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

Title Page.............................................................. 1
Table of Contents ................................................... 2
Executive Summary ................................................ 3
I. Description of the Program .................................... 5
II. Justification for the Program ................................. 7
III. Program Requirements and Curriculum .............. 11
IV. Faculty .......................................................... 15
V. Library ............................................................ 17
VI. Facilities and Equipment .................................... 18
VII. Administration ................................................ 19
VIII. Accreditation .................................................. 21
IX. Supporting Fields ............................................ 22
X. Additional Information ....................................... 22
XI. Budget .......................................................... 22
XII. Evaluation Plans ............................................. 22
XIII. Reporting Requirements ................................. 24
XIV. Starting Date and Institutional Approval ............. 24

Appendices
A. Course Descriptions
B. Faculty Vita
C. Proposed Graduate Catalog Copy
D. Atkins Library Consultation Report
E. Budget Projections for the First Three Years of Program Operation
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 coursework 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 coursework. 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.

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

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

Economics
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 doctoral degree, compare it with other similar programs in public and private universities in North Carolina, in the region, and in the nation.

The proposed program 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.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>10</td>
<td>25</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Part-time</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>TOTALS</td>
<td>15</td>
<td>35</td>
<td>45</td>
<td>50</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Student Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Category</td>
<td>UG</td>
</tr>
<tr>
<td>Category I</td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td></td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Student Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Category</td>
<td>UG</td>
</tr>
<tr>
<td>Category I</td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td></td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Student Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Category</td>
<td>UG</td>
</tr>
<tr>
<td>Category I</td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td></td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
<th>Student Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Category</td>
<td>UG</td>
</tr>
<tr>
<td>Category I</td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td></td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
</tr>
</tbody>
</table>

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)
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)

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 As or Bs 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:

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
<th>Research Interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert Anderson</td>
<td>Associate Professor</td>
<td>Probability and Stochastics</td>
</tr>
<tr>
<td>Wei Cai</td>
<td>Professor</td>
<td>Computational and Numerical Analysis</td>
</tr>
<tr>
<td>Zongwu Cai</td>
<td>Associate Professor</td>
<td>Statistics</td>
</tr>
<tr>
<td>Janusz Kawszak</td>
<td>Assistant Professor</td>
<td>Statistics, Actuarial Science</td>
</tr>
<tr>
<td>Hong Joong Kim</td>
<td>Assistant Professor</td>
<td>Computational and Numerical Analysis</td>
</tr>
<tr>
<td>Michael Klibanov</td>
<td>Professor</td>
<td>Inverse Problem and Numerical Methods</td>
</tr>
<tr>
<td>Alex Papadopoulos</td>
<td>Professor</td>
<td>Statistics</td>
</tr>
<tr>
<td>Joseph Quinn</td>
<td>Professor</td>
<td>Probability and Stochastics</td>
</tr>
<tr>
<td>Isaac Sonin</td>
<td>Professor</td>
<td>Probability and Stochastics</td>
</tr>
<tr>
<td>Volker Wihstutz</td>
<td>Professor</td>
<td>Probability and Stochastics</td>
</tr>
<tr>
<td>Zhi Yi Zhang</td>
<td>Associate Professor</td>
<td>Statistics</td>
</tr>
<tr>
<td>You Lan Zhu</td>
<td>Associate Professor</td>
<td>Derivatives, Computation, and Option Pricing</td>
</tr>
</tbody>
</table>
Finance:

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

Economics:

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

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.

   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.

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
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.
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

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.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>M</td>
<td>I/P</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>45</td>
</tr>
</tbody>
</table>

D. Recommended Consultant/Reviewers

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

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

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

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 Runge-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.
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

Technical Reports

Invited Talks

Other Activities:
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

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.


