessions

Track Chair, Global Finance, Southern Finance Association Meetings, December 2003, Charleston, SC.

Track Chair, International Finance, Midwest Finance Association Meetings, March 2003, St. Louis, Missouri.

Track Chair, International Asset Pricing, Eastern Finance Association Meetings, April 1999.

Chairman, Panel Discussion on Settlement Risks, 1998 Midwest Finance Association Meetings, Chicago IL.

Session Chairman, 1997 Eastern Finance Association Meetings, Panama City, Florida

Session Chairman, 1998 Eastern Finance Association Meetings, Williamsburg, Virginia.

Session Chairman, 1997 Midwest Finance Association Meetings, Kansas City, MO
.
Session Chairman, 1994 International Business Schools Meetings, Baltimore, MD.

Session Chairman, 1993 Midwest Finance Association Meetings, Chicago, IL.

Program Chairman, 1991 South Central Finance Workshop, Oxford, MS.

Academic Discussant

Midwest Finance Association Meetings (2003)

Eastern Finance Association Meetings (2003)

Eastern Finance Association Meetings 1999.

Eastern Finance Association Meetings 1998.

Midwest Finance Association Meetings 1997

Eastern Finance Association Meetings 1994.

International Business Schools Association Meetings 1994

American Finance Association Meetings 1992.

Midwest Finance Association Meetings 1992.

Eastern Finance Association Meetings 1992.

Financial Management Association Meetings 1991.

Southern Finance Association Meetings 1991.

Southern Economic Association Meetings 1990.

Southeastern Economic Theory and Trade Meetings 1990.

New York State Finance Association Meetings 1988.

New York State Finance Association Meetings 1987.

Other Professional Service

Track Chair-Global Finance, MFA Meetings 2003

Track Chair-International Finance, MFA Meetings 2003

Track Chair- International Finance, EFA Meetings 1998

Program Chairman- 1991 South Central Finance Workshop, Oxford, MS.

Program Committee Member 2003 EFA, 2003 MFA, 1999 FMA, 1998, 1999 EFA, 1997 MFA

Member of the Nominating Committee -EFA 1998.

University Service (University of North Carolina-Charlotte)

Member of the Graduate Affairs Research Committee (2002-)

Member of the Undergraduate International Business Task Force (2000-)

Member of the Graduate International Program Committee (2000-)

Member of the Nominations Committee (1999-2002)

Member of The Search Committee For Finance Faculty (2000-2002)

Member of The Planning Team For MA in Financial Mathematics (Department) (2001-2002)

Departmental Representative to UNC-Explore (2002)

Member of Search Committee For MBA Director (2001-2002)

College Representative to the Graduate Faculty Committee (1999-2001)

Member of the University General Educational Taskforce Review Committee (2000-2001)

Member of the Departmental ad hoc Committee on Journal Rankings (1999-2002)

University Service (University of Mississippi)

Chair- PhD Comprehensive Exam in Finance Committee (1997-1999)

Chair- PhD Field Exam in International Finance Committee (1997-1999)

Chair-Quantitative Methods Exam Committee (1995-1996)

Member- PhD Comprehensive Exam in Finance Committee (1995-1997)

Member- PhD Field Exam in International Economics Committee (1997-1999)

Coordinator-South Central Finance Workshop (1996-1997)

Member of the Graduate Review Committee (1998-1999)

Member of the Undergraduate International Business Program Committee (1996-1999)

Member of the Graduate International Program Committee (1995-1999)

Member of the Nominations Committee (1999-2002)

Member of The Search Committee For The Director of The Croft Institute (1998-1999)

Member of The Planning Team For Reviewing the PhD in Finance (1996-1998)

Member of the Recruiting Committee (1996-1999)

Member of MBA Review Committee (1996-1998)

College Representative to the Graduate Council (1996-1999)

Member of the International Business Review Committee (1995-1999)

Member of the Joint Mathematics and Finance Committee (1998-1999)

Other Educational Activities

Chicago Mercantile Exchange Seminar Series For Educators 1990, 1991, 1992, 1993

Chicago Board of Trade Research Seminar Series, 1990, 1991

Chicago Board of Trade Seminar for Educators 1989, 1990, 1991

International Banking Seminar for Educators New York Federal Reserve Bank, 1987

Editorial Responsibilities

Associate Editor of The International Journal of Finance (1996- present)

Special Issue Editor- International Review of Financial Analysis (2003-)

Journal Referee

Journal of Finance

Journal of Money, Credit and Banking

Journal of Futures Markets

Financial Management

Financial Review

Applied Economics

Journal of Applied Business Research

Journal of Economics and Finance

International Journal of Finance

International Review of Economics and Finance

Courses Taught

Ph.D.
International Finance
Seminar in International Economics and Finance
Seminar In Business Finance
Mathematical Optimization
Financial Economics: Theoretical Foundations
Financial Economics: Continuous-time Methods
Stochastic Calculus Methods

MBA
Futures and Options
International Finance
Corporate Finance
International Business Finance
Investments

Undergraduate
Investments
International Finance
Corporate Finance
International Economics
Financial Institutions, Money and Banking
Financial Management
International Business
International Financial Management

Dissertations Directed

Jian Guo Chen (1999) - (Massey University, New Zealand)

Dar-Hsin Chen 1998 - (Tamkang University-Taiwan)

Henoch Louis (1997) - (Penn State University)

Recent Book Reviews

- International Finance-by Jorge Urrita
- Corporate Finance-W. Megginson

RICHARD J. BUTTIMER JR.

Department of Finance and Business Law
The University of North Carolina at Charlotte
9201 University City Blvd.
Charlotte, NC 28223
(704) 687-6219
buttimer@email.uncc.edu

641 Chadbourne Ave
Concord, NC 28027
(704) 720-7803

EDUCATION

University of Georgia	Real Estate	Ph.D.	1993
University of Georgia	Finance	B.B.A.	1987

ACADEMIC EXPERIENCE

The University of North Carolina at Charlotte
Associate Professor 2002-Present

The University of Texas at Arlington
Assistant Professor 1993-1999
Associate Professor Fall 1999-2002
Gould-Mayfield Professor of Real Estate 2000-2002

Louisiana State University
Visiting Research Fellow, Real Estate Research Center August 1997

University of Georgia
Research Assistant 1989-1993

ACADEMIC HONORS AND AWARDS

Editorial Board Member, *The Journal of Real Estate Finance and Economics* 1998-2003
Associate Editor, *The Journal of Real Estate Literature* 2001-2003
College of Business Administration Distinguished Academic Research Award 1998
The University of Texas at Arlington
Paul W. Greene Memorial Award for Excellence in Graduate Teaching 1996
Society of Industrial and Office Realtors (SIOR) Manuscript 1994
Award for "Best Industrial Real Estate Paper", 1994 Annual
Meeting of the American Real Estate Society
University - Wide Assistantship, The University of Georgia Graduate School 1990-1993
Enhancement Award, Regents of the University System of Georgia 1990-1993
Comer Fellowship, Terry College of Business Administration 1989-1992
Summer Research Grant, Terry College of Business Administration 1990-1992
Harwood Memorial Scholarship, Real Estate Educators Association 1990

PUBLICATIONS

"A New Spin on the Jumbo-Conforming Loan Differential", with Brent W. Ambrose and Tom Thibodeau, *The Journal of Real Estate Finance and Economics,* Volume 23, Number 3, pp. 309-336, 2001.

"An Introduction to Financial Risk Management in Government", *Financial Management Series*

Grant Report, The PricewaterhouseCoopers Endowment for the Business of Government, Arlington, VA, August 2001.

"Embedded Options in the Mortgage Contract", with B. W. Ambrose, *The Journal of Real Estate Finance and Economics* 21:2, Fall, 2000, pp. 95-111.

"Government Hedging: Motivation, Implementation, and Evaluation" with S. Swidler and R. Shaw, *The Journal of Public Budgeting and Finance*, v19, n4 (Winter 1999): 75-90

"Foreign Equity Options and Exchange Rate Volatility" with S. Swidler, *Emerging Markets Quarterly*, Summer, 1999, pp. 1-7.

"The Informational Content of US Listed Options on Foreign Equity Securities: The Case of Telmex and the Peso Devaluation" with S. Swidler, *The Journal of International Financial Markets, Institutions & Money*, Volume 8, Number 2, pp. 189-204.

"A Contingent Claims Analysis of Real Estate Listing Contracts," *The Journal of Real Estate Finance and Economics,* Volume 16, Number 3, pp. 257-268.

"Industrial Rent Determinants in the Dallas/Fort Worth Area" with R. C. Rutherford and R. Whitten, *The Journal of Real Estate Research*, Volume 13, Number 1, pp. 47-56.

"Pricing Mortgage Default and Foreclosure Delay" with B. W. Ambrose and C. Capone, *The Journal of Money, Credit and Banking*, Volume 29, Number 3, August, 1997. pp.314-325.

"Determinants of Performance for Mortgage-Backed Securities Funds" with J. G. Gallo, L. J. Lockwood, and R. C. Rutherford, *Real Estate Economics*, Volume 25, 1997, pp. 657-682.

"A Model for Pricing Securities Dependent on a Real Estate Index" with J. B. Kau and V.C. Slawson, *The Journal of Housing Economics*, Volume 6, 1997, pp. 16-30.

"An Examination of the Role of Security Clauses and Deposits in Residential Lease Contracts" with M. T. Allen and N. Waller, *The Journal of Real Estate Finance and Economics*, Volume 10, pp. 271-283.

"An Alternative Trinomial Formulation for One-Factor Term Structure Models" with W. J. Muller III and R. Reeves, *The Journal of Financial Engineering*, Volume 4, Number 1, March, 1995, pp. 1-10.

GRANTS RECEIVED

U.S. Department of Housing and Urban Development, "*GSE Impact on Rural Mortgage Markets***"**, with B. W. Ambrose, 2001-2002.

Mortgage Bankers Association of America, "A Reexamination of the Conforming Loan-Rate Differential", with B. W. Ambrose and T. Thibodeau, Summer, 2000.

Research Enhancement Program Grant, The University of Texas at Arlington, Summer, 1998.

PricewaterhouseCoopers Endowment for the Business of Government, "The Role of Financial Risk Management in Government", Summer, 2000.

PAPERS CURRENTLY UNDER REVIEW

"The Long-Run Returns of REIT IPOs", with D. C. Hyland and A. B. Sanders, under revision for resubmission to *Real Estate Economics*.

"GSE Impact on Rural Mortgage Markets", with B.W. Ambrose, under review at *Regional Science and Urban Economics*.

WORKING PAPERS AND RESEARCH IN PROGRESS

"IPO's and Mutual Fund Returns", with David Hyland and Tony Sanders

"The Valuation of Individual Mortgage Servicing Contracts", with C. C. Lin.

"The Chinese Housing Provident Fund", with A. Y. Gu and T. Y. Yang

PAPERS PRESENTED AT PROFESSIONAL MEETINGS

"The Chinese Housing Provident Fund", with A. Y. Gu and T. Y. Yang, 2003 Annual Meeting of the American Real Estate and Urban Economics Association, Washington, January 2003.

"The Long-Run Returns of REIT IPOs", with David C. Hyland and Anthony B. Sanders, 2002 Annual Meeting of the American Real Estate Society, Naples, FL, April, 2002.

"GSE Impact on Rural Mortgage Markets", with Brent W. Ambrose, 2002 Annual Meeting of the American Real Estate and Urban Economics Association, Atlanta, GA, January, 2002.

"A New Spin on the Jumbo-Conforming Loan Differential", with Brent W. Ambrose and Tom Thibodeau, presented at the 2000 joint meeting of the European Housing Research Network and the American Real Estate and Urban Economics Association, Gavle, Sweden, June, 2000.

"Upward Only Adjustable Leases" with B.W. Ambrose and P. H. Hendershott, 1998 joint meeting of the American Real Estate and Urban Economics Association and the European Real Estate Association.

"Embedded Options in the Mortgage Contract" with B. W. Ambrose, 1998 American Real Estate and Urban Economics Association.

"Government Option Hedging: Motivation, Implementation, and Evaluation" with R. Shaw and S. Swidler, 1996 Southern Finance Association Annual Meeting, November, 1996.

"Specific Measures of Competing Risks in Corporate Bonds" with B. W. Ambrose and V. C. Slawson, 1996 Financial Management Association Annual Meeting, October, 1996.

"Pricing Mortgage Delay and Default" with B. W. Ambrose and C. Capone, 1996 Southwestern Finance Association Annual Meeting, March, 1996.

"The Pricing of U.S. Listed Options on Mexican Securities" with S. Swidler, 1995 Southern Finance Association Annual Meeting, November 1995.

"On the Distinction Between Default and Foreclosure on the Value of Mortgage Default" with B. W. Ambrose and C. Capone, 25th annual Financial Management Association Meeting, October, 1995.

"A Model for Pricing Securities Dependent on a Real Estate Index" with J. B. Kau and V.C. Slawson, 11th annual American Real Estate Society meeting, March, 1995.

"Industrial Rent Determinants in the Dallas/Fort Worth Area" with R. C. Rutherford and R. Whitten, 10th annual American Real Estate Society meeting, April 1994. Awarded Manuscript Award for "Best Industrial Real Estate Paper" by the Society of Industrial and Office Realtors.

"Neural Networks, Nonlinear Specifications, and Industrial Property Values" with A. L. Brunson and R. C. Rutherford, 10th annual American Real Estate Society meeting, April 1994.

"The Pricing of Derivative Mortgage Securities: a Comparison of Interest Rate Models" 9th annual American Real Estate Society meeting, April 1993.

Courses Taught

Course Number	Course	Level
At The University of North Carolina at Charlotte		
MBAD 6058	Derivative Securities	Master
MBAD 6058	Fixed Income Derivatives	Master
MBAD 6160	Real Estate Capital Markets	Master
FINN 3261	Real Estate Finance	Undergraduate
At The University of Texas at Arlington		
REAE 5319	Real Estate Finance	Master
REAE 5311	Real Estate Principals	Master
REAE 5392	Real Estate Readings	Master
REAE 4319	Real Estate Finance	Undergraduate
REAE 3325	Real Estate Principals	Undergraduate
FINA 6311	Theory of Corporate Finance	Ph.D.
FINA 5392	Financial Modeling	Master and Ph.D.
FINA 5327	Options and Futures	Master
FINA 5324	Seminar in Financial Theories	Master

FINA 5529	Seminar in Securities Analysis	Master
FINA 3313	Introductory Finance	Undergraduate

Graduate Students

Student	Level	Served As	Status	Year
Nusanne Meekagong	Doctoral (Finance)	Chair	Completed	2002
Richard Elsassaer	Masters (Real Estate)	Chair	Completed	2002
Cary Lin	Doctoral (Real Estate)	Chair	Completed	2001
John St. Clair	Masters (L. Arch.)	Committee Member	Completed	2001
Steve Isbell	Masters (Real Estate)	Chair	Completed	2000
John Brookby	Masters (Real Estate)	Chair	Completed	2000
Sheri Faircloth	Doctoral (Real Estate)	Chair	Completed	1997
Parvez Ahmed	Doctoral (Finance)	Committee Member	Completed	1996
Lisa Schwartz	Doctoral (Finance)	Committee Member	Completed	1996
Maggie Garcia	Doctoral (Finance)	Committee Member	Completed	1996
Ron Shaw	Doctoral (Finance)	Committee Member	Completed	1995
James Foley	Masters (Real Estate)	Committee Member	Completed	1993

ACADEMIC SERVICE

MS Mathematical Finance Program Committee, UNC-Charlotte	2002-2003
Ph.D. in Business Administration Committee, UNC-Charlotte	2002-2003
Chair, Departmental Curriculum Committee	2002-2003
Graduate Assembly, The University of Texas at Arlington	2000-2002
Program Policy Committee, The University of Texas at Arlington	2000-2002
Session Chair, 2000 AREUEA Annual Meeting	January, 2000
Session Chair, 2000 ARES Annual Meeting	March, 2000
AREUEA/ARES Web Task Force	1998-1999
Ph.D. Coordinator, Department of Finance and Real Estate	2000-2002
University of Texas at Arlington	1997-1998
Graduate Advisor, M.S. in Real Estate Program,	2000-2002
University of Texas at Arlington	1996-1998

Ad-hoc reviewer for

Real Estate Economics
The Journal of Real Estate Finance and Economics
The Journal of Banking and Finance
The Financial Review
The Journal of Real Estate Research
The Journal of Real Estate Literature
The Journal of Financial Engineering
The Asian Real Estate Journal
The Journal of Housing Research

Chair, Departmental Computer Committee	1996-1998
Chair, College Research Software Committee	1997
Information and Information Resources Committee	1995-1998
College of Business, University of Texas at Arlington	
Advisor to The Real Estate Group, University of Texas at Arlington	1993-1996

Session Chair, 1995 Southern Finance Association Meeting 1995
Departmental Computer Committee 1994-1996
M.S. in Finance Feasibility Committee 1994-1995
Essay Grading for Dallas Treasury Management Association
Scholarship Contest 1994
Assistant Faculty Advisor to Rho Epsilon
Real Estate Fraternity, University of Georgia 1992
Developed the Fixed Income Securities Trading Simulator (FITS), 1991
a real-time computer based Mortgage Backed Securities trading system used for instruction in MBA level Real Estate Finance classes at the University of Georgia.

BUSINESS EXPERIENCE

PricewaterhouseCoopers, L.L.P 1999

Selected Engagements

Financial Risk Management Practice – Practice Lead, January -December, 1999. Responsible for the business development of a new Financial Risk Management practice within the Washington Consulting Practice of PricewaterhouseCoopers. In conjunction with the practice partner, was responsible for business plan development, budget planning, and staffing. Was also responsible for developing strategic relationships with risk management software vendors.

Federal Agricultural Mortgage Corporation (Farmer Mac) – Project Manager, January - December, 1999. Farmer Mac is the Federally-chartered corporation created by Congress to establish a secondary market for agricultural real estate and rural housing mortgage loans, and to facilitate capital market funding for U.S. Department of Agriculture guaranteed farm program and rural development loans. PricewaterhouseCoopers designed and built a prototype capital adequacy model to establish Farmer Mac's risk-based capital requirement. As project manager was responsible for all aspects of the engagement. Specific responsibilities included client management, management of eight PwC consultants, development of agricultural mortgage pricing and default models, as well as presentation and defense of the model to Farmer Mac's regulator, the Farm Credit Administration.

US State Department, Overseas Presence Advisory Panel (OPAP) – Technical advisor, June-July 1999. OPAP was established by President Clinton to advise the State Department on methods for upgrading US overseas diplomatic facilities. OPAP engaged PwC to design and analyze potential private-sector funding vehicles for this upgrade. Responsibilities as the technical advisor included designing potential funding vehicles, analyzing their potential benefit to the State Department, and vetting those potential vehicles with various investment banks.

A Large, National Mortgage Bank – Technical advisor, January 1999 – March 1999. PwC was retained by one of the largest mortgage banks in the United States to review their mortgage modeling and hedging operations. Responsibilities as the technical advisor included analyzing and documenting the bank's mortgage prepayment models and mortgage

hedging methods.

First Imperial Investors Inc. 1987-1989

Director, Computer Sciences

Developed computer programs to model and price fixed income securities, primarily Mortgage Backed Securities, CMOs, and bond options.

D. ANTHONY PLATH

PERSONAL

Office: The Belk College of Business Administration
University of North Carolina at Charlotte
Charlotte, North Carolina 28223
Voice: (704) 687-4413
Fax: (704) 687-6987
e-mail: daplath@email.uncc.edu

Home: 814 Falls Church Road
Charlotte, North Carolina 28270
(704) 847-2326

PROFESSIONAL EXPERIENCE

University of North Carolina at Charlotte . . . . . **7/87 - Present**

Associate Professor of Finance	6/93 - Present
Director, Center for Banking Studies	1/95 - 6/98
Assistant Professor of Finance	7/87 - 5/93

Courses Taught:

Commercial Bank Management (undergraduate and graduate)
Financial Management (undergraduate and graduate)
Financial Markets and Institutions (undergraduate and graduate)
Professional Applications (graduate)

Curriculum Development:

Design and implementation of Compustat Financial Analysis Microcomputer Project for *Financial Management* (MBAD 6152/FINN 3120).

Design and implementation of Banrisk commercial bank management simulation project for *Commercial Bank Management* (MBAD 6156).

Implementation of Stanford Bank Game business simulation project in *Commercial Bank Management* (FINN 3225).

Design and implementation of professional field experience course for MBA students (MBAD 6198).

Kent State University . . . . . **6/82 - 6/87**
Kent, Ohio
Teaching Fellow/Instructor in Finance

Undergraduate Courses Taught: *Financial Management*
Intermediate Financial Management
Financial Markets and Institutions
Investments
Money, Credit, and Banking
Freshman Orientation

AmeriTrust Corporation . . . . . **9/79 - 5/82**
Cleveland, Ohio
Business Development Officer and Lending Officer; Retail Branch Manager

Huntington Bank . . . . . **3/78 - 8/79**
Kent, Ohio
Assistant Branch Manager/Branch Officer

EDUCATION

Kent State University:

D.B.A. **8/83 - 8/87**
Major: Finance
Minors: Statistics and Marketing
Dissertation: *Balance Sheet Linkages in the Commercial Banking Industry: Theory and Evidence*
GPA: 4.0

M.B.A. 9/79 - 8/83
Concentration: Finance
GPA: 3.93

B.A. **9/74 - 3/78**
Major: Economics and American History
Honors: Graduated *magna cum laude* with General Academic Honors
GPA: 3.77

PUBLICATIONS AND RESEARCH

Refereed Articles:

Stevenson, T. and Plath, D. The African-American Financial Services Market: Profiling the Substantiality and Viability of an Underserved Segment." *International Business and Economics Research Journal*, forthcoming.

Stevenson, T. and Plath, D. "Marketing Financial Services to the African-American Consumer." *California Management Review*, 44(Summer 2002), pp. 39-64.

Plath, D. and T. Stevenson. "Marketing Financial Services to the African-American Consumer: What Every Financial Planner Should Know." *Financial Services Review*, 94 (2000), pp. 343-359.

Nunnally, B., D. Plath, and E. Nnadozie. "Contemporary Banking and Bank Regulation in Nigeria." *Journal of International Bank Regulation*, 3 (Fall 2000), pp. 51-60.

Plath, D. and W. Kennedy. "Teaching Return-Based Measures of Project Evaluation."*Financial Practice and Education*, 4 (Spring/Summer 1994), pp. 77-86.

Kennedy, W. and D. Plath. "A Return-Based Alternative to IRR Evaluations." *Healthcare Financial Management*, 48 (March 1994), pp. 38-49.

Plath, D., T. Krueger, and S. Jolly. "A Dynamical Systems Framework for Capital Asset Pricing."*TheMid-Atlantic Journal of Business*, (Spring 1992), pp. 55-74.

Plath, D. and B. Nunnally. "Measuring the Effective Cost of Consumer Credit: Is Leasing Really Cheaper than Borrowing?" *Financial Services Review*, (Spring 1992), pp. 109-129.

Kloppenborg, T. and D. Plath. "Effective Project Management Practices During Expert Systems Implementation." *Project Management Journal*, 21 (December 1991), pp. 15-22.

Plath, D. "Financing Takeovers: Junk Bonds and Leveraged Buyouts." *Management Finance*, 17 (1: 1991), pp. 19-24.

Stevenson, T., D. Plath, and C. Bush. "Expert Systems in Industrial Marketing." *Industrial Marketing Management*, 19 (1990), pp. 243-249. Reprinted in: *ISA Transactions*, 30 (3: 1991), pp. 81-86.

Nunnally, B. and D. Plath. "Leasing Versus Borrowing: Evaluating Alternative Forms of Consumer Credit." *The Journal of Consumer Affairs*, 23 (Winter 1989), pp. 383-392.

Plath, D. and T. Kloppenborg. "Can Expert Systems Help Make Better Lending Decisions?" *The Journal of Retail Banking*, 11 (Winter 1989), pp. 27-38.

Complete Books:

Nunnally, B. and D. Plath. *Cases in Finance*, 2nd rev. ed. (Homewood, IL: Richard D. Irwin), 1997.

Krueger, T. and D. Plath. *Study Guide to Accompany Foundations of Managerial Finance*, 4th. rev. ed.(New York: Harper Collins), 1995.

Krueger, T. and D. Plath. *Study Guide to Accompany Principles of Managerial Finance*, 7th rev. ed. (New York: Harper Collins), 1994.

Nunnally, B., D. Plath , and H. Johns. *Handbook of Corporate Lease Analysis*. (Westport, CT: QuorumBooks), 1991.

Portions of Books:

Plath, D. "Investment Banking: Its Role in Raising Long-Term Funds." In: L. Gitman. *Foundations of Managerial Finance*, 4th. rev. ed. (New York: HarperCollins), 1995, pp. 640-674.

Professional Cases

Plath, D. "The Accidental Bank Robbery." In: Arthur Andersen & Co. *Ethics Mini-Case Collection*, (St. Charles, IL: Arthur Andersen & Co.), 1992, pp. FIN-01:1-6.

Plath, D. "The Bank Manager's Dilemma." In: Arthur Andersen & Co. *Ethics Mini-Case Collection*,(St. Charles, IL: Arthur Andersen & Co.), 1992, pp. FIN-03:1-6.

Plath, D. "The Curious Loan Approval." In: Arthur Andersen & Co. *Ethics Mini-Case Collection*, (St.Charles, IL: Arthur Andersen & Co.), 1992, pp. FIN-02:1-5.

Proceedings Papers:

Plath, D. and T. Stevenson. "The African-American Financial Services Consumer: Marketing Insights from an Analysis of Shopping and Patronage Patterns." *American Society of Business and Behavioral Sciences Proceedings*, February 2002.

Plath, D. and W. Kennedy. "Developing a Return-Based Measure for Leveraged Lease Evaluation." *Southeast Decision Sciences Institute Annual Proceedings*, February 1993.

Kennedy, W. and D. Plath. "Teaching Return-Based Measures of Project Evaluation: A Pedagogical Advance." *Southeast Decision Sciences Institute Annual Proceedings*, February 1992.

Kennedy, W. and D. Plath. "Using the Modified Internal Rate of Return to Evaluate Capital Budgeting Projects." *Southeast Decision Sciences Institute Annual Proceedings*, February 1990.

Kloppenborg, T. and D. Plath. "Expert Systems within the Commercial Banking Industry: How Are They Implemented, and What Determines Success?" *Decision Sciences Institute 20th Annual Meeting Proceedings*, November 1989.

Kloppenborg, T. and D. Plath. "Successful Implementation of Expert Systems: What Does It Take?" *Project Management Institute Seminar Proceedings*, October 1989.

Other Articles Published:

Plath, D. "Do Banks Discriminate?" *The Charlotte Observer*, (August 24, 1995), p. 11A.

Plath, D. "Efficiency, Not Size, Key to Banks' Cost Advantage." *The Business Journal*, 2(February 1988), p 5.

Presentations:

Stevenson, T. And D. Plath. "Profiling the Substantiality of the African-American Financial Services Segment." The European Applied Business Research Conference, Rothenburg, Germany, June 17, 2002. (Winner of the Best Paper Award for manuscripts presented at the conference).

Stevenson, T. and D. Plath. "The African-American Financial Services Consumer: Shopping and Patronage Patterns." American Society of Business and Behavioral Sciences, Las Vegas, NV, February 8, 2002.

Stevenson, T. and D. Plath. "Marketing Financial Services to African-American Consumers." American Society of Business and Behavioral Sciences, Las Vegas, NV, February 18, 2000.

Plath, D. and W. Kennedy. "Developing a Return-Based Measure for Leveraged Lease Evaluation." Southeast Decision Sciences Institute, Chattanooga, TN, February 1993.

Kennedy, W. and D. Plath. "Teaching Return-Based Measures of Project Evaluation: A Pedagogical Advance." Southeast Decision Sciences Institute, Savannah, GA, February 1992.

Kennedy, W. and D. Plath. "Using the Modified Internal Rate of Return to Evaluate Capital Budgeting Projects." Southeast Decision Sciences Institute, Columbia, SC, February 1990.

Kloppenborg, T. and D. Plath. "Expert Systems Within the Commercial Banking Industry: How Are They Implemented and What Determines Success?" Decision Sciences Institute, New Orleans, LA, November 1989.

Kloppenborg, T. and D. Plath. "Successful Implementation of Expert Systems in Banks: What Does It Take?" Project Management Institute, Atlanta, GA, October 1989.

Plath, D. and B. Nunnally. "Measuring the Effective Cost of Consumer Credit: Is Leasing Really Cheaper than Borrowing?" Financial Management Association, Boston, MA, October 1989.

Plath, D. and T. Krueger. "Using Catastrophe Theory to Explain Chaotic Stock Price Fluctuations."Financial Management Association, New Orleans, LA, October 1988.

Plath, D. "Examining the Linkage Between Liability Structure and Asset Allocation Patterns within the Commercial Banking Industry: Theory and Evidence." Financial Management Association Doctoral Student Invitational Seminar, New York, NY, October 1986.

Professional Reviews:

Journals:
Financial Practice and Education
Financial Services Review (Associate Editor)
Journal of Consumer Affairs
Midwest Journal of Business and Economics
Studies in Economics and Finance

Textbook Publishers:
Irwin Publishing Company
McGraw Hill, Inc.
Prentice Hall, Inc.
West Publishing Company

Funded Research:

University Grants:

Khan, A. and D. Plath. "Corporate Issuance of Junk Bonds: Separating the Winners from the Losers." UNCC Faculty Research Grants Committee funding ($6,000), January 1991.

Khan, A. and D. Plath. "Cash Flow Variability and the Wealth Transfer Hypothesis in Corporate Restructurings: New Evidence." UNCC College of Business Administration Grants Committee funding ($3,100), April 1990.

Nunnally, B. and D. Plath. "Measuring the Effective Cost of Consumer Credit in Retail Lease Agreements." UNCC Faculty Research Grants Committee funding ($5,700), January 1989.

Plath, D. and H. Johns. "Determinants of Concept Retention in Accounting and Finance Courses." UNCC College of Business Administration Grants Committee funding ($3,100), April 1990.

Plath, D. and W. Kennedy. "Developing a Return-Based Measure for Leveraged Lease Evaluation." UNCC College of Business Administration Grants Committee funding ($2,850), April 1992.

Plath, D. and W. Kennedy. "Using the Stanford Bank Game in the Finance Curriculum at UNCC." UNCC Curriculum and Instruction Development Grants Committee funding ($3,850), January 1988.

Plath, D. and T. Kloppenborg. "The Role of Expert Information Systems in Commercial BankManagement." UNCC Faculty Research Grants Committee funding ($6,970), January 1988.

Corporate Research Grants:

Barclays Capital, Inc	1998
North Carolina State Banking Commission	1997
First Commerce Bank	1997
Wachovia Operational Services Corporation	1997
Bank Austria	1996
BellSouth Mobility, DCS, Inc.	1996
Central Carolina Bank	1996

UNIVERSITY AND COMMUNITY SERVICE

University:

Information Technology Advisory Group	8/93 - 6/99
Faculty Council Member	8/91 - 6/92
	8/89 - 6/90

College:

Carolina Business Review faculty research advisor	5/93 - 4/97
College Personnel Committee	5/95 - 4/97
College Planning Committee	8/98 - 6/99
Computing Services Advisory Committee	8/91 - 8/96
Course and Curriculum Committee Member	8/88 - 8/93
Dean's Search Committee	7/92 - 1/93
Faculty Advisor to MBA Student Association	9/93 - 8/01
Finance Department Chairperson Search Committee	7/97 - 4/98
	1/88 - 5/88
Graduate Affairs and Research Committee	1/98 - 6/99
	8/93 - 4/96
MBA Advisory Committee	6/92 - 8/93

SBTDC Faculty Advisor	1/95 - 6/99
Undergraduate Programs Committee	8/93 - 4/95

Department:

Computing Technology Planning Committee (Chairman)	1/92 - 8/93
Course and Curriculum Committee Member	8/89 - 6/98
Department Personnel Committee	8/01 - Present
	5/97 - 7/98
	5/93 - 4/95
Faculty Advisor to the FMA Student Chapter	8/89 - 7/92
Faculty Advisor to Finance Co-Op students	12/88 - Present

Student Projects Sponsored:

Chen, W. "Labor Productivity in North Carolina Banking: 1965-2000." Graduate independent study, Spring 2002.

Lambert, S. "Adding Put Options to the AFC Equities Portfolio: From Equity Fund to Hedge Fund." Graduate independent study, Spring 2000.

Starr, R. "The AFC Equities Portfolio and Common Filter Trading Rules: Examining Market Efficiency." Graduate independent study, Fall 1999.

Sun, J. "Convertible Bond Pricing Methods." Ph.D. dissertation in mathematics, (committee member), Fall 1999.

Heitzman, B. "High Performance Community Banking." Undergraduate honors thesis, Spring 1998.

Goodwin, K. "Leasing Versus Buying: A Charlotte Metropolitan Market Case Study." R. E. McNair Achievement Program, Summer 1993.

Cashion, R. "Turn-Around Management in the Retailing Industry." Graduate independent study, Spring1993.

Jurney, P. "Commercial Loan Analysis and Evaluation: A Collegiate Curriculum Proposal." Graduate independent study, Summer 1992.

Triantafyllides, D. "Equity Valuation Models and Stock Market Efficiency ." Graduate independent study, Summer 1992.

Kuhn, L. "International Lending Activities of Domestic Commercial Banks." Undergraduate independent study, Spring 1991.

Michael, T. "The Linkage between Corporate Culture and Financial Performance." Graduate independent study, Fall 1990.

Rayfield, M. "Computer Security within Electronic Funds Transfer Networks and Corporate Databases in the Financial Services Industry." Undergraduate senior project in Computer Science, Fall 1989.

Williams, C. "Leveraged Buyouts and Corporate Finance." Undergraduate independent study, Summer 1989.

Continuing Education Instruction and Consulting Work:

Selected Programs:
Bank Directors' College
Continuing Professional Education in Accounting
Continuing Professional Education in Law
Commercial Bank Management Roundtable
Engineering Management Program
Evaluating Lease vs. Buy Alternatives
Finance for Non-Financial Managers
Financial Management for Physicians
Financial Management for Technical Professionals
Seminar in Commercial Bank Management
Seminar in Financial Management
Seminar in Strategic Planning and Corporate Governance

Selected Sponsors:
American Community Bank
Bank of America
Bank of Davie
Bank of Stanly
Carolina Trust Bank
Carolinas AGC
Catawba Valley Bank
China Resources (Holdings) Co.
Coca Cola Consolidated, Inc.
Coddle Creek Financial Corp.
Cornerstone Bank & Trust
Council Japan, Inc.
Duke Energy, Inc.
First Carolina State Bank
First Trust Bank
First National Bank of Christiansburg
First Union Corp.
Gateway Bank & Trust Company
Helicopter Association International
IBM
LSB Bancshares, Inc.
North Carolina Bankers Association
North Carolina Banking Commission
North Carolina Center for the Advancement of Teaching
Paragon Bank
Piedmont Bank
Scottish Bank
Staton Investment Management Co.
Surrey Bank & Trust
U-Vest Investment Securities, Inc.
Wachovia Corp.

ACADEMIC HONORS AND AWARDS

Voted outstanding professor of the year in the College of Business Administration by the Graduate Management Student Association, April 1992.

Featured in *Profiles in Research and Creativity*, (UNC - Charlotte: Office of Academic Affairs), November1991, pp. 12-13.

Elected to *Omicron Delta Epsilon* Academic Honorary Society in Economics, *Gamma* Chapter of Ohio, Kent State University, April 1987.

Doctoral Student Research Award, Kent State University, April 1986.

Doctoral Student Teaching Award, Kent State University, May 1985.

Elected to *Beta Gamma Sigma* Academic Honorary Society in Business Administration, Ohio Chapter, Kent State University, April 1984.

Elected to *Phi Beta Kappa* Academic Honorary Society, Chapter *Nu* of Ohio, Kent State University, May 1978.

PROFESSIONAL AFFILIATIONS

Academy of Financial Services
American Finance Association
Delta Sigma Pi
Financial Management Association
Southern Finance Association

STEVEN P. CLARK
University of North Carolina at Charlotte
Department of Finance and Business Law
Charlotte, NC 28075
spclark@email.uncc.edu

October 2002

Research Interests

Corporate Finance, Asset Pricing, Financial Mathematics, Stochastic Modeling and Optimal Control Theory.

Education

Ph.D. in Applied Economics — May 2003 (Dissertation Defended)
Clemson University, Clemson, SC
Concentration: Financial economics

Ph.D. in Mathematical Sciences — August 2000
Clemson University, Clemson, SC
Thesis: *"Stochastic control of a research and development project.*
Committee: Peter Kiessler (chair),
Robert Tamura, Michael Maloney, James A. Reneke, Robert E. Fennell

M.A. in Mathematics — March 1995
University of Georgia, Athens, GA

B.A. in Mathematics — March 1992
Valdosta State University, Valdosta, GA

B.A. in Philosophy — March 1992
Valdosta State University, Valdosta, GA

Professional Experience

University of North Carolina at Charlotte, Department of Finance and Business Law
Assistant Professor of Finance — 2002-
Courses taught: Undergraduate Investments, Graduate Investment Management

University of Virginia, Department of Economics
Lecturer in Economics — 2001-2002
Courses taught: Corporate Finance, Introduction to Statistics, Stochastic Calculus

University of Alberta, Department of Mathematical Sciences
Edmonton, AB, Canada
Postdoctoral Fellow in Mathematical Finance 2000 - 2001
Courses taught: Calculus III, Stochastic Calculus (graduate level)

Professional Experience (cont.)

Clemson University, Department of Mathematical Sciences
Graduate Teaching Assistant 1996 - 2000
Graduate Research Assistant 1998 - 1999
Courses taught: Business Calculus, Undergraduate courses in Calculus
Assisted with: Calculus III, Probability Theory

University of Georgia, Mathematics Department
Graduate Teaching Assistant 1992 - 1995
Courses taught: Precalculus, Contemporary Mathematics
Assisted with: Calculus I and II

Committee Service

Curriculum Committee, Department of Finance and Business Law,
UNC Charlotte 2002-
Seminar Series Coordinator, Department of Finance and Business Law,
UNC Charlotte 2002-

Student Advising

Hua Fang, UVa (Financial Economics)
Dissertation committee member 2001-02
Jason Beveridge, UVa (Computational Finance)
Senior thesis advisor 2001-02

Grants

Office of Naval Research Grant 1998 - 1999
Clemson University Affordability Group
Graduate Research stipend plus tuition

Publications

Journal Articles

- Clark, Steven P. and Kiessler, Peter C.
  "The convexity of the value functions of a class of stochastic dynamic programming problems",
  Stochastic Analysis and Applications, vol. 20, number 4, 2002, pp. 783–789
- Clark, Steven P., Elliott, Robert J., Van der Hoek, John and Valencia, Jorge.
  "A hidden Markov model approach to estimating stochastic volatility",
  Submitted to *Journal of Applied Probability.*
- Cadenillas, Abel and Clark, Steven P.
  "Management vs. Equity: Stochastic Control-Theoretic Foundations for the Free Cash Flow Hypothesis",
  Submitted to *Journal of Economic Theory.*

Publications (cont.)

- Alvarez, Luis H. R. and Clark, Steven P.
  "A model of dividend optimization from a managerial perspective",
  in preparation.
- Clark, Steven and Kiessler, Peter.
  "Stochastic control of a research and development project
  with constant returns to scale",
  in preparation.
- Blenman, Lloyd P. and Clark, Steven P.
  "Partial Participation Options"
  in preparation

Books

- Elliot, Robert J. and Clark, Steven.
  Stochastic Calculus and Applications, Springer Verlag
  in preparation

Conference Presentations

- "Stochastic Control of a Research and Development Project" April 1, 2000
  Fifth Southeastern Probability Days Conference
  at the Georgia Institute of Technology.

Invited Talks

- "Management vs. Equity: Stochastic Control-Theoretic
  Foundations for the Free Cash Flow Hypothesis" September 24, 2002
  Brown Bag Seminar Series in Finance
  Kenan Flagler Business School
  University of North Carolina at Chapel Hill.

Honors and Awards

Philosophy Department, Valdosta State University
  Outstanding Philosophy Student Award 1991

Personal Data

U.S. citizen, Born July 12, 1970
Married to Kelle L. Clark.