Master’s Orals one-1997-98


Ph D. Qualifying Exam, one-1996-97


**Funded Research:**

1984, Air Force Grant, investigator

1985, UNCC Faculty Grant

1995-1997, ONR Grant, co-investigator

October 11, 1999
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


**Community Service**

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

**PUBLICATIONS AND RESEARCH**

1. **Books**


2. **Chapter in books**

   Spectral and Multiresolution methods for PDE's, a chapter in a book  

3. **Articles in refereed journals**


4. Other articles published


5. Paper presented


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. Invited talk at Courant Institute, April, 2002


19. Invited talk at Brown University, April, 2002


6. Funded research

3) Air Force Grant, Wavelet Methods for Combustion ($104,000, 1994-97)
4) Air Force Grant, Wavelet Methods for Combustion ($126,000, 1996-99)
6) National Science Foundation Grant, Adaptive Wavelet Element Methods for Highly Parallel Computations ($322,384, 1999-2002)

PROFESSIONAL AFFILIATIONS

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. Jianliang Li, 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: (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:


♦ Papers Accepted:


♦ Papers Published:


**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 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
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 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 University of Western Ontario, London, Canada
1994, 1995, 1996 (Summers) Teaching Assistant The University of Western Ontario
Janusz Kawczak

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


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


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


**Conference Presentations**


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


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


March, 2003
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
- *Stochastic Partial Differential Equations and Scientific Computation*, Rice University, 2002

Invited Talks

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


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 gives 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 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
CURRICULUM 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:


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


**Other Selected Publications:**


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 recommendation 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**


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 - University
Promotion and Tenure Committee - Departmental
Curriculum 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


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


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


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 Reliability, 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.
- 1984-85, Professor of Mathematics, UNC Charlotte.
- 1985-1994, Professor and Chairperson, Department Mathematics, UNC Charlotte.
- 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:

- 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.
• Shannon Entropy and the Design of True Randomizers, talk by Alex Gordon (delivered by J. Quinn) to Monte Carlo 2000, July 3-5, 2000.
• 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: 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


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


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., Probability 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,
  Actuarial Program Committee, 2002-pres.
  College Course and Curriculum Committee, 1994-1996.
  College of Art and Sciences Council, 1995-1996.
PUBLICATIONS

I. BOOKS


II. PAPERS IN REFEREED JOURNALS


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


III. CONFERENCE PROCEEDINGS (REFEREED)


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.


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


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

“Asymptotics of Lyapunov Spectrum and  
Stabilization, by Noise”
“Large Noise Asymptotics and Numerics for Degenerate Stochastic Differential Systems”

PUBLICATIONS

Papers:
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.
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)
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.
7. “Asymptotic Expansion and Exact Formulas for Rotation Numbers of Noisy Systems,” Iowa State 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.
10. “Asymptotics of the Localization Length and the Density of States Associated with Standing Waves,” University of South Carolina, Clemson, SC.
22. Institute for Mechanics, University of Hannover, 1993.
24. Université de Provence, Marseille, France, 1994.
28. Case Western RU, Cleveland, Ohio, 1997

INVITED TALKS AT CONFERENCES  (since 1987)

18. Annual Meeting of Italian Probabilists, Trento, Italy (1-hour address), September 1994.
34. International Conference on Monte Carlo Methods, Monte Carlo, Monaco, July 2000.

OTHER INVITATIONS

Visiting Professor (since 1987)
(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.
(7) University Kyoto, Japan, May 1996.
PROFESSIONAL SERVICE

Organization of Conferences:
(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:


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

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

INVITED PRESENTATION:

1. Quantifying the Impact of Maintenance Activities on SSO via Statistical Modelling, Water Environmental Federation's Collection Systems Rehabilitation and M Specialty Conference, 1999

PUBLICATIONS:


SELECTED CONSULTING ACTIVITIES:


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’ representative 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.
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**