References

Robert J. Elliott, RBC Financial Group Professor of Finance
Faculty of Management
University of Calgary
2500 University Drive NW
Calgary, Alberta Canada T2N 1N4
Phone: 403-220-5540
Email: relliott@ucalgary.ca

Michael T. Maloney, Professor of Economics
Clemson University 223 Sirrine Hall
Clemson, SC 29634
Phone: 864-656-3430 Email: maloney@clemson.edu

T. W. Epps, Professor of Economics
University of Virginia
P.O. Box 400182
Charlottesville, VA 22904-4182
Phone: 434-924-7947
Email: twe@virginia.edu

Peter C. Kiessler, Associate Professor of Mathematical Sciences
Department of Mathematical Sciences
Clemson University
Clemson, SC 29634-0975
Phone: 864-656-3281
Email: pkiess@math.clemson.edu

Curriculum Vitae

MARTIN HALEK

Current Positon: Assistant Professor of Risk Management and Insurance
Department of Finance and Business Law
The Belk College of Business Administration
University of North Carolina at Charlotte
9201 University City Boulevard
Charlotte, North Carolina 28223-0001

Tel: (704) 687-4125
Fax: (704) 687-6987

Internet: mhalek@email.uncc.edu
http://www.uncc.edu/mhalek

Education:

2002 Ph.D. in Insurance and Risk Management (Major) & Finance (2nd Major)
The Wharton School, University of Pennsylvania
Dissertation Title: "Essays in Insurance and Risk Management"

1996 M.S. in Actuarial Science, University of Wisconsin-Madison

1990 B.A. in Mathematics (Major) & Economics (Minor), Whitman College

Past Positions:

1999 – 2001 The Wharton School, University of Pennsylvania
Instructor, INSR 205: Risk Management; Insurance and Risk Management Department
Teaching Assistant, FNCE 218/715: Theory and Structure of Financial Markets (Undergraduate and MBA); Finance Department

1994 – 1996 University of Wisconsin-Madison, School of Business
Teaching Assistant, Intermediate Business Statistics (MBA and Undergraduate)
Research Assistant, Department of Actuarial Science, Risk Management & Insurance

1990 – 1994 Howard Johnson & Company, *Actuarial Consultant*
Managed defined benefit and defined contribution pension plans. Responsibilities included conducting timely allocations and actuarial valuations, performing government compliance and discrimination testing, and daily plan maintenance. Presented periodic reports and consulted clients on issues such as pension plan design and implementation.

Publications and Working Papers:

"An Analysis of Stockholder Dividend Payout Policies of Publicly Traded Insurers" Working paper with Charles Nyce, University of Georgia and David W. Sommer, University of Georgia.

"Examining the Social Security Payroll Tax: Is An Age-Weighted Taxation Scheme Optimal?" Working paper with Pierre Lemaire, University of Pennsylvania.

"Measuring Individual Risk Aversion: An Examination of the Health and Retirement Study Data," Working paper.

"Effects of Analysts' Ratings on Stock Returns: Evidence from the Insurance Industry," Working paper.

Halek, Martin and Eisenhauer, Joseph G. "Demography of Risk Aversion," *Journal of Risk & Insurance,* 68 (1) March 2001: 1-24.

Eisenhauer, Joseph G. and Halek, Martin. "Prudence, Risk Aversion, and the Demand for Life Insurance," *Applied Economics Letters*, 6(4) April 1999: 239-242.

Presentations:

November 2002	"Examining the Social Security Payroll Tax: Is An Age-Weighted Taxation Scheme Optimal?" Southern Risk and Insurance Association Annual Meeting; New Orleans, Louisiana
August 2002	"Examining the Social Security Payroll Tax: Is An Age-Weighted Taxation Scheme Optimal?" "An Analysis of Stockholder Dividend Payout Policies of Publicly Traded Insurers" American Risk and Insurance Association Annual Meeting; Montreal, Canada
April 2002	"Measuring Individual Risk Aversion: An Examination of the Health and Retirement Study Data" Risk Management and Insurance Seminar Series; The Terry School of Business, University of Georgia, Athens, Georgia
March 2001	"Demography of Risk Aversion" Rosen – Huebner – McCahan Seminar Series; The Wharton School, University of Pensylvania, Philadelphia, Pennsylvania
November 2000	"Effects of Analysts' Ratings on Stock Returns: Evidence from the Insurance Industry" Rosen – Huebner – McCahan Seminar Series; The Wharton School, University of Pensylvania, Philadelphia, Pennsylvania
August 2000	"Effects of Analysts' Ratings on Stock Returns: Evidence from the Insurance Industry" American Risk and Insurance Association Annual Meeting; Baltimore, Maryland
August 1999	"Demography of Risk Aversion" American Risk and Insurance Association Annual Meeting; Vancouver, British Columbia

Awards and Honors:

1996 – 2000	S.S. Huebner Foundation Fellowship for Insurance Education, University of Pennsylvania
1995 – 1996	Actuarial Science Scholarship, University of Wisconsin-Madison
1986 – 1990	Presidential Scholarship , Whitman College
1988	Order of Waiilatpu (a local honorary society), Whitman College
1986	Honors at Entrance, Whitman College

Passed Society of Actuaries exams 100, 110, 120, 130, 135 and Casualty Actuarial Society Exam 4A.

Professional Activities:

Teaching:	Advanced Risk Management and Insurance, Principles of Risk Management and Insurance, Property and Casualty Insurance, Employee Benefits, Theory and Structure of Financial Markets, Business Statistics

Referee/Reviewer: Journal of Economics and Finance. Journal of Risk and Insurance, North American Actuarial Journal, Journal of Insurance Issues

Professional Associations: American Risk and Insurance Association, Southern Risk and Insurance Association, American Finance Association

Conference Participation:

November 2002	Southern Risk and Insurance Association Annual Meeting, New Orleans, Louisiana
August 2002	American Risk and Insurance Association Annual Meeting; Montreal, Canada
January 2001	American Finance Assoc./American Economic Assoc. Meeting; New Orleans, Louisiana
August 2000	American Risk and Insurance Association Annual Meeting; Baltimore, Maryland
May 2000	The Pension Research Council Symposium, The Wharton School, Univ. of Pennsylvania
August 1999	American Risk and Insurance Association Annual Meeting; Vancouver, British Columbia
August 1998	American Risk and Insurance Association Annual Meeting; Boston, Massachussettes
May 1997	The Pension Research Council Symposium, The Wharton School, Univ. of Pennsylvania

Committee Work:

2003	Faculty Advisor, Gamma Iota Sigma (The International Risk Management, Insurance and Actuarial Science Collegiate Fraternity), Alpha Tau Chapter, University of North Carolina at Charlotte
2002 - 2003	Curriculum Committee, Department of Finance and Business Law, University of North Carolina at Charlotte
August 2002	American Risk and Insurance Association, Program Committee and Moderator
August 2000	American Risk and Insurance Association, Kulp-Wright Book Award Committee
April 2000	Ph.D. Student Representative, Quinquennial Review of the Insurance and Risk Management Program, The Wharton School, University of Pennsylvania

Areas of Interest:

Social Security, risk behavior, insurance economics, environmental risk management.

References:

Available upon request.

Department of Economics
Faculty

Vita

Louis H. Amato
Professor of Economics
Department of Economics
University of North Carolina at Charlotte
Charlotte, NC 28223

EDUCATION

University of South Carolina
Columbia, SC 29208
Ph.D. Economics, August 1980

University of North Carolina-Greensboro
Greensboro, NC 27412
M.A. Economics, December 1976

Lenoir Rhyne College
Hickory, NC 28601
A.B. Economics, May 1974

TEACHING AWARDS:

College of Business Administration, Excellence In Teaching, 2000

Economics Department, Outstanding Graduate Teaching Award, 1999

Economics Department, Outstanding Undergraduate Teaching Award, 1999

Economics Department, Outstanding Undergraduate Teaching Award, 1997

CONSULTING ACTIVITIES:

Economic Analysis and Expert Testimony In Case Involving Proposed Addition of New Hyundai Dealership to Charlotte NC Market, Retained by LaPointe Hyundai, April 1994

Economic Analysis and Expert Testimony In Case Involving Proposed Addition of new Isuzu Dealership to Charlotte NC Market, Retained by Diamond Isuzu, February 1998.

Economic Analysis Involving Proposed Addition of New Dodge Dealership to Raleigh NC market, retained by Al Smith Dodge, July 1998.

Economic Analysis and Expert Testimony, Retained by Decralite Incorporated, August 2000.

Economic Analysis of Proposed Addition Automobile Dealership to Charlotte NC, Retained by Johnson, Mercer, Hearn and Vinegar, August 2000.

Statistical Analysis of Corporate Layoff, Retained by Moore & Van Allen, January 2001.

PUBLICATIONS AND RESEARCH:

Editorial Activity:

Managing Editor: *Studies In Economics and Finance, 1992-1999.*

Reviewer: *Southern Economic Journal, Quarterly Journal of Business and Economics, Review of Industrial Organization, Economics of Education Review, Journal of Sports Economics.*

Publications

Amato, Christie H. and Louis H. Amato, "Advertising, Firm Size and Profitability In The Service Sector", Academy of Marketing Studies, Volume 5, Number 2, December 2001, pp. 69-84.

Amato, Louis H., Christie H. Amato, and Timothy Burson, "Productivity, Firm Size and Concentration in the Financial Markets", Proceedings of American Society of Business and Behavorial Sciencies, pp. 108-114.

Amato, Louis H. and Christie H. Amato, "The Effect of Global Competition On Total Factor Productivity in U.S. Manufacturing", Review of Industrial Organization, Volume 19, Number 4 pp., December 2001, pp. 407-423,

Amato, Louis H., John M. Gandar, and Richard A. Zuber, "The Impact of Proposition 48 on the Relationship Between Football Success and Football Player Graduation Rates", Journal of Sports Economics, Volume 2, Number 2, May 2001, pp. 101-112.

Amato, Louis H. and Christie H. Amato, "Retail Industry Structure: 1977-1992, Economics and Economic Education Research Journal, Volume 1, Number 1, 2000 pp.124-132.

Amato, Louis H. and Christie H. Amato, "The Impact of High Technology On Productivity and Profitability In Selected U.S. Manufacturing Industries", Review of Industrial Organization, Volume 16, Number 4, December 2000, pp 327-342.

Amato, Louis and Ronald P. Wilder, "Alternative Profitability Measures and Tests of the Structure- Performance Relationship. Review of Industrial Organization, Volume 10, Number 1, 1995, pp 21-31.

Amato, Louis, "The Choice of Structure Measure and the Structure-Performance Model", Quarterly Journal of Business and Economics , Volume 34, Number 2, Spring 1995, pp. 39-52.

Amato, Louis, John Gandar, Irvin B. Tucker, and Richard A. Zuber, "Athletics vs Academics: Testing the Relationship Between Football Success and Football Player Graduation Rates In the National Collegiate Athletic Association, Economics of Education Review, Vol 15, No 2, 1996, pp. 187-195.

Tucker, Irvin B. and Louis Amato, "Does big-time Success in Football or Basketball Affect SAT Scores?", Economics of Education Review, Vol 12, No 2, 1993, pp 177-181.

Amato, Louis and Ronald P. Wilder,"On Firm and Industry Effects", Southern Economic Journal, July 1990, 93-105.

Amato, Louis and Ronald P. Wilder, "Market Concentration, Efficiency, and Antitrust Policy: Demsetz Revisited," Quarterly Journal of Business and Economics, Autumn 1988, pp. 3-19.

Amato, Louis, "Market Structure, Technological Change, and Labor Productivity, Midsouth Journal of Economics, Spring 1986, pp 63-87.

Amato, Louis and Ronald P. Wilder, "The Effects of Firm Size on Profitability In U.S. Manufacturing," Southern Economic Journal, April 1985, pp 181-190.

Amato, Louis,"Firm Size, Leading Firms and Mobility" Studies In Economic Analysis, Spring 1984, pp. 5-25.

Tucker, Irvin B. and Louis Amato, "Equal Pay," Business and Economic Review, October 1984, pp.11-13

Amato, Louis, "Net Entry and Strategic Groups," Midsouth Journal of Economics, December 1982, pp. 543-553.

Amato, Louis, J. Michael Ryan, and Ronald P. Wilder "Market Structure and Dynamic Performance In U.S. Manufacturing," Southern Economic Journal, April 1981, pp. 1105-1110.

Formby, John P. and Louis Amato, "Competition and the Regulation of State Milk Markets: The Case of North Carolina," Studies In Economic Analysis, Spring 1979 pp. 3-22.

Submissions:

Amato, Christie H. and Louis H. Amato, "Testing Corporate Commitment To Quality of Life Using the Corporate Mission Statement", Journal of Marketing Theory and Practice, (In Review, Revised and Resubmitted at Editor's request)

Davis, William Y. Jr., Louis H. Amato and Christie H. Amato, "Mock Labor Negotiations and A Group Rawlsian Experiment", Economics and Economic Education Research Journal (In Review)

Amato, Louis H., Christie H. Amato, and Timothy Burson, "Productivity, Firm Size and Concentration in the Financial Markets" (submitted to Journal of Business and Behavioral Sciences*)*

Work In Progress:

"Concentration, Firm Size and Total Factor Productivity" (with Christie H. Amato). This project examines the impact of concentration and firm size on total factor productivity. The focus of the research is on the potential for non-linear relationships between these variables.

Amato, Louis H. and Christie H. Amato, "Total Factor Productivity and Concentration: Additional Evidence of the Inverted U", (paper very near completion, will be submitted to *Review of Industrial Organization* by June 30, 2002)

Amato, Louis H. and Christie H. Amato, "Socially Responsible Behavior or Socially Responsible Perception: Which Determines Profit?" (project at data gathering stage. Data sources are *Compustat* and *Shopping For A Better America*.)

Amato, Louis H. and Ronald P. Wilder, "Profitability Measures and International Differences in Accounting Philosophy", data has been completed, initial empirical specifications estimated).

Amato, Christie H. and Louis H. Amato", Myers Briggs Personality Profile and Student Team Performance", (funded by Childress Klein research grant, data is presently being tabulated).

Selected Paper Presentations

Amato, Louis H., Christie H. Amato, and Timothy Burson, "Productivity, Firm Size and Concentration in the Financial Markets", *Presented to American Society of Business and Behavorial Sciencies* (presented February 2002, Award Winning Paper)

Amato, Christie H. and Louis H. Amato, "Advertising, Firm Size and Profitability In The Service Sector", *Presented to Academy of Marketing Studies* (presented October 2001, Award Winning Paper)

Davis, William Y. Jr., Louis H. Amato and Christie H. Amato, "Mock Labor Negotiations From Behind a Veil of Ignorance,", presented at the Western Economic Association, July 2001.

Davis, William Y. Jr., Louis H. Amato and Christie H. Amato "Mock Labor Negotiations and A Group Rawlsian Experiments," presented at the International Meeting of the Allied Academies, October, 2001.

"Firm Size and Market Power In the Channel Distribution", presented to the Atlantic Economic Society, October 2000.

“Trends In Industry Retail Structure”, presented to Allied Academies, October 1999.

Industry Specific Applications For The Economic Principles Course”, presented *Southern Economic Association*, November 1998.

"The Impact of Business Cycle Variability On Firm Profitability at Alternative Firm Sizes", presented to Midsouth Economic Association, 1991.

"The Consequences of International Competition On Profit Rates In U.S. Manufacturing", presented to Missouri Valley Economic Association, March 1990.

"Business Cycle Effects and The Structure-Performance Relationship", presented to the Eastern Economic Association, March, 1989.

"The Implications of Risk and Elasticity For The Structure-Performance Model", presented to Eastern Economic Association, March 1988.

"The Choice of Structure Measure and the Structure-Performance Model," presented to the Missouri Valley Economic Association, March 1987.

"Alternative Profit Measures and The Structure- Performance Model," presented to the Western Economic Association, July 1986

"Technological Change, Innovation, Firm Size, and Market Structure" Economic Association, March 1985.

"Firm Size, Market Structure and Profitability," presented to the Eastern Economic Association, March 1985.

"A Human Capital Model of the Determinants of Gender Wage Differentials," presented to the Missouri Valley Economic Association, March 1985.

Productivity and Concentration: A Simultaneous Model presented to the Southern Economic Association, 1984.

Citations

Waldman, Don E. and Elizabeth Jensen, Industrial Organization: Theory and Practice, Addison Wesley, Reading Mass., 1998, cites “The Effects of Firm Size On Profit Rates in U. S. Manufacturing, Southern Economic Journal, July 1985 (citation appears on page 461.)

Martin, Stephen, Advanced Industrial Organization , Blackwell, Press, Oxford, 1993 cites "Market Concentration, Efficiency,

and Antitrust Policy: Demsetz Revisited," Quarterly Journal of Business and Economics, Autumn 1988, (Citation appears on page 491.)

Martin, Stephen, Industrial Economics: Economic Analysis and Public Policy, Second Edition, Prentice Hall, 1994 cites "Market Concentration, Efficiency, and Antitrust Policy: Demsetz Revisited," Quarterly Journal of Business and Economics, Autumn 1988, (Citation appears on page 218.)

Scherer, F.M. and David Ross, Industrial Market Structure and Economic Performance, Houghton Mifflin Company, Third Edition, cites "Market Structure and Dynamic Performance In U.S. Manufacturing", Southern Economic Journal, April 1981 (citation appears on p. 645 of Scherer and Ross).

Greer, Douglas F, Business Government and Society, Second Edition, Macmillan Publishing Company, 1987, cites "The Effects of Firm Size On Profit Rates In U.S. Manufacturing", Southern Economic Journal, July 1985, (citation appears on page 113)

Grier, K.B., "Corporate Political Participation," Southern Economic Journal, January 1991, cites "The Effects of Firm Size On Profit Rates In US Manufacturing, Southern Economic Journal, July 1985, (citation appears on Pages 729 and 738 of Grier article)

Uri, ND, "A Re-examination of the Relationship Between Industry Structure and Economic Performance," Applied Economics, October 1988, cites "The Effects of Firm Size On Profit Rates In US Manufacturing", Southern Economic Journal, July 1985, (citation appears on page 1383 of Uri article).

Addison J.T. and A.H. Barnett, "The Impact of Unions On Productivity", British Journal of Industrial Relations, Volume 20, Number 2, cites "Market Structure and Dynamic Performance In US Manufacturing, Southern Economic Journal, April 1981, (citation appears on page 160 of Addison and Barnett).

Hirschey, Mark, and Dean W. Wichern, Managerial and Decision Economics, Volume 4, Number 2, cites "Market Structure and Dynamic Performance In US Manufacturing, Southern Economic Journal, April 1981.

Articles Selected For Abstracts:

Amato, Louis and Ronald P. Wilder, "The Effects of Firm Size On Profit Rates In US Manufacturing", Southern Economic Journal , July 1985, Abstract appears Journal of Economic Literature, December 1985, page 2170.

Amato, Louis and Ronald P. Wilder, "Market Concentration, Efficiency, and Antitrust Policy: Demsetz Revisited", Quarterly Journal of Business and Economics, Autumn 1988, Abstract appears Journal of Economic Literature, June 1989, page 1008.

Amato, Louis and Ronald P. Wilder, "On Firm and Industry Effects", Southern Economic Journal, July 1990, Abstract appears Journal of Economic Literature, March 1991, pages 411-412.

Research Grants:

University of North Carolina at Charlotte, Summer 1999.

Apple Computer Grant, Member of Apple Computer Grant team designed to develop applications of Macintosh software for instructional purposes.

College of Business Administration Faculty Research Grant, Summer 1993

College of Business Administration Faculty Research Grant, Summer 1992

College of Business Administration Faculty Research Grant, Summer 1991

College of Business Administration Faculty Research Grant, Summer 1990

College of Business Administration Faculty Research Grant, Summer 1989

College of Business Administration Faculty Research Grant, Summer 1988

College of Business Administration Faculty Research Grant, Summer 1987

College of Business Administration Faculty Research Grant, Summer 1986

PROFESSIONAL AFFILIATIONS

American Economic Association, Industrial Organization Society,

SERVICE

President, Southeastern Economic Association elected October 1994.
Treasurer, Southeastern Economic Association elected October 1994.

Departmental Committees:

Member, Department of Economics Personnel Committee, elected 1983-1987, 1989-1991, 1993-1996, 1997-2000, Chair 1984, 1999

Economics Department, Graduate Affairs Committee, 1998-2000.

Journal Rankings Committee, 2000-2001, 2001-2002.

Member, Department of Economics Committee to Restructure Economics Major, elected 1988-1990.

Member, Department of Economics Curriculum Committee, elected, 1983-1987, 1989-1991.

Chair, Department of Economics Masters Degree Planning Committee, appointed, 1986-1989. Responsibilities included chairing committee that produced document "Authorization to Plan a New Degree Program". Chairs role included primary co-authorship of proposal along with coordination of work from all committee members.

College Committees:

Ad Hoc Writing Committee, AACSB Accreditation To Assess Belk College of Business Administration Students, 1999-2000.

Search Committee to Fill Torrence E. Hemby Distinguished Professorship of Banking, Acting Chair During Ronald Madsen's absence for surgery.

Member, Graduate Affairs and Research Committee, 1993-1995.

Search Committee For Director of Research and Special Projects, 1994-1995.

Member, College of Business Administration Course and Curriculum Committee, 1986-1990, 1992-1994.

Member, College of Business Administration Promotion and Tenure Committee, 1984-1986, 1991-1992.

Chair, Search Committee for Department Chair In Department of Marketing, 1990-1991.

University Committees:

Department Representative, University Faculty Council, 1995-1996, 1998-1999, 1999-2000, 2000-2001, 2001-2002.
Member, Academic Integrity Board, appointed 1984-present.

Faculty Course and Curriculum Committee, elected 1983-1985, 1990-1991.

Chair, Ad Hoc Committee to Examine Academic Integrity Code 1994-1996, chair 1995-1996..

Community Service:

University for Young Americans, 1981-1994. Participated as Keynote Speaker on Numerous Occasions, Panel Member, and Hosted meeting at UNC-Charlotte, 1993 and 1994.

Numerous Speeches, Television Appearances, Radio Interviews, and Charlotte Observer editorial articles.

Provided Editing and Data Analysis For Evaluation of JTPA program administered by Charlotte Urban League.

JOHN M. GANDAR

Professor and Chair
Department of Economics
University of North Carolina at Charlotte

EDUCATION

Ph.D. in Economics, University of Missouri, 1982
M.A., Victoria University, New Zealand, 1972.
B.A., Massey University, New Zealand, 1969.

Ph.D. Dissertation recognised as one of six outstanding dissertations in Economic History at American Economic History Association Annual Meeting, Washington, DC, 1983.

PROFESSIONAL EXPERIENCE

University of North Carolina at Charlotte
- Chair, 2001- present
- Interim Assistant Chair, 2000 - 2001
- Professor, 1998 - present
- Associate Professor, 1987 - 1998
- Assistant Professor, 1982 - 1987

Massey University, New Zealand
- Visiting Professor, 1997
- Lecturer, 1975 - 1977
- Assistant Lecturer, 1972 - 1975

TEACHING

Undergraduate Courses Taught

- Econometrics
- Economic History of the United States
- Economics of Sports
- International Trade
- Mathematical Economics
- Principles of Macroeconomics
- Economic History of Europe
- Economics of the Firm
- Intermediate Microeconomics
- International Finance
- Money and Banking
- Principles of Microeconomics

Graduate Courses Taught

- Health Economics
- Microeconomic Theory
- Research Methods I & II
- Health Finance
- Uncertainty & Asymmetric Information

PUBLICATIONS AND RESEARCH

Refereed Journal Articles

"Interest-Sensitive Wealth and the Life-Cycle Hypothesis: Implications for Fiscal Policy," with Ben Russo, *Quarterly Review of Economics and Finance*, forthcoming.

"Mortgage-Backed Securities: A Synopsis," with John Gandar and R. Stafford Johnson, *International Review of Economics and Business*, 49 (4) December 2002.

"Re-examining the Betting Market on Major League Baseball Games: Is There a Reverse Favorite-Longshot Bias?" With Richard A. Zuber, R. Stafford Johnson, and William Dare, *Applied Economics*, 34 (10) July 2002.

"Binomial Interest Rate Trees: A Synopsis of Uses and Estimation Approaches," with R. Stafford Johnson and Richard Zuber, *Journal of Financial Education*, 27 (3), Fall 2001.

"Searching for the Favorite-Longshot Bias Down Under: An Examination of the New Zealand Pari-Mutuel Betting Market," with Richard Zuber and R. Stafford Johnson, *Applied Economics*, 53 (4), July 2001.

"The Home Field Advantage Revisited: A Search for the Bias in Other Sports Betting Markets," with Richard Zuber and Reinhold Lamb, *Journal of Economics and Business*, 53 (2), July 2001.

"The Impact of Proposition 48 on the Relationship between Bowl Appearances and Football Player Graduation Rates," with Louis Amato and Richard Zuber, *Journal of Sports Economics*, 2(2), May 2001.

"The Search for Informed Traders in the Totals Betting Market on National Basketball Association Games," with Richard Zuber and William Dare, *Journal of Sports Economics*, 1 (2), May 2000.

"The Impact of Investor-Fan Ownership on the Value of Publicly Traded Sports Franchises: the Case of the Boston Celtics," with Reinhold Lamb, Lawrence Blose, and Richard Zuber, *Academy of Accounting and Financial Studies Journal*, 3 (1), 1999.

"Informed Traders and Price Variations in the Betting Market for Professional Basketball Games," with William Dare, Richard Zuber, and Craig Brown, *Journal of Finance*, 53 (1), 1998.

"Bowls versus Playoffs: The Impact on Football Player Graduation Rates in the National Collegiate Athletic Association," with Louis Amato, Irvin Tucker, and Richard Zuber, *Economics of Education Review*, 15 (2), 1996.

"The Impact of the Paasche-Laspeyres Choice Upon Econometric Results," with David

Loschky, *Empirical Economics*, 20 (2), 1995

"Testing Efficiency in Gambling Markets: A Comment," with Richard Zuber and Ben Russo, *Applied Economics*, 25 (7), 1993.

"Foreign Currency Options: Ex Post and Ex Ante Market Efficiency Tests," with Richard Zuber and R. Stafford Johnson, *Southern Business Review*, 16 (1), 1990.

"Market Rationality Tests Based on Cross-Equation Restrictions," with Ben Russo and Richard Zuber, *Journal of Monetary Economics*, 24 (3), 1989. This article was abstracted in the *Journal of Economic Literature*, 28 (2), 1990.

"Testing Rationality in the Point Spread Betting Market," with Richard Zuber, Ben Russo, and Thomas O'Brien, *Journal of Finance*, 43 (4), 1988.

"A Re-examination of the Effect of Lifting the Television Blackout on No-Shows at Professional Football Games," with Richard Zuber, *Atlantic Economic Journal*, 16 (2), 1988.

"An Econometric Analysis of NFL Point Spreads," with Richard Zuber and Benny Bowers, *Journal of Economics and Finance*, 9 (3), 1985.

"Beating the Spread: Testing the Efficiency of the NFL Gambling Market," with Richard Zuber and Benny Bowers, *Journal of Political Economy*, 93 (4), 1985. This article was abstracted in the *Journal of Economic Literature*, 23 (4), 1985. It was also reprinted in Sportometrics, Brian Goff and Robert Tollison (eds), Texas A&M Press, 1990.

"Economic Causation and British Emigration in the Late Nineteenth Century," *Journal of Economic History*, 64 (2), 1984.

"New Zealand Net Migration in the Latter Part of the Nineteenth Century," *Australian Economic History Review*, 19 (2), 1979.

"On an Incorrect Use of Cost-Benefit Analysis," *New Zealand Economic Papers*, 7 (2), 1975.

Work In Progress

Submissions

"Don't Lose Sleep on It: A Re-examination of the Daylight Savings Time Anomaly," with Reinhold Lamb and Richard Zuber, submitted to *Applied Economics*.

"A Reexamination of the Efficiency of the Betting Market on National Hockey League Games," with Richard Zuber and R. Stafford Johnson, submitted to the *Journal of Sports Economics*.

Other Work in Progress

"An Examination of the Source of Informed Trader Information in the College Football Betting Market," with William Dare and Richard Zuber.

"Skewness-Adjusted Binomial Model for Pricing Mortgage-Backed Securities," with R. Stafford Johnson and Richard Zuber.

"A Natural Experiment on the Relationship between Weather, Production and Asset Prices: the Totals Betting Market on Professional Football Games," with Richard Zuber.

"Are Bookmakers Risk Averse? An Analysis of Betting Line Changes in the NBA Betting Market," with Jason Abrevaya and Richard Zuber.

"Does the Size of the Win Pool Explain the Favorite-longshot Bias? A Test of the Relationship in the New Zealand Pari-Mutuel Racetrack Betting Market," with Richard Zuber.

"Testing for Non-Random Streaks in the Betting Market on Professional Basketball Games," with Richard Zuber and William Dare.

Other Scholarly Products

"Alternative Regulatory Mechanisms in an Insurance Industry with a Guaranty Fund," Financial Services Exchange, with Claude Lilly and Calvin W. Sealey, 2002.

"The Behavior of Stock Returns Around IPO Lockup Expirations," American Society of Business and Behavioral Sciences (Accounting and Finance) Proceedings, with Reinhold Lamb and Richard Zuber, 2001, pp. 197-207.

The Economic Impact of the Arts and Sciences Council Affiliates on Mecklenberg County, with John Connaughton and Ronald Madsen, University of North Carolina at Charlotte, 1998.

The Regional Impact of the Charlotte-Douglas International Airport, with Ronald Madsen, Center for Business and Economic Research / Urban Institute, University of North Carolina at Charlotte, 1996.

"Filter Rules for NFL Gambling," with Richard Zuber and Ben Russo, Proceedings of the Seventh Annual International Conference on Gambling and Risk Taking, Vol. 7, 1989.

Summary of North Carolina Occupational Forecasts for Selected Occupational Clusters: State and Regional Results, with John Connaughton and Ronald Madsen, North Carolina Department of Community Colleges / Center for Business and Economic Research, University of North Carolina at Charlotte, 1987.

North Carolina Occupational Forecasts through 1990 for Selected Occupational Clusters: State Level Results, Volume I, with John Connaughton and Ronald Madsen, North Carolina Department of Community Colleges / Center for Business and Economic Research, University of North Carolina at Charlotte, 1987.

North Carolina Occupational Forecasts through 1990 for Selected Occupational Clusters: Results For Planning Regions, Volumes II - VII, with John Connaughton and Ronald Madsen, North Carolina Department of Community Colleges / Center for Business and Economic Research, University of North Carolina at Charlotte, 1987.

North Carolina Occupational Forecasts for 1985 through 1990 for Selected Occupational Clusters, with John Connaughton and Ronald Madsen, North Carolina Department of Community Colleges / Center for Business and Economic Research, University of North Carolina at Charlotte, 1985.

Referee Activity

The following lists only refereeing activity at major journals:

American Economic Review
Journal of Business
Journal of Finance
Journal of Financial Economics
Journal of Political Economy
Review of Economics and Statistics

Conference Presentations

The following lists only presentations at major conferences:

American Economics Association Annual Meeting, 1986.
American Economic History Association Annual Meeting, 1983.
Eastern Finance Association Annual Meeting, 1990, 1995.
Financial Management Association Annual Meeting, 1988, 1996, 2002.
International Equine Industry Academic Conference, 1999, 2001.
National Decision Sciences Institute Annual Meeting, 1988.
Southern Economic Association Annual Meeting, 1984,1985, 1986, 1987, 1990, 1991.
Southern Finance Association Annual Meeting, 1992, 1993, 1994, 1995, 1996, 1997, 1999.
Western Economic Association Annual Meeting, 1984, 1985.

Invited seminar presentations at:

The University of North Carolina at Chapel Hill, 1987.
Wake Forest University, 1995.
The University of Northern Arizona, 1996.
Waikato University, New Zealand, 1997.
Victoria University, New Zealand, 1997.

Research Grants

Internal

University Faculty Research Grant, 1983, 1984, and 1988.

University C. I. D. Grant, 1999, 2000.
Belk College of Business Administration Faculty Research Grant, 1986, 1989, 1990, 1991, 1992, and 1993.
Belk College of Business Administration BarclaysAmerica Research Grant, 1995.

External

Principal Investigator (with John Connaughton and Ronald Madsen), North Carolina Department of Community Colleges Grant for "State Occupational Forecasting" ($37,500), 1985.
Principal Investigator (with John Connaughton and Ronald Madsen), North Carolina Department of Community Colleges Grant for "Regional Occupational Forecasting" ($75,700), 1987.
Principal Investigator (with Ronald Madsen and Wayne Walcott), Charlotte Chamber of Commerce / Charlotte-Douglas International Airport Grant for "Airport Economic Impact Study" ($19,600), 1996.
Principal Investigator (with Claude Lilly and Calvin W. Sealey), Financial Services Exchange Grant for "Alternative Regulatory Mechanisms in an Insurance Industry with a Guaranty Fund" ($21,000), 2001-2002.

SERVICE

Departmental Committees

Economics Department Personnel Committee (elected), 1984 - 1986, 1989 - 1992, 1999-2000.
Economics Department Undergraduate Curriculum Committee (elected), 1988 - 1989.
Economics Department Graduate Studies Committee (elected), 1990 - 2000 (chair 1992 - 1995).
Economics Department *ad hoc* committees on Journal Feasibilty (appointed), 1986 -1988, 1994 - 95.
Finance Concentration for Master of Science in Economics (appointed), 1994 – 1995.
Economics Department *ad hoc* committee on Ranking of Publication Outlets in Economics (volunteered), 2000.

College Committees

Belk College of Business Promotion and Tenure Committee (elected) 1986 - 1988.

University Committees

Faculty Council (elected), 1983 - 1984.
University Hearing Committee (elected), 1986 - 1993 (chair 1988 - 1992).
University Grievance Committee (elected), 1994 - 1997.
Masters of Health Administration Advisory Committee (appointed), 1995 - present.
Steering Committee, PhD in Public Policy. 1999-2000.

Administrative Appointments

Chairperson, Department of Economics, 2001 – present.
Interim Assistant Chairperson, Department of Economics, 2000 - 2001.
Faculty Associate to the Provost and Vice Chancellor for Academic Affairs (appointed), 1994 - 1996.
Postgraduate Studies Coordinator, Department of Applied and International Economics, Massey University, 1997.

Community Service

Off-Campus Courses

Computers in economics, Charlotte-Mecklenberg High Schools, 1983 - 1984.
Computers in economics, Gastonia High Schools, 1983 - 1984.
Financial markets, Interstate Securities Brokers Training Program, 1986.
Money, banking and financial markets, Charlotte-Observer Business Writers' Project, 1986.
Issues in Health Care Economics, North Carolina CPA Continuing Education Series, 1998.

Speeches

Civitan Club, Charlotte, 1985.
Senior Scholars, Charlotte, 1985.
Friendship Force, Charlotte, 1989.

Consulting

International Business Machines, Charlotte, 1983 - 1985.
City of Charlotte (airport noise litigation), 1984 - 1985.
Wallace Gibbs & Company, Charlotte, 1983 - 1985, 1987.
Frontier Casino, Las Vegas, 1989 - 1992.
City of Raleigh (airport noise litigation), 1993.
Bally's International, Las Vegas, 1993, 1996.

Version: February 2003

BIOGRAPHICAL SKETCH

Hwan-Chyang Lin

Education

Ph.D., Economics, 1990, University of Illinois at Urbana-Champaign
M.S., 1986, Economics, University of Illinois at Urbana-Champaign
B.A., 1980, Business Administration, National Chung Hsing University, Taiwan

Current & Past Positions

1999- ~ :	Associate Professor of Economics University of North Carolina at Charlotte
1993-99:	Assistant Professor of Economics University of North Carolina at Charlotte
1992-93:	Assistant Professor of Economics Portland State University, Portland, Oregon
1991-92:	Visiting Assistant Professor of Economics University of North Carolina at Charlotte
1990-91:	Assistant Professor of Economics Campbell University, Buies Creek, North Carolina

Research Areas

International Economics
Economic Growth
Financial Economics
Computational Economics and Finance

Publications in Refereed Journals

Lin, Hwan C. Shall the Northern Optimal R&D Subsidy Rate Inversely Respond to Southern Intellectual Property Protection? *Southern Economic Journal*, Vol. 69, No. 2, October 2002.

Lin, Hwan C, and Benjamin Russo. Growth Effects of Capital Income Taxes: How much does Endogenous Innovation Matter? *Journal of Public Economic Theory*, Vol. 4, No. 4, 613-640, October 2002.

Lin, Hwan C., and Benjamin Russo. A Taxation Policy Toward Capital, Technology, and Long-Run Growth. *Journal of Macroeconomics*, Vol. 21, No. 3, 463-491, Summer 1999.

Lin Hwan C. Import-subsidy Coordination and the Gains from International Diffusion of

Differentiated Middle Products. *International Economic Journal*, Vol. 12, No. 2, 55-76, Summer 1998.

Lin, Hwan C. Coordinating Bilateral Export Subsidies under Monopolistic Competition. *Journal of International Trade and Economic Development*, Vol. 5, No. 3, 319-339, November 1996.

Lin, Hwan C. Targeted Tariff Protection, Monopolistic Competition and Demand Interdependence. *International Economic Journal*, Vol. 10, No. 2, 25 - 49, Summer 1996.

Lin, Hwan C. Foreign Monetary Shocks, Differentiated Products and International Transmission: A Two-Country Model with Intra-Industry Trade. *Journal of International Trade and Economic Development*, Vol. 3, No. 1, 73-92, March 1994.

Lin, Hwan C. Does Price Rigidity Cause Large Social or Private Costs? *Atlantic Economic Journal*, Vol. 21, No. 4, 11 - 21, December 1993.

Lin, Hwan C., and Hui-Kuan Tseng. Exchange Rate Shocks and the Current Account under Monopolistic Competition. *Open Economies Review* 4: 133-150, 1993.

Professional Citations

The working-paper version of "Exchange Rate Shocks and the Current Account under Monopolistic Competition," (co-authored with H.K. Tseng), Open Economies Review 4: 133-150, 1993, cited in Chapter 15, entitled "Saving, Investment, and the Current Account, in The Handbook of International Macroeconomics (1994), edited by Frederick von der Ploeg and published by Basis Blackwell.

Papers under Review

"Asymmetric Intellectual Property Rights Protection and North-South Welfare" (with Earl Grinols), 3rd revise and resubmit, Review of Economic Studies.

Papers Presented at Professional Meetings/Workshops

"Shall the Northern optimal R&D subsidy inversely respond to Southern intellectual property protection?" *The Hawaii Conference on Business and Economics*. Honolulu, June 14-17, 2001.

"Build Taiwan into a Knowledge-based Economy: Policy Recommendations." The Annual Conference of North America Taiwanese Professors Association (NATPA), Tainan/Chunghua/Taipei, Taiwan, June 23 – July 1, 2000.

"Toward a High-Tech Island: Assessment of Taiwan's R&D Investment." The Annual Conference of North America Taiwanese Professors Association (NATPA), Albuquerque, New Mexico, August 6 – 8,1999.

"A Taxation Policy toward Capital, Technology, and Long-Run Growth" (with Benjamin Russo), presented at the ASSA annual conference, January 1999.

"Asymmetric Intellectual Property Rights Protection and North-South Welfare" (with Earl L.

Grinols), presented at: Western Economic Association International 72nd Annual Conference, Seattle, July 9 - July 13, 1997; The International Conference ***Dynamics, Economic Growth, and International Trade***, (organizing units: Institute of Economics, Sinica Academy, Taipei, Taiwan; Copenhagen School of Business, Copenhagen, Denmark; and Economics Department, University of Washington), Taipei, Taiwan, August 24-27, 1998; and Economics Workshop, Department of Economics, University of North Carolina at Charlotte, Fall 1998.

"Import-subsidy Coordination and the Gains from International Diffusion of Specialized Middle Products," Western Economic Association International 71st Annual Conference, San Francisco, June 28 - July 2, 1996.

"Coordinating Bilateral Export Subsidies under Monopolistic Competition," at the International Economics/Development Workshop, Economics Department, the University of Illinois at Urbana-Champaign, October 1995.

"Asymmetric Intellectual Property Enforcement, Imitation, and Country Welfare," at the College of Business Administration, the University of North Carolina at Charlotte, September 1995.

"Targeted Tariff Protection, the Markup Pricing Distortion and Noncompetitive Market Linkages," Southern Economic Association Meetings, Orlando, Florida, November 20 - 22, 1994.

Talked as a panelist on NAFTA and GATT at the Southeastern Economic Association Meetings, October 28 - 29, 1994.

"Trade Policy, Differentiated Products, and Monopolistic Competition," Western Economic Association International 67th Annual Conference, San Francisco, July 9-13, 1992.

"Monopolistic Competition, International Transmission, and the Effects of Aggregate Demand," Atlantic Economic Conference, Washington, D.C., October, 1991.

"Welfare and Intra-Industry Trade Wars," Western Economic Association International 66th Annual Conference, Seattle, Washington, June 29 - July 3, 1991.

"Export Promotion, Retaliation and Intra-Industry Trade in an Interdependent World Economy," the 3rd Annual Symposium on International Economic Competitiveness, Radford, Virginia, March, 1990.

Media Articles Publications

"Taiwan has over-invested in China." The Taipei Times, October 31, 2002.
"Rethinking investment in China." The Taipei Times, March 8, 2002.
"Economic reality and political ideologies." The Taipei Times, December 30, 2001.
"One Taiwan but two economies." The Taipei Times, August 17, 2000.
"Development needs action, not talk." The Taipei Times, February 17, 2000.
"Media should be fairer to the WTO." The Taipei Times, December 17, 1999.
"Don't be misled by the size of a country." The Taipei Times, November 18, 1999.
"U.S. losers? Yes, but winners, too." The Charlotte Observer, October 7, 1993.

Awards

1999 BarclaysAmerican Summer Research Award.
1997 BarclaysAmerican Summer Research Award.

Referee

Review of Economic Studies
Journal of Macroeconomics
International Economic Journal
Journal of International Trade and Economic Development
Journal of Economic Integration
Bulletin of Economic Research

Rob Roy McGregor

Department of Economics
Belk College of Business Administration
University of North Carolina at Charlotte
Charlotte, NC 28223
Phone 704-687-4121
Fax 704-687-6442
Email rrmcgreg@email.uncc.edu

Education

Ph.D. in economics, University of South Carolina, 1991.