<table>
<thead>
<tr>
<th>Dates</th>
<th>Institution/Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid Aug. 1990 - present</td>
<td>Department of Mathematics, University of North Carolina at Charlotte</td>
</tr>
<tr>
<td>July 1990 - Mid Aug. 1990</td>
<td>Stanford University</td>
</tr>
<tr>
<td>Dec. 1989 - June 1990</td>
<td>University of Heidelberg</td>
</tr>
<tr>
<td>Mid May 1989 - Nov. 1989</td>
<td>Computing Center, Academia Sinica</td>
</tr>
<tr>
<td>Mid Apr. 1989 - Mid May 1989</td>
<td>IMA, University of Minnesota</td>
</tr>
<tr>
<td>Oct. 1988 - Mid Apr. 1989</td>
<td>University of Heidelberg</td>
</tr>
<tr>
<td>Mid Dec. 1986 - Nov. 1987</td>
<td>Computing Center, Academia Sinica</td>
</tr>
<tr>
<td>Mid Sep. 1986 - Mid Dec. 1986</td>
<td>IMA, University of Minnesota</td>
</tr>
<tr>
<td>Mid Apr. 1986 - Mid Sep. 1986</td>
<td>Computing Center, Academia Sinica</td>
</tr>
</tbody>
</table>
Mid Jan. 1986 - Mid Apr. 1986 University of Heidelberg
June 1985 - Mid Jan. 1986 Computing Center, Academia Sinica
Apr. 1985 - May 1985 California Institute of Technology
Apr. 1981 - June 1981 Uppsala University
Apr. 1980 - June 1980 University of California, Berkeley
May 1979 - Dec. 1979 Courant Institute, NYU
May 1978 - Apr. 1979 Computing Center, Academia Sinica

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

**Publications**

**Books and Proceedings:**


**Papers:**


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).


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).


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


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


BENNIE H. NUNNALLY, JR.

Professor of Finance

Business Address     Residence Address
The University of North Carolina at Charlotte    5031 Ridgetop Trail
Belk College of Business Administration    Charlotte, NC 28215-8739
Department of Finance and Business Law    Telephone:(704) 598-1184
Charlotte, NC 28223
Telephone: (704) 687-2875
Fax: (704) 687-6987
Email: bhnunna@email.uncc.edu

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


Book Chapters


Journal Articles (Refereed)


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


National Proceedings and Meetings (Refereed)


Regional Proceedings (Refereed)


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


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


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


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

Faculty President, 2002-2004

Department


Honors Thesis Supervisor 1999-Present.


Community


Awards


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


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


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


Refereed Papers Published or Accepted for Publication (Continued)


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.


Conference Presentations

American Finance Association, 1996
Cambridge-Maastricht Real Estate Symposium
Eastern Finance Association, 1993
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.


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 Association.
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 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**
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

e-mail: 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:

   Degree: Bachelor of Arts  
   Major: Economics

   Degree: Master of Arts  
   Major: Economics

   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:**
- Associate Dean - MBA Program (1990 - 1992)
- Professor of Finance (1985 - 1988)
- Associate Professor Of Finance (1980 - 1985)

**Courses Taught:**

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  

**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, Fonds pour la Formation de Chercheurs et l'Aide à 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.


Publications:


**Working Papers And Work In Progress:**

“Can Delegating Bank Regulation to Market Forces Really Work,” with S. Nagarajan.


**V. PROFESSIONAL ACTIVITIES**

**Refereeing Activities:**


**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
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: 704-687-6967

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


**Other Journal Publications**


**Book Chapters**


**Refereed Conference Proceedings**


**Papers Under Journal Review**

“Eurodollar Futures Pricing With a New Two-Factor Interest Rate Model", with Jian Guo Chen.


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


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**


"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.


"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.


"Path-Dependency, Market Constraints and Multipoint Arbitrage", presented at the 1990 Southern Economic Meetings in New Orleans, LA.


"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.


**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, 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 1999.


Midwest Finance Association Meetings 1997


International Business Schools Association Meetings 1994


Southern Economic Association Meetings 1990.

**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.
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 Board of Trade Research Seminar Series, 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 641 Chadbourne Ave
The University of North Carolina at Charlotte Concord, NC 28027
9201 University City Blvd. (704) 720-7803
Charlotte, NC 28223
(704) 687-6219
buttimer@email.uncc.edu

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
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 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


**GRANTS RECEIVED**


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.


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


“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.