Dissertation Title: Estimation of FOMC Reaction Functions Using Dissent Voting Data: Tests of Political Influence on Monetary Policy.

Master of Arts degree in economics, Clemson University, 1984.

Thesis Title: The Financing of the Unemployment Insurance System and the Interest Group Theory of Government.

Bachelor of Arts degree in economics with a minor in administration, Clemson University, 1982.

Work Experience

Associate professor of economics, University of North Carolina at Charlotte, since July 1, 1997. Assistant professor of economics, 1991-1997.

Courses Taught: Graduate Econometrics, Graduate Business and Economic Forecasting, Graduate Monetary Economics, Graduate Macroeconomic Theory, MBA-Level Macroeconomics, Business and Economic Forecasting, Intermediate Macroeconomics, Managerial Economics, and Principles of Macroeconomics.

Visiting associate professor of economics, Clemson University, 2000-2001.

Courses Taught: Intermediate Macroeconomics, Applied Time Series Analysis, Business Forecasting Techniques and Applications.

Graduate assistant in the Department of Economics, University of South Carolina, 1987-1991.

Courses Taught: Principles of Macroeconomics and Managerial Economics.

Lecturer in Economics, University of North Carolina at Charlotte, 1984-1987.

Courses Taught: Principles of Macroeconomics, Principles of Microeconomics, Consumer Economics, and Managerial Economics.

Research Associate for UNCC/First Union North Carolina Economic Forecast, 1985-1987.

Duties included collection of data, formulation of forecasts, preparation of written analysis, proofing of galleys, and organization of charts and other materials for Forecast press conferences.

Graduate research assistant in the Department of Economics at Clemson University, January-June 1983. Economics tutor for the Clemson University Athletic Department, May-June 1983.

Refereed Publications

"Optimal Annexation," co-authored with Gaines H. Liner. 2002. *Applied Economics* 34: 1477-1485.

"A Long History of FOMC Voting," co-authored with Henry W. Chappell, Jr. 2000. *Southern Economic Journal* 66: 906-922.

"Monetary Policy Preferences of Individual FOMC Members: A Content Analysis of the *Memoranda of Discussion*," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky. 1997. *Review of Economics and Statistics* 79: 454-460.

"FOMC Voting Behavior and Electoral Cycles: Partisan Ideology and Partisan Loyalty." 1996. *Economics and Politics* 8: 17-32.

"Institutions and the Market for Annexable Land," co-authored with Gaines H. Liner. 1996. *Growth and Change* 27: 55-74.

"Policymakers, Institutions, and Central Bank Decisions," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky. 1995. *Journal of Economics and Business* 47: 113-136.

"Partisan Monetary Policies: Presidential Influence Through the Power of Appointment," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky. 1993. *Quarterly Journal of Economics* 108: 185-218.

"The Barro-Grossman General Disequilibrium Model of Income and Employment: A Critique." 1989. *Studies in Economic Analysis* 12: 40-55.

"Financing the Unemployment Insurance System and the Interest Group Theory of Government," co-authored with Michael T. Maloney. 1988. *Public Choice* 56: 249-258.

Other Publications

Book review of Torsten Persson and Guido Tabellini, *Political Economics: Explaining Economic Policy* (Cambridge, MA: The MIT Press, 2000). *Public Choice* 108 (2001): 204-206.

"Economic Growth Among a Cross-Section of Municipalities," co-authored with Gaines H. Liner. *International Advances in Economic Research* 3 (November 1997): 424.

"Congress Threatens the Fed," co-authored with Thomas M. Havrilesky, Henry W. Chappell, Jr., and John Gildea. 1993. *Challenge: The Magazine of Economic Affairs* 36 (March/April): 50-57.

Publications Forthcoming

"Majority Rule, Consensus Building, and the Power of the Chairman: Arthur Burns and the FOMC," co-authored with Henry W. Chappell, Jr., and Todd Vermilyea. Forthcoming in the *Journal of Money, Credit, and Banking*.

Book review of William Bernhard, *Banking on Reform: Political Parties and Central Bank Independence in the Industrial Democracies* (Ann Arbor, MI: The University of Michigan Press, 2002). Forthcoming in *Public Choice*.

Papers Under Review

"Did Time Inconsistency Contribute to the Great Inflation? Evidence from the FOMC Transcripts," co-authored with Henry W. Chappell, Jr. Working paper, 2001. Revise-and-resubmit to *Economics and Politics*, in progress.

"Municipal Economic Growth, 1960-1990," co-authored with Gaines H. Liner. Working paper, 2002. Revise-and-resubmit to the *Quarterly Journal of Business and Economics*, in progress.

"Estimating Reaction Function Parameters for Individual Members of the FOMC," co-authored with Henry W. Chappell, Jr., and Todd Vermilyea. Working paper, 2002. Submitted to the *American Economic Review*.

Work in Progress

"Does the Fed Chairman Campaign for Reappointment?" Working paper, 2002.

Committee Decisions on Monetary Policy: Evidence from Historical Records of the Federal Open Market Committee, co-authored with Henry W. Chappell, Jr., and Todd Vermilyea. Under contract with The MIT Press.

Grant Reports

The Economic Impact of the Affiliated Members of the Charlotte Arts and Science Council, co-authored with John E. Connaughton.

The Economic Impact of an Alternative Economic Development Strategy on the Central Park Region of North Carolina, co-authored with John E. Connaughton.

Conference Presentations

Presented "Models of Monetary Policy Decision-Making: Arthur Burns and the Federal Open Market Committee," co-authored with Henry W. Chappell, Jr., and Todd Vermilyea, at the 1998 meeting of the Midwest Political Science Association in Chicago, Illinois.

Presented "Models of Monetary Policy Decision-Making: Arthur Burns and the Federal Open Market Committee," co-authored with Henry W. Chappell, Jr., and Todd Vermilyea, at the 1997 meeting of the Western Economic Association in Seattle, Washington.

Presented "Does the Fed Chairman Campaign for Reappointment?" at the 1996 meeting of the Western Economic Association in San Francisco, California.

Presented "Regions, Institutions, and Public Service Delivery," co-authored with Gaines H. Liner, at the 1995 meeting of the Western Economic Association in San Diego, California.

Presented "Monetary Policy Preferences of Individual FOMC Members: Evidence from the *Memoranda of Discussion*," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky, at the 1994 meeting of the Western Economic Association in Vancouver, British Columbia, Canada.

Presented "FOMC Voting Behavior and Electoral Cycles: Partisan Ideology and Partisan Loyalty," at the 1993 meeting of the Western Economic Association in Lake Tahoe, Nevada.

Presented "Policymakers, Institutions, and Central Bank Decisions," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky, at the 1993 meeting of the Western Economic Association in Lake Tahoe, Nevada.

Presented "Regions, Institutions, and Public Service Delivery," co-authored with Gaines H. Liner, at the 1993 meeting of the Mid-Continent Regional Science Association in Duluth, Minnesota.

Presented "Monetary Policy Preferences of Individual FOMC Members: Evidence from the *Memoranda of Discussion*," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky, at the 1993 meeting of the American Economic Association in Anaheim, California.

Presented "Monetary Policy Reaction Functions for Individual FOMC Members," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky, at the 1992 meeting of the Southern Economic Association in Washington, D.C.

Presented "Partisan Monetary Policies: Presidential Influence Through the Power of Appointment," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky, at the 1992 meeting of the Midwest Political Science Association in Chicago, Illinois.

Presented "Partisan Monetary Policies: Presidential Influence Through the Power of Appointment," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky, at the 1991 meeting of the Southern Economic Association in Nashville, Tennessee.

Presented "Partisan Monetary Policies: Presidential Influence Through the Power of Appointment," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky, at the 1990 meeting of the Western Economic Association in San Diego, California.

Other Presentations

Presented "Fed Chat: FOMC Transcripts and the Politics of Monetary Policymaking," co-authored with Henry W. Chappell, Jr., on the Economics Department's research seminar series, Clemson University, February 2001.

Presented "Municipalities, Economic Growth, and Convergence," co-authored with Gaines H. Liner, on the Economics Department's research seminar series, Clemson University, October 1999.

Presented "Models of Monetary Policy Decision-Making: Arthur Burns and the Federal Open Market Committee," co-authored with Henry W. Chappell, Jr., and Todd Vermilyea, on the Economics Department's research seminar series, Clemson University, October 1998.

Presented "Monetary Policy Preferences of Individual FOMC Members: Evidence from the *Memoranda of Discussion*," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky, at the University of North Carolina, March 1995.

Presented "FOMC Voting Behavior and Electoral Cycles: Partisan Ideology and Partisan Loyalty," at Duke University, October 1993.

Presented "Partisan Monetary Policies: Presidential Influence Through the Power of Appointment," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky, at the Federal Reserve Bank of Chicago, April 1992.

Presented "Partisan Monetary Policies: Presidential Influence Through the Power of Appointment," co-authored with Henry W. Chappell, Jr., and Thomas M. Havrilesky, at Clemson University, January 1992.

Departmental, College, and University Assignments

Member of the Graduate Council, University of North Carolina at Charlotte, 2002-2003.

Member of the econometrics examination committee, Department of Economics, Clemson University, 2000-2001.

Member of the Personnel Committee, Department of Economics, University of North Carolina at Charlotte, 1997-1998.

Member of the Search Committee for a new Chair of the Department of Economics, University of North Carolina at Charlotte, 1997.

Member of the Advisory Committee for the Master of Science Program in Economics, University of North Carolina at Charlotte, 1991-2000, 2001-2003; Committee chairman, 1994-2000, 2001-2003.

Member of the Graduate Affairs and Research Committee, Belk College of Business Administration, University of North Carolina at Charlotte, 1995-1997, 1999-2000, and 2001-2003; chairman of subcommittee on assessment, 1996; member of subcommittee on grant proposals, 1996-1997 and 1999-2000; member of subcommittee on the MBA program, 2001-2002.

Member of the Council on General Education, University of North Carolina at Charlotte, 1995-1997.

Member of Faculty Council, University of North Carolina at Charlotte, 1992-1993 and 1997-1998.

Coordinator for Lecturers in Economics, University of North Carolina at Charlotte, 1992-1993.

Member of the Publications Committee, Department of Economics, University of North Carolina at Charlotte, 1986-1987.

Lecturer's representative on the Personnel Committee, Department of Economics, University of North Carolina at Charlotte, 1985-1987.

Continuing Professional Education

Presented two modules, Basic Macroeconomics and The Federal Reserve and U.S. Monetary Policy, for training programs conducted by First Union's Capital Management Group, August 31 and September 4, 1998; September 21 and 25, 1998; and February 23 and 25, 1999.

Presented a module on The Federal Reserve and U.S. Monetary Policy for the Continuing Professional Education for Accountants program, November 12, 1997; December 2, 1998; and November 17, 1999.

Presented a module on The Federal Reserve and U.S. Monetary Policy for NationsBank CPAs, April 16, 1997.

Presented a module on Financial Markets for a training program for NationsBanc Advisors, February 19, 1997.

Other Professional Activities

Served as a reviewer for *American Journal of Political Science*; *Contemporary Economic Policy*; *Economic Inquiry*; *Economics and Politics*; *Journal of Macroeconomics*; *Journal of Money, Credit, and Banking*; *Public Choice*; *Southern Economic Journal*; and *Studies in Economics and Finance* (formerly *Studies in Economic Analysis*).

Chairman of the thesis committees of Patrick Rishe, Ann M. Poovey, and Matthew Birmingham, University of North Carolina at Charlotte.

Member of the thesis committees of Thor Sigfusson, Michael Rife, Sing Heng Ho, Jacqueline Howard, Jack O'Reilly, Nana Baffour-Gyewu, Jialing Wilson, and Christopher Bell, University of North Carolina at Charlotte.

Member of the examination committee for Shana Dardan, PhD student in Information Technology, University of North Carolina at Charlotte, 2001.

Member of the editorial board of *Studies in Economic Analysis*, 1991-1995.

Served as a reviewer for the fourth edition of *Business Forecasting* by J. Holton Wilson and Barry Keating; the second edition of *Principles of Economics* by John B. Taylor; *Principles of Economics* by N. Gregory Mankiw; *Intermediate Macroeconomics* by David J. Smyth; and the fourth edition of *Principles of Economics* by Ryan C. Amacher and Holley H. Ulbrich.

Member of the American Economic Association, the Southern Economic Association, the Western Economic Association, the National Association for Business Economics, and the Charlotte Economics Club.

Funded Research

Received a grant for studying "The Economic Impact of the Affiliated Members of the Charlotte Arts and Science Council" (co-principal investigator John E. Connaughton, University of North Carolina at Charlotte), 2000. This grant was funded by the Charlotte Arts and Science Council.

Received a grant for studying "The Central Park Vision for the Uwharrie Lakes Region of North Carolina" (co-principal investigator John E. Connaughton, University of North Carolina at Charlotte), 1998-1999. This grant was funded by the North Carolina Zoological Park, the Yadkin/Pee Dee Lakes Project, and the Uwharrie Capital Corporation.

Received a grant for studying "Optimal Sampling Plans in Commercial Bank Loan Review and Credit Analysis Activities," (co-principal investigator Tony Plath, University of North Carolina at Charlotte), 1998-2000. Funded by a grant from the North Carolina State Commissioner of Banks.

Received a National Science Foundation grant for "More Collaborative Research on Politics and Monetary Policy: Evidence from Individual FOMC Members' Reaction Functions" (co-principal investigators Henry W. Chappell, Jr., University of South Carolina, and Thomas M. Havrilesky, Duke University), 1995-1997.

Received a UNC Charlotte Faculty Research Grant for study of "Economic and Political Influences on Individual FOMC Members: Evidence from the *Memoranda of Discussion*," 1994.

Post-doctoral researcher on National Science Foundation grant for research on "Politics and Monetary Policy: Evidence from Individual FOMC Members' Reaction Functions" (principal investigators Henry W. Chappell, Jr., University of South Carolina, and Thomas M. Havrilesky, Duke University), 1992-1994.

Honors

Recipient of the 1998 Distinguished Scholarship Award, Belk College of Business Administration, University of North Carolina at Charlotte.

Named Outstanding Graduate Teacher of the Year for 1996-1997 and for 1999-2000, Department of Economics, University of North Carolina at Charlotte.

Member of Omicron Delta Epsilon, Beta Gamma Sigma, and Phi Kappa Phi.

STANISLAV RADCHENKO
University of North Carolina
Department of Economics

Address: 9201 University City Blvd.
Charlotte, NC 28262
Office Telephone: (704) 687-6157
E-mail: sradchen@email.uncc.edu

Education:

M.A.: Economics Department, Rutgers University, New Brunswick, NJ, 2000

Ph.D.: Economics Department, Rutgers University, New Brunswick, NJ, 2002

B. A.: Donetsk State Academy of Management, Donetsk, Ukraine, 1998

Professional Experience:

2002-present **Assistant Professor of Economics**
Department of Economics, University of North Carolina at Charlotte

Publications:

"A Bayesian Approach to Decomposing Wage Differentials" (joint with Myeong-Su Yun), *Economics Letters,* forthcoming

"A Bayesian Test of Stationarity in a Regression Model with an ARMA Error Term" (joint with Elena Goldman, Teruo Nakatsuma and Hiroki Tsurumi), *American Statistical Association 2001 JSM Proceedings*

Working Papers

"The response of gasoline prices to changes in crude oil prices: asymmetry and lags" December 2002

"Limited Information Bayesian Analysis of a Simultaneous Equation with an Autocorrelated Error Term and its Application to the U.S. Gasoline Market" (joint with Hiroki Tsurumi), March 2002

"Oil Stock Management and Futures Prices. Empirical Analysis." (joint with Salah Abosedra), October 2002

"A new Test for Money Supply Volatility Hypothesis", October 2001

"Bayesian Tests of Cointegration in the framework of ECM model", August 2001

"A Bayesian Test of Seasonal Unit Root in a Regression Model with an ARMA or ARMA-GARCH Error Term" (joint with Elena Goldman, Teruo Nakatsuma and Hiroki Tsurumi), September 2001

Professional Activities:

Member: International Society for Bayesian Analysis, The Econometric Society, A American Economic Association

Referee: Communication in Statistics, Journal of Empirical Finance

Conference Presentations:

"Limited Information Bayesian Analysis of a Simultaneous Equation with an Autocorrelated Error Term and its Application to the U.S. Gasoline Market" Valencia Bayesian Statistics Meetings 7, Tenerife, Spain, June 2002

"A Bayesian Test of Stationarity in a Regression Model with an ARMA-GARCH Error Term" ISBA Regional Meeting, Laguna Beach, California, January 2001 (presented by coauthor)

Curriculum Vitae

Benjamin Russo

Economics Department
University of North Carolina at Charlotte
9201 University City Blvd.
Charlotte NC 28223

Office: (704) 687-4137
Home: (704) 847-4566
brusso@email.uncc.edu

Education

Ph.D., Economics, The University of Iowa, May 1985.
B.A., Philosophy, State University of New York at Stony Brook, August 1974.

Employment

1992-present, Associate Professor of Economics, University of North Carolina at Charlotte.
1985-1992, Assistant Professor of Economics, University of North Carolina at Charlotte.
1984-1985, Lecturer, University of North Carolina at Charlotte.
1982-1983, Instructor, The University of Iowa.

Refereed Publications

"Interest-Sensitive Wealth and the Life-Cycle Hypothesis: Implications for Fiscal Policy," 2003, with J. Gandar, 2003, Quarterly Review of Economics and Finance, 43.

"Taxes, the Speed of Convergence, and Implications for Welfare Effects of Fiscal Policy," 2002, Southern Economic Journal, 69, 444-56.

"Growth Effects of Capital Income Taxes: How Much Does Endogenous Innovation Matter?" 2002, with H. Lin, Journal of Public Economic Theory, 4, 613-40.

"A Taxation Policy Toward Capital, Technology and Long-run Growth," 1999, with H. Lin, Journal of Macroeconomics, 21, 463-92.

"Testing Efficiency in Gambling Markets," 1993, with J. Gandar and R. Zuber, Applied Economics, 25, 937-43,

"Stochastic Inflation and Demand for Nominal Assets," 1992, with R. Tiwari, Atlantic Economic Journal, 20, 40-7.

"An Analysis of Stability in a Keynesian Economy with Ricardian Consumers," 1992, Studies in Economic Analysis, 14, 49-69.

"Market Rationality Tests Based on Cross-Equation Restrictions," 1989, with J. Gandar and R. Zuber, Journal of Monetary Economics, 24, 445-70.

"Testing Rationality and the Point Spread Betting Market," 1988, with J. Gandar, R. Zuber, and T. O'Brien, Journal of Finance, 43, 995-1008.

"Bayesian Estimation of Inflation Expectations and Uncertainty," 1988, Journal of Economics, 13, 74-79.

Revise and Resubmit

"A Cost-Benefit Analysis of R&D Tax Incentives," August 2002, Canadian Journal of Economics.

Abstract

"Market Rationality Tests Based on Cross-Equation Restrictions," 1990, with J. Gandar and R. Zuber, Journal of Economic Literature, XXXVIII, 998-9.

Other Publications

"Report on Research into Proposed Solutions to Sales and Use Tax Conundrums," 11/4/02, State Tax Notes, 331-336.

"Higher Retail Sales Tax Would be Bad for North Carolina," 4/25/01, Charlotte Observer.

"Why it's Hard to Predict Growth," 4/99, Charlotte Observer.

"Deficit Deja vu (All Over Again)," 4/3/95, Business Journal.

Government Consulting and Commissions

Department of Finance, Federal Government of Canada, Summer 2001
Governor's Commission to Modernize State Finances, North Carolina, February-December 2002
Chair, New Economy Subcommittee, Governor's Commission…, February-December2002

Government Reports

"Report on North Carolina State Revenue Shortfalls and Budget Stabilization Funds, June 2002, prepared for Commission to Modernize State Finances.

Working Papers

"State and Local Tax Bases at Risk: A Computer Analysis of Suggested Reforms."

"Should General Sales Taxes be Expanded or Replaced? A Welfare Analysis of a Taxing Dilemma," with E. Taylor.

"The Elasticity of Taxable Income and the Revenue-maximizing Tax Rate."

Selected Presentations

"A Cost-benefit Analysis of R&D Tax Incentives focused on Canada and the U.S.," 2001, seminar, Department of Finance, Federal Government of Canada, Ottawa, Canada.

"Tax Rates and Tax Revenue Revisited: An Innovation-based Analysis of Supply-side Economics," 2000, conference presentation, Western Economic Association International, Vancouver, British Colombia.

"Interest Rate-Induced Wealth Effects," 1992, seminar, Fordham University Economics Department.

"Interest Rates and Consumption: Theory and Evidence," 1991, Macroeconomics Workshop, North Carolina State University.

Referee

Economica, Economic Inquiry, Energy Journal, Journal of Macroeconomics, Journal of Economic Growth, Quarterly Journal of Business and Economics, Southern Economic Journal

Masters Theses

J. Howard, 1996, "Fiscal Policy and the Capital-Labor Ratio."
S. Ho, 1995, "Ricardian Equivalence, Macroeconomic Theory, and Tests of the 'Twin Deficits.'"
M. Rife, 1994, "The Method of Moments, Lucas's Critique, and Capital Asset Pricing Models."

Graduate Teaching

Advanced Macroeconomics (MS program in economics)
Economics of Public Policy (Ph.D. program in public policy)
Time Series and Forecasting (MS program in economics)

Professional Associations

American Economic Association
National Tax Association
Southern Economic Association

JENNIFER L. TROYER

Personal:
Assistant Professor of Economics and Health Administration
The Belk College of Business Administration
University of North Carolina at Charlotte
9201 University City Boulevard
Charlotte, NC 28223-0001
Phone: (704) 687-3721
FAX: (704) 687-6442
E-Mail: jtroyer@email.uncc.edu
Website: http://www.uncc.edu/jtroyer

Education:

Ph.D., Economics, Florida State University, Tallahassee, FL, Summer 1999
Fields of Specialization: Health, Industrial Organization, Labor
Dissertation: "The Impact of Regulatory Measures on Nursing Home Quality, Costs, and Access"
M.S., Economics, Florida State University, Tallahassee, FL, Spring 1996
B.B.A., Economics, University of Memphis, Memphis, TN, Spring 1993
Graduated Summa Cum Laude with Honors in Business

Publications and Work in Progress:

"Affirmative Action, Political Representation, Unions, and Female Police Employment." (with Tim R. Sass) 20 *Journal of Labor Research* 571-587 (Fall 1999).
"Cross-Subsidization in Nursing Homes: Explaining Rate Differentials Among Payer Types." 68 *Southern Economic Journal* 750-773 (April 2002).
"Decomposing the Effect of Marital Status on Migration" 9 *Applied Economics Letters* 641-644, (August 2002).
"The Effect of Price Regulation on Innovation in the Pharmaceutical Industry," (with Alexander Krasnikov) 18 *Journal of Applied Business Research* 87-96 (Fall 2002).
"The Impact of Litigation on Nursing Home Quality" (with Herb Thompson) *Journal of Health Politics, Policy and Law*, conditionally accepted for publication and forthcoming.
"Why Are Medicaid Residents More Likely to Die in the Nursing Home? Explaining Differences in Death Rates for Medicaid and Non-Medicaid Residents," under review, January 2003.
"Medicaid Enrollee Switching Among Managed Care Plans" (with Bill Brandon, Raji Sundaram, Yanqing Sun, Nancy Schoeps, and Besty Walsh), working paper, November 2002.
"Determinants of Emergency Room Utilization for Children in Medicaid HMOs and SCHIP FFS Plans" (with Todd Nicholson and Bill Brandon) working paper, January 2003.
"Supply Regulation and Price Markups in the Nursing Home Industry" work in progress.

Conference Presentations:

"Medicaid Enrollee Switching Among Managed Care Plans" (with Bill Brandon, Raji Sundaram, Yanqing Sun, Nancy Schoeps, and Besty Walsh). Presented at the Southern Economic Association Meetings, New Orleans, LA, November 2002.

"The Impact of Litigation on Nursing Home Quality" (with Herb Thompson). Presented at the Southern Economic Association Meetings, Washington, D.C., November 2000, and at the American Public Health Association Conference, Atlanta, November 2001.

"Cost Shifting In Nursing Homes: Explaining Rate Differentials Among Payer Types." Presented at the American Economic Association Meetings, Boston, January 2000.

"Affirmative Action, Unions, and Female Employment in Protective Service Occupations" (with Tim R. Sass). Presented at the Public Choice Society Meetings, New Orleans, March 1998.

Honors and Grants:

Awarded Georgescu-Roegen Prize for best paper published in the Southern Economic Journal during the year 2001-2002 (volume 68).

Principal Investigator (with Jim McAuley) on a proposal funded by the Administration on Aging, Department of Health and Human Services, October 2002 – September 2004. "The SOS Nutrition Project: MNT and Therapeutic Meals for Homebound Seniors with Three Chronic Diagnoses." Award amount: $928,000, with $396,000 for UNC Charlotte.

Co-Investigator on a proposal submitted to the National Human Genome Research Institute, National Institutes of Health, Department of Health and Human Services, requested for July 2003 – June 2006. "Group Differences in Predictive Models of Behavior." Requested amount: $1,162,611.

Faculty Research Support Grant, UNC Charlotte, awarded for academic year 2001-2002.

Junior Faculty Summer Research Fellowship, UNC Charlotte, 2001, 2002.

Childress Klein Research Fellowship, The Belk College of Business Administration, UNC Charlotte, 2000.

Principal Investigator, Dissertation Fellowship Grant, U.S. Department of Health and Human Services, Health Care Financing Administration, 1998, $21,580.

Teaching Experience:

Graduate Econometrics, MS in Economics program, University of North Carolina at Charlotte (Fall 2002).

Finance in Healthcare Administration, MHA program, University of North Carolina at Charlotte (Fall 1999, Fall 2000, Fall 2001, Fall 2002).

Health Economics, University of North Carolina at Charlotte (Spring 2000, Spring 2001, Spring 2002, Spring 2003).

Economics of Health Policy, MHA program, University of North Carolina at Charlotte (Spring 2000, Spring 2001, Spring 2002, Spring 2003).

Principles of Microeconomics, University of North Carolina at Charlotte (Fall 1999, Fall 2000, Fall 2001) and Florida State University (Summer 1996-Fall 1996).

Money, Banking, and Monetary Policy, Florida State University (Spring 1997).

Principles of Macroeconomics, Florida State University (Summer 1995-Spring 1996).

University, College, and Departmental Service:

Committee to Revise the Journal Rankings List in the Department of Economics. Fall 2000 to Present.

Undergraduate Major Recruitment Committee in the Department of Economics. Fall 2001 to Present.

Health Services Research Academy. General Member Fall 1999 to Spring 2001. Executive Committee Summer 2001 to Present.

Admissions Committee for the Master of Health Administration Program. Summer 2001 to Present.

Committee on Health Policy Specialization in the Ph.D. in Public Policy. Summer 2001 to Present.

Faculty Advisor for student in the health concentration the Ph.D. in Public Policy program. Summer 2001 to Present.

Search Committee for an Assistant Professor for the Master of Health Administration Program. Fall 2000 to Spring 2001 and Spring 2002.

Study on Relative Market Salaries by Discipline and Rank. Commissioned by Chancellor Woodward and Provost Trauth. Spring 2000 to Spring 2002.

Guest lecturer on the topic of Health Economics, for Dr. Jackie Dienemann's NURS 6115 course in March 2002, September 2002, September 2003.

Guest lecturer on the topic of Health Economics, for Dr. Jane Neese's NURS 6115 course in October 2001.

Guest lecturer on the topic of Health Economics, for Dr. Peggy Wilmoth's NURS 6115 course in October 1999, March 2000, October 2000.

Search Committee for a Director of the Master of Health Administration Program. Fall 2000 to Fall 2001.

Gender Equity in Faculty Salaries Study (with John Gandar). Commissioned by Chancellor Woodward and Provost Trauth. Spring 2000 to Spring 2001.

Arts and Science Council Campaign Coordinator for the Department of Economics. Spring 2001, Spring 2002.

Public Service:

Featured speaker at the monthly meeting of the Central Piedmont Chapter of the American Society for Public Administration on the topic of Rising Health Care Costs, February 2002.

Referee for the *Southern Economic Journal*. Spring 2001.

Charlotte Mecklenburg Council on Aging, Fall 1999 to Summer 2000. Presented a seminar and at the Council on Aging Forum entitled, "Caregiving Issues in the Workplace." Developed related materials for distribution by the Council.

Guest, WFAE's Charlotte Talks Program, May 2000.

Member of American Economic Association, Southern Economic Association, International Health Economics Association, American Public Health Association, Committee on the Status of Women in the Economics Profession.

VITA

RICHARD A. ZUBER
Professor of Economics

Education:

Ph.D., University of Kentucky (Economics), 1978
M. A., University of Kentucky (Economics), 1976
B. A., Wake Forest University (Economics), 1974

Personal:

Date of Birth: December 20, 1952
Place of Birth: Aberdeen, Maryland

Professional Experience:

Teaching Experience

University of North Carolina at Charlotte, 1978 - present
Lecturer, 1978 - 1979
Assistant Professor, 1979 - 1982
Associate Professor, 1982 - 1988
Full Professor, 1988 - present

University of Kentucky, 1976 - 1977
Teaching Fellow, 1976 - 1977

University and Community Service:

University Service:

Department - Department of Finance and Business Law Personnel Committee, 1995-96
Community Relations Committee, 1993 - 1998
Long Run Planning Committee, 1980 - 1996
Personnel Committee, 1983 – 1999, 2000 - 2002 (Chair, 1990 – 1998; 2000-2002)
Journal Feasibility Committee, 1986 – 1991
Coordinator, Department of Economics Seminar Series, 1998 – present
Coordinator, Department of Economics Annual Alumni Reception, 1998 – present
Masters Advisory Committee, 1998 – present
Journal Rankings Committee, Chair, 2000-2002
Department of Economics Recruiting Majors Committee, 2001-2002

College - Promotion and Tenure Committee, 1979 - 1983, 1984 - 1986, 1988 - 1990
Undergraduate Affairs Committee, 1995 - 1997
Self-Study Committee, 1980 - 1981
Faculty Grants Committee, 1985 – 1986
Search Committee for the Chair of the Department of Economics, 1999 – 2000
Belk College Nominations, Chair, 2000- 2002
Belk College Celebration Committee, Chair, 2001-2002

University - Faculty Academic Policy and Standards Committee (FAPSC), 1978 - 1980
FAPSC Sub-Committees on Student Disruption and Student Withdraw Policy, 1978 - 1980
Group Conversation on the Future of the University committee, 1984 - 1985
Alternate to Faculty Advisory Library Committee, 1982 - 1989
Assistant Soccer Coach, 1981 - 1995
Chi Phi Fraternity Advisor, 1986 - 1994
Faculty Associate, 1990 - 1991
Dean's Search Committee for Belk College of Business Administration, 1993
Library Serials Cancellation Committee, 1995 - 1996
Search Committee for Dean of the Belk College of Business Administration, 1999 – 2000
First Citizens Bank Scholar Medal Committee, 2001-2002
University Homecoming Committee, 2001-2002
Faculty Advisor to Orthodox Christian Fellowship, 2001-2002

Community Service:

Volunteer Work - Coordinator (1 of several) of the UNCC - McDonald's Youth Soccer Tournament, 1984 - 1995
Assisted in the 1986 UNCC Golf Scholarship Tournament
Assisted in the 1983 Basketball Season Ticket Drive
League Secretary for the Myers League of the Charlotte - Mecklenburg Parks and Recreation Softball, 1982 - 1985, 1987 -1990
Coaches' Committee, Charlotte-Mecklenburg Parks and Recreation, 1993 – present
Team Captain for the American Heart Association Heart Walk, 1999-2002

Talks and Workshops Conducted - "Economics for Public School Teachers" to Gaston County Teachers, 1985
"Tradeoffs" to Charlotte - Mecklenburg County Teachers, 1984
Training Session on International Economics to business reporters of the Charlotte Observer

Consulting Activities - Battelle Columbus Laboratories and Chemical Systems Laboratory, January 1, 1981 - June 1, 1981

Publications and Research:

1. Chapters in Books - A reprint of a 1985 JPE article in Sportometrics edited by Brian L. Goff and Robert D. Tollison, Texas A&M University Press, 1990.

2. Articles in Refereed Journals

* "Kentucky Food Price Trends," with J.B. Marshall, Public Affairs Analyst, Vol. 3, No. 1, 1976, pp. 3 - 6.

* "International Currency Cocktails - Their Development and Use," with R. Stafford Johnson, Journal of Economics, 1979, pp. 46 - 51.

* "Model for Constructing Currency Cocktails," with R. Stafford Johnson, Business Economics, Summer 1979, pp. 9 - 14.

* "International Currency Cocktails - Their Development, Use and Construction, with R. Stafford Johnson, International Review of Economics and Business, Summer 1979, pp. 925 - 943.

* "Currency Cocktails and Exchange Rate Stability," with R. Stafford Johnson, Columbia Journal of World Business, Winter 1979, pp. 117 - 126.

* "International Adjustment Cost Model," with R. Stafford Johnson, Journal of Economics, 1980, pp. 117 - 120.

* "Currency Cocktail Diversification and the Reduction of Exchange Rate," with R. Stafford Johnson, Atlantic Economic Journal, September 1980, pp. 67.

* "An Economic Assessment of Natural Gas Supplies," with R. Stafford Johnson, Midsouth Journal of Economics, Vol. 5, No. 3, December 1981, pp. 27 - 40.

* "An Input-Output Portfolio Analysis Approach to the Measurement of Industrial Diversification and Stability," with R. Stafford Johnson and Gary Fleming, Midsouth Journal of Economics, Vol. 6, No. 3, December 1982, pp. 521 - 527.

* "Toward Determining a Model for State Surplus Funds," with R. Stafford Johnson, Journal of Economics, Vol. 7, 1981, pp. 107 - 119.

* "The Short Run Demand for Major League Baseball," with James R. Hill and Jeff Madura, Atlantic Economic Journal, Vol. X, No. 2, July 1982, pp. 31 - 35.

* "The Economic Cost of Correcting External Imbalances," with R. Stafford Johnson, International Review of Economics and Business, Vol. 31, No. 3, March 1984, pp. 193 - 210.

* "The Construction of International Currency Cocktails-An Argument for the Use of the Markowitz Portfolio Model," with R. Stafford Johnson, American Economist, Vol. 28, No. 1, Spring 1984, pp. 69 - 74.

* "An Econometric Analysis of NFL Point Spreads," with John M. Gandar and Benny D. Bowers, Midsouth Journal of Economics, Vol. 9, No. 3, December 1985, pp. 241 - 248.

* "Beating the Spread: Testing the Efficiency of the Gambling Market for National Football League Games," with John M. Gandar and Benny D. Bowers, Journal of Political Economy, Vol 93, No. 4, 1985, pp. 800 - 806.

* "An Investigation into Currency Options and Market Efficiency," International Review of Economics and Business, with R. Stafford Johnson and David Loy, Vol. 33, 1986, pp. 1007 - 1093.

* "A Reexamination of the Effect of Lifting the Television Blackout on No-Shows of Professional Football Games," with John M. Gandar, Atlantic Economic Journal, June 1988, Vol. XVI, No. 2, pp. 63 - 73.

* "Testing Rationality in the Point Spread Betting Market," with John M. Gandar, Tom O'Brien, and Benjamin Russo, Journal of Finance, No. 43, June 1988, pp. 995 - 1008.

* "The Investment Performance of Common Stocks in Relation to Their Price-Earnings Ratios: An Update of the Basu Study," with R. Stafford Johnson and Lyle C. Fiore, Financial Review, August 1989, Vol. 24, No. 3, pp. 499 - 505.

* "Market Rationality Tests Based on Cross-Equation Restrictions," with Benjamin Russo and John M. Gandar, Journal of Monetary Economics, No. 24, 1989, pp. 455 - 470.

* "Foreign Currency Options: Ex Post and Ex Ante Market Efficiency Tests," with R. Stafford Johnson and John M. Gandar, Southern Business Review, Vol. 16, No. 1, Spring 1990, pp. 9 - 24.

* "A Note on the Investment Performances of Different Price-Earnings Stocks," with R. Stafford Johnson, International Review of Economics and Business, Vol. 35, 1991, pp. 1067 - 1074.

* "Scale and Location Tests in Foreign Exchange Markets," with R. Stafford Johnson and Carmelo Giaccotto, Journal of Economics and Business, August - October 1993, No. 45, No.3, pp. 285 - 296.

* "Testing Efficiency in Gambling Markets: A Comment," with John M. Gandar and Ben Russo, Applied Economics, Vol. 25, No. 7, July 1993, pp. 937 - 943.

* "Athletics versus Academics: Testing the Relationship between Football Success and Football Player Graduation Rates in the NCAA" with John M. Gandar, Louis Amato and Irvin Tucker, Economics of Education Review, Vol. 15, No. 2, 1996, pp. 187 - 195.

* "Informed Traders and Price Variations in the Betting Market for Professional Basketball Games," with Craig Brown, Bill Dare, and John Gandar, Journal of Finance, Vol. 53, No. 1, 1998.

* "The Impact of Investor-Fan Ownership on the Value of Publicly Traded Sports Franchises: The Case of the Boston Celtics," with Reinhold Lamb, Lawrence Blose, and John Gandar, Academy of Accounting and Financial Studies Journal, Vol. 3, No. 1, pp. 1-15, February, 1999.

* "Looking for Informed Traders in the Totals Betting Market for NBA Games," with John Gandar and William Dare, Journal of Sports Economics, Vol. 1, No. 2, pp. 170-179, May, 2000.

* "The Impact of Proposition 48 on The Relationship Between Bowl Appearances and Football Player Graduation Rates," with Louis Amato and John Gandar, Journal of Sports Economics, Vol. 2, No. 2, May, 2001, pp. 101-112.

* "The Home Field Advantage Revisited: A Search for the Bias In Other Sports Betting Markets, with John Gandar and Reinhold Lamb, Journal of Economics and Business, Vol. 53, No. 4, July-August, 2001, pp. 439-453.

* "Searching for the Favorite-Longshot Bias Down Under: An Examination of the New Zealand Pari-Mutuel Betting Market," with John Gandar and Stafford Johnson, Applied Economics, Vol. 33, No. 13, October, 2001, pp. 1621-1629.

* "Binomial Interest Rate Trees: A Synopsis of Uses and Estimation Approaches," with John Gandar and Stafford Johnson, Journal of Financial Education, Vol. 27, Fall, 2001, pp. 53-75.

* "Mortgage-Backed Securities: A Synopsis," with John Gandar and R. Stafford Johnson, International Review of Economics and Business, Vol. 49, No. 4, December, 2002, pp. 463-489.

* "Reexamining the Betting Market on Major League Baseball Games: Is There a Reverse Favorite-Longshot Bias?" with John Gandar, R. Stafford Johnson, and William Dare, Applied Economics, Vol. 34, No. 10, July, 2002, pp. 1309-1317.

3. Papers Presented

American Economic Association Annual Meeting, 1986
Southern Economic Association Annual Meeting, 1979, 1980, 1983, 1984, 1986, 1987, 1990
Western Economic Association Annual Meeting, 1979, 1980, 1984, 1985
Missouri Valley Economic Association Annual Meeting, 1980, 1981, 1983, 1987, 1988
Atlantic International Economic Association Annual Meeting, 1980
Atlantic Economic Association Annual Meeting, 1980
Midsouth Academy of Economists Annual Meeting, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989
Midwestern Economic Association Annual Meeting, 1981, 1986, 1988
Midwestern Finance Association Annual Meeting, 1986
Financial Management Association Annual Meeting, 1985, 1987, 1996, 2002
Midwestern Business Administration Association Annual Meeting, 1983
Midwest Academy of International Business, 1984
Mid-Continent Regional Sciences Association Annual Meeting, 1982
National Decision Sciences Institute National Meeting, 1988
Eastern Finance Association National Meeting 1990 (two papers), 1991, 1992, 2001
Southern Finance Association Annual Meeting, 1986, 1992, 1993, 1994, 1996, 1997, 1999, 2001, 2002
Allied Academies International Conference, 1998, 1999, 2002
International Equine Industry Academic Conference, 1999, 2001
American Society of Business and Behavioral Sciences Annual Meeting, 2001, 2002

4. Manuscript Submissions

. "Don't Lose Sleep On It: A Reexamination of the Daylight Savings Time Anomaly," with

John Gandar and Reinhold Lamb, submitted to *Applied Economics.*

"An Examination of the Source of Informed Trader Information in the College Football Betting Market," with Bill Dare and John Gandar, submitted to *The Journal of Economics and Business*.

"Investor Fans? An Examination of the Performance of the Publicly Traded English Premier League Teams," with Patrick Yiu, Reinhold Lamb and John Gandar, submitted to *Financial Review*.

5. Manuscripts in Progress

"Reconsidering the Efficiency of the Point Spread Betting Market on NFL Games," with John Gandar and William Dare.

"Are Bookmakers Risk Averse? An Analysis of Betting Lines in the NBA Betting Market," with Jason Abrevaya and John Gandar.

"Do Variations in the Size of the Win Pool and Track Takeout Explain the Favorite-Longshot Bias?" with John Gandar and R. Stafford Johnson.

"A Natural Experiment on the Relationship between Weather, Production and Asset Prices: The 'Totals' Betting Market on Professional Football Games," with John Gandar.

"An Analysis of the Impact of Parity Based Scheduling in the National Football League," with John Gandar and Lou Trosch, Sr.

"Efficiency in the Betting Market on National Hockey League Games: A Revision and Update," with William Dare and John Gandar.

"Testing for Non-Random Streaks in the Betting Market on Professional Basketball Games," with William Dare and John Gandar.

6. Funded Research

An Application of Box-Jenkins to Currency Cocktail Construction, UNCC, 1981

Using the PC in Economics - A Faculty Development Grant, UNCC Department of Economics and the UNCC First Union Econometric Model, 1983, $900

Economics of Sports Research, UNCC College of Business Administration, 1985, $1,750

Impact of 1979 Monetary Policy Act on Exchange Rates, UNCC, 1986, $1,750

Testing Efficiency in the Foreign Currency Options Market, UNCC Faculty Reassignment Duties, 1985-86, $-N/A

A PC Toolkit for Economics Majors, with Gaines H. Liner, UNCC CID Grant, 1990, $1,425.

Is Bigger Better or At Least as Good: An Analysis of Large-Size Classes in the Belk College of Business Administration, with John Gandar, UNCC Curriculum and Instructional Grant, 2000, $2,850.

The Behavior of Stock Returns Around IPO Lockup Expirations, Barclays American Grant, 2001, $4,500.

Student Manual for Econometric Diagnostic Techniques, with Gaines Liner, Belk College Johnson Award for Teaching Research and Development, 2002, $2,500.

Honors and Awards:

Distinguished Research Award for Best Paper in Economics, with John Gandar, Allied Academies International Conference, 1999.

Dissertation Year Fellowship, University of Kentucky, 1977-78

Teaching Fellow, University of Kentucky, 1976-77

Professional Affiliations:

American Economic Association
Southern Economic Association
Western Economic Association
Atlantic Economic Association
Eastern Finance Association
Southern Finance Association
Southwest Finance Association
Financial Management Association

Appendix C

Catalog Copy

MATHEMATICAL FINANCE

Mathematical Finance Program Office
349 Friday Building
704-687-2063
http://www.uncc.edu/mathfinance
mathfinance@email.uncc.edu

Program Director
Dr. Richard Buttimer
340B Friday Building
704-687-6219
buttimer@email.uncc.edu

Degree
Master of Science in Mathematical Finance

Program of Study

The Master of Science in Mathematical Finance program is designed to prepare graduates for a career or further research in an ever-expanding part of the financial sector. Today the principles of finance are being combined with advanced mathematical structures to form useful financial products, strategies, and models that are tested and implemented with the use of advanced quantitative techniques. These products are an integral part of the overall financial activity in several areas: financial instrument development and usage; investment; and risk analysis.

The curriculum spans five disciplines: Financial Economics and Econometrics; Statistics; Stochastic Processes; Numerical/Optimization Methods; Computational and Empirical Finance.

The program is designed for graduates in mathematics, engineering, business, economics, and finance with strong mathematical background who wish to pursue high-tech careers in the financial industry or the government.

The program in Mathematical Finance requires the successful completion of 30 hours of graduate-level course work. Electives can be selected to orient the graduate for a career in the retail and management sectors of the financial services industry, or for the product development, pricing, and risk analysis sector of the industry. Depending upon their background, students in the program are housed in one of three departments: the Department of Finance and Business Law, the Department of Economics, or the Department of Mathematics.

Additional Admission Requirements for the Program

In addition to the general requirements for admission to the Graduate School, the following are required for admission to the Master of Science in Mathematical Finance program.

1. A baccalaureate degree in a related field with a GPA of at least 2.75 out of 4.0 with an average of 3.0 in the junior and senior years.
2. Acceptable scores on each portion of the GRE, or a GMAT score of at least 600, with a

minimum score of at least the 85th percentile on the math portion of the GMAT.

3. For applicants from non-English speaking countries, a language requirement score of 550 on the TOEFL or 220 on the new computer-based TOEFL or 85% on the MELAB. Non-native speakers of English, may, at the discretion of either the Graduate School or the Program Committee for the M.S. in Mathematical Finance, be required to enroll in English as a Second Language (ESL) courses at the English Language Training Institute.
4. Specific course work equivalent to the following: introductory course in the Theory of Finance; a standard three-semester sequence in Calculus; Linear Algebra; working knowledge of a suitable programming language; at least one upper-level course in Probability and Statistics. Students lacking this coursework may be admitted subject to the condition that they satisfactorily complete such coursework during the first two semesters that they are enrolled in the program and prior to their taking any program courses where prerequisites are missing.
5. Admission is competitive but efforts will be made to recruit and retain students from the region and students from identifiable minorities.

Degree Requirements:

Total hours required:
Thirty hours of course work beyond the bachelor's degree. The student must complete:

The program core consisting of 24 credits
1. **ECON 6203/FINN 6203** Financial Economic Theory
2. **MATH 6201** Statistical Techniques in Finance or **ECON 6218** Advanced Business & Economic Forecasting
3. **FINN 6219/ECON 6219** Financial Econometrics
4. **FINN 6210** Derivatives I: Financial Elements of Derivatives
5. **FINN 6211** Risk Management & Fixed Income Derivatives
6. **MATH 6202** Derivatives II: Partial Differential Equations for Finance
7. **MATH 6203** Stochastic Calculus for Finance
8. **MATH 6204** Numerical Methods for Financial Derivatives

Completion of 6 credits from Elective Mathematical Finance related courses
1. **ECON 6090** Topics in Economics
2. **ECON 6100** Mathematical Economics
3. **ECON 6112** Graduate Econometrics
4. **ECON 6201** Advanced Macroeconomic Theory
5. **ECON 6202** Advanced Microeconomic Theory
6. **ECON 6235** Monetary Theory and Financial Theory
7. **ECON 6800** Directed Study Economics
8. **FINN 6058** Special Topics in Financial Services
9. **MATH 5128** Applied Probability I
10. **MATH 5129** Applied Probability II
11. **MATH 5143** Analysis I
12. **MATH 5171** Numerical Solution of Ordinary Differential Equations

13. **MATH 6205** Financial Computing
14. Any MATH/STAT 6200 level course and above.

Amount of transfer credit

No more than 6 credit hours and only courses with a grade of *A* or *B* at an accredited institution. Requires approval of the program committee

Grades

A student is expected to achieve *A*s or *B*s in all course work taken for graduate credit and must have a least an average of *B* in order to graduate. More than two *C* grades will result in termination of the student's enrollment in the graduate program. If a student makes a grade of *U* in any course, enrollment will be terminated and the student cannot take any further graduate course work without being re-admitted to the program. Re-admission to the program requires approval of the Dean of the Graduate School upon the recommendation of one of the Mathematical Finance Program Director.

Advisor

Upon admission to the program each student is assigned an advisor by the Program Director.

Program Approval

Each student's individual program of study must be approved by the Mathematical Finance Program Director.

Admission to Candidacy

The Admission to Candidacy form should be filed upon successful completion of a minimum of 18 semester hours of graduate work and in no case later than four weeks prior to completion of all requirements for the degree. Completed forms should be forwarded to the Graduate School**.**

Comprehensive Examination

Students will be required to pass a comprehensive examination. An examining committee will be appointed by the Program Director and will be constituted from the program's faculty. The exam may be, at the committee's discretion, either written or oral.

Time Limit

University policy requires that no course may be listed on a master's student candidacy form that is older than six years**.**

Appendix D

Atkins Library Consultation Report

J. MURREY ATKINS LIBRARY CONSULTATION

FOR NEW MASTER IN SCIENCE IN MATHEMATICAL FINANCE PROGRAM UNIVERSITY OF NORTH CAROLINA

From: Barbara G. Tierney,
Liaison Librarian, UNC Charlotte Mathematics Department
Jeanie M. Welch,
Liaison Library, UNC Charlotte Belk College of Business Administration

Date: November 5, 2002

Regarding: CIP Discipline Specialty Title: Mathematics, Finance
CIP Discipline Specialty Number: 30.9999 Level: Master's
Exact Title of Proposed Degree: Master in Science Mathematical Finance
Proposed date to establish this program: Fall 2003

Summary of Librarians' Evaluation of Holdings:
We have completed a careful evaluation of current J. Murrey Atkins Library holdings that support the proposed five Department of Mathematics graduate level courses (Statistical Techniques in Finance, Partial Differential Equations for Finance, Stochastic Calculus for Finance, Numerical Methods for Finance, and Financial Computing) that would be offered as part of the proposed MS in Mathematical Finance program.

We have also completed a careful evaluation of current J. Murrey Atkins Library holdings that support the proposed four Department of Finance and Business Law graduate level courses (Risk Management and Fixed Income Derivatives, Financial Elements of Derivatives, Financial Economic Theory, and Financial Econometrics) that would be offered as part of the graduate program in the Belk College of Business Administration.

We find that the J. Murrey Atkins Library currently has adequate holdings (including print and electronic indexes, databases, journals, and monographs) to support the proposed MS in Mathematical Finance.

Jeanie M Welch 11/5/02
Evaluator's Signature Date

Barbara G. Tierney 11/5/02
Evaluator's Signature Date

UNC CHARLOTTE
The University of North Carolina at Charlotte
9201 University City Boulevard
Charlotte, NC 28223-0001

The Belk College of Business Administration
Department of Finance and Business Law
704/687-2063

To: Ms. Jeanie Welch
Reference Librarian
J. Murray Atkins Library

From: C. William Sealey
Chair, Department of Finance

Date: October 9, 2002

RE: Library consultation for proposed course FINN 6211.

The Department of Finance and Business Law is proposing the creation of a new graduate-level finance course. The proposed course number and name are FINN 6211 *Risk Management and Fixed Income Derivatives*. As part of this proposal we are asking for a library consultation. Please find attached a copy of the proposal, a course syllabus for the proposed course, and a reading list for the proposed course.

Thank you very much for you time and effort. If you have any questions or comments on the proposal, or if the Department can be of any assistance, please do not hesitate to contact me, or to contact Dr. Richard Buttimer, who is chair of the Department's Curriculum committee.

Consultative on Library Holdings

To: Prof. C. William Sealey

From: Jeanie M. Welch, Business Librarian

Date: October 17, 2002

Subject: FINN 6211—Risk Management and Fixed Income Derivatives

Summary of Librarian's Evaluation of Holdings:

Evaluator: Jeanie M. Welch **Date:** October 17, 2002

Check One:

1. Holdings are superior ____
2. Holdings are adequate __X__
3. Holdings are adequate only if Dept. purchases additional items. ____
4. Holdings are inadequate

Comments: Please see attached note.

Jeanie M. Welch

Evaluator's Signature

10/17/02

Date

Prof. Sealey:

I have reviewed the course proposal for FINN 6211 Risk Management and Fixed Income Derivatives and find library holdings to be adequate. I searched JASMINE, the library's online catalog and found the following number of titles published from 1997-2002 under the following subject headings:

Derivative Securities	36
Derivative Securities—Law & legislation—U. S.	14
Derivative Securities—Mathematical models	5
Derivative Securities—U. S.	9
Futures	29
Futures Market	22
Futures Market—U. S.	3
Options (Finance)	41
Options (Finance)—Mathematical models	6
Options (Finance)—U. S.	4

There are also 14 books listed on the combined subjects of risk management and derivative securities.

I also searched online periodical indexes for articles on risk management and derivatives and found over 100 citations to articles in *ABI/INFORM Global*, a standard index for business titles published since 1998. Many of these articles were available full-text in either *ABI/INFORM Global* or in another online index (e.g., *Business Source Elite*). Full-text articles on derivatives are also available in *Lexis-Nexis Academic* and citations and abstracts are available in *EconLit*, the online version of the *Journal of Economic Literature* (available via *FirstSearch*).

I also checked the titles on the "Sample Reading List." We had print subscriptions or electronic access to all but one of the journal articles. Of the books listed, the library owns all of them.

Please let me know if you need any further information.

Jeanie M Skelton
10/17/02

UNC CHARLOTTE
The University of North Carolina at Charlotte
9201 University City Boulevard
Charlotte, NC 28223-0001

The Belk College of Business Administration
Department of Finance and Business Law
704/687-2063

To: Ms. Jeanie Welch
Reference Librarian
J. Murray Atkins Library

From: C. William Sealey
Chair, Department of Finance

Date: October 9, 2002

RE: Library consultation for proposed course FINN 6210.

The Department of Finance and Business Law is proposing the creation of a new graduate-level finance course. The proposed course number and name are FINN 6210 *Financial Elements of Derivatives*. As part of this proposal we are asking for a library consultation. Please find attached a copy of the proposal, a course syllabus for the proposed course, and a reading list for the proposed course.

Thank you very much for you time and effort. If you have any questions or comments on the proposal, or if the Department can be of any assistance, please do not hesitate to contact me, or to contact Dr. Richard Buttimer, who is chair of the Department's Curriculum committee.

Consultative on Library Holdings

To: Prof. C. William Sealey

From: Jeanie M. Welch, Business Librarian

Date: October 16, 2002

Subject: FINN 6210—Financial Elements of Derivatives

Summary of Librarian's Evaluation of Holdings:

Evaluator: Jeanie M. Welch **Date:** October 16, 2002

Check One:

1. Holdings are superior	____
2. Holdings are adequate	__X__
3. Holdings are adequate only if Dept. purchases additional items.	____
4. Holdings are inadequate	

Comments: Please see attached note.

Jeanie M Welch

Evaluator's Signature

10/16/02

Date

Prof. Sealey:

I have reviewed the course proposal for FINN 6210 Financial Elements of Derivatives and find library holdings to be adequate. I searched JASMINE, the library's online catalog and found the following number of titles published from 1997-2002 under the following subject headings:

Derivative Securities	36
Derivative Securities—Law & legislation—U. S.	14
Derivative Securities—Mathematical models	5
Derivative Securities—U. S.	9
Futures	29
Futures Market	22
Futures Market—U. S.	3
Options (Finance)	41
Options (Finance)—Mathematical models	6
Options (Finance)—U. S.	4

I also searched online periodical indexes for articles on derivatives and found over 1,000 citations to articles in *ABI/INFORM Global*, a standard index for business titles. Many of these articles were available full-text in either *ABI/INFORM Global* or in another online index (e.g., *Business Source Elite*). Full-text articles on derivatives are also available in *Lexis-Nexis Academic* and citations and abstracts are available in *EconLit*, the online version of the *Journal of Economic Literature* (available via *FirstSearch*).

I also checked the titles on the "Sample Reading List." We had print subscriptions or electronic access to all of the journal articles. Of the books listed, the library owns six. Of the other titles listed, I was able to determine that three are still in print and available for purchase. The library could consider purchasing these titles when funds become avail-able.

Please let me know if you need any further information.

Joanie M Kalah

10/16/02

J. Murrey Atkins Library
Memorandum

TO: Dr. Alan Dow
Coordinator, MS in Mathematical Finance Program

FROM: Barbara G. Tierney
Reference Librarian

DATE: 11/8/00

RE: Consultation with Library for Course and Curriculum Proposal

Date of initiation of consultation with Library Reference personnel: Request received 10/20/00

Course Proposal No: MATH 6201: Statistical Techniques in Finance (3G) This course reviews basic concepts and introduces more advanced techniques from Probability and Statistics which are commonly utilized in Mathematical Finance. Topics covered include random variables, distributions, conditional expectations, confidence intervals and hypothesis testing, simple and multiple regression, multivariate analysis including factor and canonical correlation analysis, and time series models including ARMA, ARIMA, ARCH, and GARCH.

SUMMARY OF REFERENCE LIBRARIAN'S EVALUATION OF HOLDINGS:
Evaluator: Barbara G. Tierney Date: 11/8/00
Check one:
1. Holdings are superior.
2. **Holdings are adequate** Please see comments
3. Holdings are adequate only if department purchases add.holdings
4. Holdings are inadequate

Comments: Atkins Library currently provides several print and electronic indexes and databases to support the proposed course including: **MathSciNet** (electronic), **Applied Science and Technology Index** (electronic), **Current Mathematical Publications** (print), **Mathematical Reviews** (print), **Science and Social Sciences Citation Index** (print), **Academic Search Elite** (electronic), **ABI /Inform Global**(electronic) , **Business Source Elite**, and **MasterFile** (electronic). In addition, Atkins Library subscribes to several periodicals in this subject area such as "Annals of Probability," "Annals of Applied Probability," "Journal of Applied Probability," "Annals of Statistics," "Journal of Time Series Analysis," "Journal of Multivariate Analysis," and others.

A search of JASMINE (the Atkins online library catalog) using the following **Library of Congress Subject Headings** reveals the following:

LC Subject Heading	Total # of Titles	# of Titles 1992+	% Titles 1992+
Business Forecasting	96	28	29%
Commercial Statistics	55	8	15%
Economic Forecasting	123	42	34%
Mathematical Statistics	290	55	19%
Multivariate Analysis	123	32	26%
Probabilities	363	76	21%
Regression Analysis	142	37	26%
Time-Series Analysis	100	25	25%

It is recommended that the Mathematics Department purchase additional current titles in the above listed subject areas to further support this course, as well as purchasing the following already identified titles: **"Probability and Statistics"** by Kevin J. Hastings (1997); **"A Second Course in Statistics – Regression Analysis"** by W. Mendenhall (1996); **"Applied Multivariate Statistical Analysis"** by R.A. Johnson (1998); **"Time Series Models for Business and Economic Forecasting"** by P.H. Frances (1998); and **"Applied Statistical Time Series Analysis"** by R.H. Shumway.

Barbara G. Tierney — November 8, 2000

Evaluator's Signature **Date**

J. Murrey Atkins Library
Memorandum

TO: **Dr. Alan Dow**
Coordinator, MS in Mathematical Finance Program

FROM: Barbara G. Tierney
Reference Librarian

DATE: 11/8/00

RE: **Consultation with Library for Course and Curriculum Proposal**
Date of initiation of consultation with Library Reference personnel: Request received 10/20/00

Course Proposal No: MATH 6202:Partial Differential Equations for Finance-This course deals with those partial differential equations which are associated with financial derivatives based on factors such as equities and spot interest rates.

SUMMARY OF REFERENCE LIBRARIAN'S EVALUATION OF HOLDINGS:
Evaluator: Barbara G. Tierney Date: 11/8/00
Check one:
1. Holdings are superior.
2. **Holdings are adequate** Please see Comments
3. Holdings are adequate only if department purchases add.holdings
4. Holdings are inadequate

Comments: Atkins Library currently provides several print and electronic indexes and databases to support the proposed course including: **MathSciNet** (electronic), **Applied Science and Technology Index** (electronic), **ABI/Inform Global** (electronic), **Academic Search Elite** (electronic), **Business Source Elite** (electronic), **MasterFILE** (electronic), **Current Mathematical Publications** (print), **Mathematical Reviews** (print), and **Science and Social Sciences Citation Index** (print). In addition, Atkins Library subscribes to several periodicals to support this subject area such as: "Financial Analyst's Journal," "Risk Management," "RMA (Risk Management Assoc.) Journal," " Numerical Methods for Partial Differential Equations," "Journal of Differential Equations," "Advances in Differential Equations," etc.

A search of JASMINE (the Atkins online library catalog) using the below listed Library of Congress Subject Headings reveals the following current holdings:

Library of Congess Subject Heading	**Total # Titles**	**#Titles 1992+**	**% Titles 1992+**
Cash Flow-Mathematical Models	1	1	100%
Derivative Securities	37	37	100%
Derivative Securities–Mathematical Models	5	5	100%
Differential Equations	222	21	9%
Finance Mathematical Models	17	9	53%
Interest Rates – Mathematical Models	9	1	11%.
Investment Analysis-Mathematical Models	8	8	100%
Investments-Mathematical Models	26	10	38%
Options (Finance)-Prices–Mathematical Models	5	5	100%
Risk Management	94	64	68%
Risk Management – Mathematical Models	4	4	100%

It is recommended that the Mathematics Department purchase additional current titles in the above listed subject areas to further support this course, as well as purchasing the following already identified titles: **Derivative Securities and Finite Difference Methods**, by Y. Zhu (to be published); **Option Pricing: Mathematical Models and Computation,** by P. Wilmott (1993); and **Mathematical Models of Financial Derivatives**, by Y.K. Kwok (1998).

Barbara G. Tierney — November 8, 2000
Signature of Evaluating Librarian **Date**

J. Murrey Atkins Library
Memorandum

TO: **Dr. Alan Dow**
Coordinator, MS in Mathematical Finance Program

FROM: Barbara G. Tierney
Reference Librarian

DATE: 11/8/00

RE: **Consultation with Library for Course and Curriculum Proposal**

Date of initiation of consultation with Library Reference personnel: Request received 10/20/00

Course Proposal No: MATH 6203: Stochastic Calculus for Finance- An introduction to those aspects of partial differential equations and diffusion processes most relevant to finance. Random walk and first-step analysis, Markov property, martingales and semimartingales, Brownian motion, Stochastic differential equations, Ito's lemma, backward and forward Kolmogorov equations, the Feynman-Kac formula, stopping times, Hull and White Model, Cox-Ingersoll-Ross Model. Applications to finance including portfolio optimization and option pricing.

SUMMARY OF REFERENCE LIBRARIAN'S EVALUATION OF HOLDINGS:
Evaluator: Barbara G. Tierney Date: 11/8/00
Check one:
1. Holdings are superior.
2. **Holdings are adequate** Please see comments
3. Holdings are adequate only if department purchases add. holdings
4. Holdings are inadequate

Comments: Atkins Library currently provides several print and electronic indexes and databases to support the proposed course including: **MathSciNet** (electronic), **Applied Science and Technology Index** (electronic), ABI/Inform Global (electronic), Academic Search Elite (electronic), Business Source Elite (electronic), MasterFILE (electronic), **Current Mathematical Publications** (print), **Mathematical Reviews** (print), **Science and Social Sciences Citation Index** (print). In addition, Atkins Library subscribes to several periodicals in this subject area including: "Communications in Statistics. Stochastic Models," Stochastic Processes and their Applications," "Stochastic Analysis and Applications," "Random Operators and Stochastic Equations," "Numerical Methods for Partial Differential Equations," etc.

A search of JASMINE (the Atkins online library catalog) using the following list of subject headings revealed the following current holdings:

Lib. of Congress Subject Heading	**Total # Titles**	**#Titles 1992+**	**% Titles 1992+**
Brownian Motion Processes	24	8	33%
Derivative Securities-Prices	3	3	100%
Kolmogorov Theory	2	1	50%
Martingales (Mathematics)	30	5	17%
Stochastic Analysis	31	15	48%
Stochastic Differential Equations	18	5	28%

It is recommended that the Mathematics Department purchase additional current titles in the above listed subject areas to further support this course, as well as purchasing the following already identified titles: **Invitation to Stochastic Calculus & Financial Applications**, by J.M. Steele (2000); **Financial Calculus**, by Martin Baxter and Andrew Rennie (1996); **Brownian Motion and Stochastic Calculus**, by I. Karatzas and S. Shreve (1997); **Financial Modeling**, by Simon Bennigna and Benjamin Czaczkes (2000); and **Stochastic Calculus, A Practical Introduction**, by Richard Durrett (1996).

Barbara G. Tierney — November 8, 2000

Signature of Evaluating Librarian **Date**

J. Murrey Atkins Library
Memorandum

TO: **Dr. Alan Dow**
Coordinator, MS in Mathematical Finance Program

FROM: Barbara G. Tierney
Reference Librarian

DATE: 11/8/00

RE: **Consultation with Library for Course and Curriculum Proposal**

Date of initiation of consultation with Library Reference personnel: Request received 10/20/00

Course Proposal No: MATH 6204: Numerical Methods for Finance- This course will introduce students to numerical and computational techniques for solving both European and American style financial derivative problems. The approach will be the finite difference method and basic theoretical concepts will be introduced. Final projects will involve implementing the techniques on computers. Some spectral and Monte Carlo methods will also be discussed.

SUMMARY OF REFERENCE LIBRARIAN'S EVALUATION OF HOLDINGS:
Evaluator: Barbara G. Tierney Date: 11/8/00
Check one:
1. Holdings are superior.
2. **Holdings are adequate** Please see Comments
3. Holdings are adequate only if department purchases add.holdings
4. Holdings are inadequate

Comments: Atkins Library currently provides several print and electronic indexes and databases to support the proposed course including: **MathSciNet** (electronic), **Applied Science and Technology Index** (electronic), **ABI/Inform Global** (electronic), **Academic Search Elite** (electronic), **Business Source Elite** (electronic), **MasterFILE** (electronic), **Current Mathematical Publications** (print), **Mathematical Reviews** (print), **Science and Social Sciences Citation Index** (print). In addition, Atkins Library subscribes to several periodicals in this subject area including: "Journal of Finance," "Journal of Portfolio Management," "Journal of Business & Economic Statistics," etc.

A search of JASMINE (the Atkins online library catalog) using the following Library of Congress subject headings revealed the following current holdings:

Lib. of Congress Subject Heading	**Total # Titles**	**#Titles 1992+**	**% Titles 1992+**
"Derivative Securities-Mathematical Models	5	5	100%
"Options (Finance)-Prices-Mathematical Models	5	5	100%

It is recommended that the Mathematics Department purchase additional current titles in the above listed subject areas to further support this course, as well as purchasing the following already identified title: **Derivative Securities and Finite Difference Methods**, by Y. Zhu (to be published).

Barbara G. Tierney — November 8, 2000

Signature of Evaluating Librarian **Date**

J. Murrey Atkins Library
Memorandum

TO: **Dr. Alan Dow**
Coordinator, MS in Mathematical Finance Program

FROM: Barbara G. Tierney
Reference Librarian

DATE: 10/24/02

RE: **Consultation with Library for Course and Curriculum Proposal**

Date of initiation of consultation with Library Reference personnel: Request received 10/23/02

Course Proposal No: MATH 6205: Financial Computing- This lab oriented course introduces the major numerical methods needed for quantitative work in finance, focusing on derivatives pricing and fixed income applications. Topics include binomial and trinomial methods, Crank-Nicholson methods for various exotic options, treatment of discrete dividends, numerical methods for stochastic differential equations, random number generators, Monte-Carlo methods for European and American options. The computing classes teach the theory and practice of numerical finance as well as the programming skills needed to build software systems in C/C++, Java, Javascript and Mathematica/Matlab.

SUMMARY OF REFERENCE LIBRARIAN'S EVALUATION OF HOLDINGS:
Evaluator: Barbara G. Tierney Date: 10/24/02
Check one:
1. Holdings are superior.
2. **Holdings are adequate** **Please see Comments XX**
3. Holdings are adequate only if department purchases add.holdings
4. Holdings are inadequate

Comments: Atkins Library currently provides several print and electronic indexes and databases to support the proposed course including: **MathSciNet, (electronic), Applied Science and Technology Index** (electronic), **Science Direct** (electronic), and **Springer Verlag Link** (electronic). In addition, Atkins Library subscribes to several periodicals in this subject area including: "Journal of Financial & Qualitative Analysis," "Journal of Portfolio Management," "Journal of Business & Economic Statistics," etc.

A search of JASMINE (the Atkins online library catalog) using the following Library of Congress subject headings reveals the following current holdings:

Lib. of Congress Subject Headings	**Total # Titles**	**#Titles 1995+**
Binomial Distribution (Probability)	1	0
C++ Computer Program Language	62	41
Capital Assets Pricing Models	20	9
Credit Derivatives	5	5
Derivative Securities-Mathematical Models	6	6
Exotic Options (Finance)	4	4
Finance-Mathematical Models	29	20
Finance-Statistical Methods	5	5
Financial Engineering	17	12
Fixed-income Securities	16	3
Investments-Mathematical Models	32	13
Investments-Mathematics	22	11

Lib. of Congress Subject Headings	Total # Titles	#Titles 1995+
Java Computer Program Language	79	79
Javascript Computer Program Language	13	13
Mathematica Computer File	13	3
MATLAB Computer File	24	2
Options (Finance)-Prices-Mathematical Models	5	5
Random Number Generators	7	3
Risk Management	154	108
Statistical Decision	89	12
Stochastic Differential Equations	18	3
Stochastic Processes	215	35

Currently Atkins Library owns the following three (of six) "suggested readings" listed in the course proposal. Atkins has: "Financial engineering and computation," by Yuh-Dauh Lyuu (2002);" Numerical methods in finance, MATLAB," by Paolo Brandimarte (2002); and "Probability and finance; it's only a game!" by Glenn Shafer and Vladimir Vovk (2002).

It is recommended that the Mathematics Department purchase the additional three titles identified in this course proposal: "Tools for computational finance," by Rudiger Seydel (2002); "Computational financial mathematics using MATHEMATICA", by Srdan Stojanovic (2002); and "C++ How to program," by Harvey Deitel and Paul Deitel (2002).

It is also recommended that the Mathematics Department purchase additional current titles in the above listed Lib. Of Congress Subject areas to further support this course.

Barbara J. Kearney — Oct. 25, 2002

Signature of Evaluating Librarian — **Date**

UNCCHARLOTTE
J. Murrey Atkins Library

Consultation on Library Holdings

To: Prof. Gandar

From: Jeanie M. Welch

Date: Oct. 31, 2002

Subject: ECON 6203/FINN 6203

Summary of Librarian's Evaluation of Holdings:

Evaluator: Jeanie M. Welch Date: 10/31/02

Check One:

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

Comments: Please see attached note.

Jeanie M Welch
Evaluator's Signature

10/31/02
Date

Revised 9/13/2002
OAA jdp

TO: PROF. GANDAR
FROM: JEANIE M. WELCH, BUSINESS LIBRARIAN
DATE: OCTOBER 31, 2002
SUBJECT: ECON 6203/FINN 6203

I have reviewed the course proposal for ECON 6203/FINN 6203 Financial Economic Theory and have concluded that the library has adequate resources to support this course. This determination is based on a review of monographic holdings in JASMINE, the online catalog, and a review of periodical holdings. The library owns three of the five titles listed in the "References" section of the syllabus. In addition, I have taken several of the subject areas listed in "Proposed Catalog Copy" section and found that JASMINE lists the following number of titles of works published since 1997 under the following subject headings:

Capital assess pricing model	5
Investments—Mathematical models	10
Securities—Pricing—Mathematical models	5
Business enterprises—Valuation	6

In terms of journal articles, a search of ABI/INFORM Global, a major business periodical databases, lists 73 peer-reviewed articles on the subject of capital assets pricing model published since 1998 and 51 articles on risk assessment and finance. Many of these articles are available full-text online or via print subscription in the library. A search of EconLit, the online version of the *Journal of Economic Literature*, lists 47 articles on the subject of capital assets pricing model and 77 articles on risk assessment and finance. Again, the library provides access to these articles either via full-text online or via print subscription.

If you need any further information, please contact me.

To: Ms. Jeanie Welch
Reference Librarian
J. Murray Atkins Library

From: John M. Gandar
Chair, Department of Economics

Date: October 29, 2002

RE: Library consultation for proposed course ECON 6203 / FINN 6203.

The Departments of Economics and Finance & Business Law are proposing the creation of a new graduate-level economics/finance course. This course will be jointly listed as ECON 6203 / FINN 6203 *Financial Economic Theory*. As part of this proposal we are asking for a library consultation. Please find attached a copy of the proposal and a course syllabus for the proposed course (which includes a reading list for the proposed course).

Thank you very much for you time and effort. If you have any questions or comments on the proposal, or if the Department can be of any assistance, please do not hesitate to contact me, or to contact Dr. Rob Roy McGregor, who is chair of the Department's Graduate Affairs committee.

UNC CHARLOTTE
J. Murrey Atkins Library

Consultation on Library Holdings

To: Prof. Gandar
From: Jeanie M. Welch
Date: Oct 31, 2002
Subject: ECON 6219

Summary of Librarian's Evaluation of Holdings:

Evaluator: Jeanie M. Welch Date: 10/31/02

Check One:

1. Holdings are superior ____
2. Holdings are adequate X
3. Holdings are adequate only if Dept. purchases additional items. ____
4. Holdings are inadequate ____

Comments:

Please see attached note.

Jeanie M Welch
Evaluator's Signature

10/31/02
Date

Revised 9/13/2002
OAA jdp

TO: PROF. GANDAR
FROM: JEANIE M. WELCH, BUSINESS LIBRARIAN
DATE: OCTOBER 31, 2002
SUBJECT: ECON 6219

I have reviewed the course proposal for ECON 6219 Financial Econometrics and have concluded that the library has adequate resources to support this course. This determination is based on a review of monographic holdings in JASMINE, the online catalog, and a review of periodical holdings. The library owns all of the titles listed in the "Main textbook" and "Other very useful textbooks" sections of the syllabus. In addition, JASMINE lists the following number of titles of works published since 1997 under the appropriate subject headings:

Econometrics	40
Time-series analysis	23
Finance—Statistical methods	4
Finance—Mathematical models	12
Stochastic analysis	8
Finance—Econometric models	3

In terms of journal articles, a search of ABI/INFORM Global, a major business periodical database, lists 69 peer-reviewed articles on this topic published since 1998. Many of these articles are available full-text online or via print subscription in the library. A search of EconLit, the online version of the *Journal of Economic Literature*, lists 285 articles on this topic. Again, the library provides access to many of these articles either via full-text online or via print subscription. In addition, the library has print subscriptions or electronic access to 11 econometric journals and the *Journal of Time-Series Analysis.*

If you need any further information, please contact me.

To: Ms. Jeanie Welch
Reference Librarian
J. Murray Atkins Library

From: John M. Gandar
Chair, Department of Economics

Date: October 29, 2002

RE: Library consultation for proposed course ECON 6219.

The Department of Economics is proposing the creation of a new graduate-level economics course. The proposed course number and name are ECON 6219 *Financial Econometrics*. As part of this proposal we are asking for a library consultation. Please find attached a copy of the proposal, a course syllabus for the proposed course (which includes a reading list for the proposed course).

Thank you very much for you time and effort. If you have any questions or comments on the proposal, or if the Department can be of any assistance, please do not hesitate to contact me, or to contact Dr. Rob Roy McGregor, who is chair of the Department's Graduate Affairs committee.

Appendix E

Budget Projections for the First Three Years of Program Operation

Projected Funding for New Degree Program
M.S. in Mathematical Finance
Regular Term 2003-2004
(Based on 2002-2003 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		0		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				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

		Total Positions Required		**0.000**
		Instructional - Position Salary Rate	(FY 02)	$62,573
	101-1310	Instructional Salary Amount		$0
		Other Academic Costs	44.89300%	0
	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
Fringes for faculty salaries				
FICA @ 7.65%;	*$0*	In-state SCHs	0	
Retirement @ ***9.71%***	*$0*	Financial Aid (in-state)	67.99800%	0
Medical @ $2,933	*$0*			
		Total Requirements		**$0**
	$0			

SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

Institution **UNC Charlotte** *Date* **March 5, 2003**

Program (API#, Name, Level) **30.9999 Multidisciplinary Studies, Other (Mathematical Finance)**

Degree(s) to be Granted **M.S.** *Program Year* **2003-2004**

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

NOTE: Accounts may be added or deleted as required.

Projected Funding for New Degree Program
M.S. in Mathematical Finance
Regular Term 2004-2005
(Based on 2003-2004 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		225		643.72	171.44	138.41	0.000	1.312	0.000
Category II				487.37	249.94	146.74	0.000	0.000	0.000
Category III				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

		Total Positions Required		**1.312**
		Instructional - Position Salary Rate	(FY 02)	$62,573
101-1310		Instructional Salary Amount		$82,122
		Other Academic Costs	44.89300%	36,867
Purpose 101		Total Academic Requirements		$118,989
Purpose 151		Library	11.48462%	13,665
Purposes 152, 160, 170 180		General Instit Support	54.04980%	64,313
		Neg Adj Factor	50.00000%	n/a
Fringes for faculty salaries				
FICA @ 7.65%;	*$6,282*	In-state SCHs	0	
Retirement @ ***9.71%***	*$7,974*	Financial Aid (in-state)	67.99800%	0
Medical @ $2,933	*$3,849*			
		Total Requirements		**$196,967**
	$18,106			

SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

Institution **UNC Charlotte** *Date* **March 5, 2003**

Program (API#, Name, Level) **30.9999 Multidisciplinary Studies, Other (Mathematical Finance)**

Degree(s) to be Granted **M.S.** *Program Year* **2004-2005**

	ADDITIONAL FUNDING REQUIRED - BY SOURCE				
	Reallocation of Present Institutional Resources	Enrollment Increase Funds	Federal/State or Other Non-state Funds (Identify)	New Allocations	Total
101 Regular Term Instruction					
1210 SPA Regular Salaries					$0
1110 EPA Non-teaching Salaries					0
1310 EPA Academic Salaries	0	82,122	0		82,122
		82,122			
1810 Social Security	0	6,282			6,282
1820 State Retirement	0	7,974			7,974
1830 Medical Insurance	0	3,849			3,849
2000 Supplies and Materials		5,000			5,000
2300 Educational Supplies		3,000			
2600 Office Supplies		2,000			
3000 Current Services		6,762			6,762
3100 Travel		3,000			
3200 Communications		1,762			
3400 Printing & Binding		2,000			
5000 Capital Outlay (Equipment)		7,000			7,000
5100 Office Equipment		2,000			
5200 EDP Equipment		5,000			
TOTAL Regular Term Instruction	**$0**	**$118,989**	**$0**	**$0**	**$118,989**
151 Libraries					
5000 Capital Outlay (Equipment)		13,665			13,665
5600 Library Book/Journal		13,665			
TOTAL Libraries	**$0**	**$13,665**	**$0**	**$0**	**$13,665**
189 General Institutional Support					
2000 Supplies and Materials		15,000			15,000
2600 Office Supplies		15,000			
3000 Current Services		25,000			25,000
3200 Communications		12,500			
3400 Printing & Binding		12,500			
5000 Capital Outlay (Equipment)		24,313			24,313
5100 Office Equipment		10,000			
5200 EDP Equipment		14,313			
TOTAL General Inst. Support	**$0**	**$64,313**	**$0**	**$0**	**$64,313**
TOTAL ADDITIONAL COSTS	**$0**	**$196,967**	**$0**	**$0**	**$196,967**

NOTE: Accounts may be added or deleted as required.

Projected Funding for New Degree Program
M.S. in Mathematical Finance
Regular Term 2005-2006
(Based on 2004-2005 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		255		643.72	171.44	138.41	0.000	1.487	0.000
Category II				487.37	249.94	146.74	0.000	0.000	0.000
Category III				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

	Total Positions Required		**1.487**
	Instructional - Position Salary Rate	(FY 02)	$62,573
101-1310	Instructional Salary Amount		$93,071
	Other Academic Costs	44.89300%	41,782
Purpose 101	Total Academic Requirements		$134,853
Purpose 151	Library	11.48462%	15,487
Purposes 152, 160, 170 180	General Instit Support	54.04980%	72,888
	Neg Adj Factor	50.00000%	n/a
	In-state SCHs	0	
	Financial Aid (in-state)	67.99800%	0
	Total Requirements		**$223,228**

Fringes for faculty salaries

FICA @ 7.65%;	*$7,120*
Retirement @ ***9.71%***	*$9,037*
Medical @ $2,933	*$4,363*
	$20,520

SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

Institution **UNC Charlotte** *Date* **March 5, 2003**

Program (API#, Name, Level) **30.9999 Multidisciplinary Studies, Other (Mathematical Finance)**

Degree(s) to be Granted **M.S.** *Program Year* **2005-2006**

	ADDITIONAL FUNDING REQUIRED - BY SOURCE				
	Reallocation of Present Institutional Resources	Enrollment Increase Funds	Federal/State or Other Non-state Funds (Identify)	New Allocations	Total
101 Regular Term Instruction					
1210 SPA Regular Salaries					$0
1110 EPA Non-teaching Salaries					0
1310 EPA Academic Salaries		93,071	0		93,071
		93,071			
1810 Social Security		7,120			7,120
1820 State Retirement		9,037			9,037
1830 Medical Insurance		4,363			4,363
2000 Supplies and Materials		7,000			7,000
2300 Educational Supplies		4,000			
2600 Office Supplies		3,000			
3000 Current Services		7,262			7,262
3100 Travel		3,262			
3200 Communications		2,000			
3400 Printing & Binding		2,000			
5000 Capital Outlay (Equipment)		7,000			7,000
5100 Office Equipment		2,000			
5200 EDP Equipment		5,000			
TOTAL Regular Term Instruction	**$0**	**$134,853**	**$0**	**$0**	**$134,853**
151 Libraries					
5000 Capital Outlay (Equipment)		15,487			15,487
5600 Library Book/Journal		15,487			
TOTAL Libraries	**$0**	**$15,487**	**$0**	**$0**	**$15,487**
189 General Institutional Support					
2000 Supplies and Materials		20,000			20,000
2600 Office Supplies		20,000			
3000 Current Services		25,000			25,000
3200 Communications		12,500			
3400 Printing & Binding		12,500			
5000 Capital Outlay (Equipment)		27,888			27,888
5100 Office Equipment		12,000			
5200 EDP Equipment		15,888			
TOTAL General Inst. Support	**$0**	**$72,888**	**$0**	**$0**	**$72,888**
TOTAL ADDITIONAL COSTS	**$0**	**$223,228**	**$0**	**$0**	**$223,228**

NOTE: Accounts may be added or deleted as required.