**Courses Taught**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>At The University of North Carolina at Charlotte</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBAD 6058</td>
<td>Derivative Securities</td>
<td>Master</td>
</tr>
<tr>
<td>MBAD 6058</td>
<td>Fixed Income Derivatives</td>
<td>Master</td>
</tr>
<tr>
<td>MBAD 6160</td>
<td>Real Estate Capital Markets</td>
<td>Master</td>
</tr>
<tr>
<td>FINN 3261</td>
<td>Real Estate Finance</td>
<td>Undergraduate</td>
</tr>
<tr>
<td>REAE 5311</td>
<td>Real Estate Finance</td>
<td>Master</td>
</tr>
<tr>
<td>REAE 5325</td>
<td>Real Estate Principals</td>
<td>Undergraduate</td>
</tr>
<tr>
<td>REAE 4319</td>
<td>Real Estate Finance</td>
<td>Undergraduate</td>
</tr>
<tr>
<td>FINA 6311</td>
<td>Theory of Corporate Finance</td>
<td>Ph.D.</td>
</tr>
<tr>
<td>FINA 5392</td>
<td>Financial Modeling</td>
<td>Master and Ph.D.</td>
</tr>
<tr>
<td>FINA 5324</td>
<td>Seminar in Financial Theories</td>
<td>Master</td>
</tr>
</tbody>
</table>
Graduate Students

<table>
<thead>
<tr>
<th>Student</th>
<th>Level</th>
<th>Served As</th>
<th>Status</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nusanne Meekagong</td>
<td>Doctoral (Finance)</td>
<td>Chair</td>
<td>Completed</td>
<td>2002</td>
</tr>
<tr>
<td>Richard Elsassaer</td>
<td>Masters (Real Estate)</td>
<td>Chair</td>
<td>Completed</td>
<td>2002</td>
</tr>
<tr>
<td>Cary Lin</td>
<td>Doctoral (Real Estate)</td>
<td>Chair</td>
<td>Completed</td>
<td>2001</td>
</tr>
<tr>
<td>John St. Clair</td>
<td>Masters (L. Arch.)</td>
<td>Committee Member</td>
<td>Completed</td>
<td>2001</td>
</tr>
<tr>
<td>Steve Isbell</td>
<td>Masters (Real Estate)</td>
<td>Chair</td>
<td>Completed</td>
<td>2000</td>
</tr>
<tr>
<td>John Brookby</td>
<td>Masters (Real Estate)</td>
<td>Chair</td>
<td>Completed</td>
<td>2000</td>
</tr>
<tr>
<td>Sheri Faircloth</td>
<td>Doctoral (Real Estate)</td>
<td>Chair</td>
<td>Completed</td>
<td>1997</td>
</tr>
<tr>
<td>Parvez Ahmed</td>
<td>Doctoral (Finance)</td>
<td>Committee Member</td>
<td>Completed</td>
<td>1996</td>
</tr>
<tr>
<td>Lisa Schwartz</td>
<td>Doctoral (Finance)</td>
<td>Committee Member</td>
<td>Completed</td>
<td>1996</td>
</tr>
<tr>
<td>Maggie Garcia</td>
<td>Doctoral (Finance)</td>
<td>Committee Member</td>
<td>Completed</td>
<td>1996</td>
</tr>
<tr>
<td>Ron Shaw</td>
<td>Doctoral (Finance)</td>
<td>Committee Member</td>
<td>Completed</td>
<td>1995</td>
</tr>
<tr>
<td>James Foley</td>
<td>Masters (Real Estate)</td>
<td>Committee Member</td>
<td>Completed</td>
<td>1993</td>
</tr>
</tbody>
</table>

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
Ph.D. Coordinator, Department of Finance and Real Estate University of Texas at Arlington 2000-2002
Graduate Advisor, M.S. in Real Estate Program, University of Texas at Arlington 2000-2002
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), 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

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.**  
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:


**Complete Books:**


**Portions of Books:**

**Professional Cases**


**Proceedings Papers:**


**Other Articles Published:**


**Presentations:**


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:


**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:

Michael, T. “The Linkage between Corporate Culture and Financial Performance.” Graduate independent study, Fall 1990.
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  
                 First Union Corp.  
                 Bank of America  
                 Gateway Bank & Trust Company  
                 Bank of Davie  
                 Helicopter Association International  
                 Bank of Stanly  
                 IBM  
                 Carolina Trust Bank  
                 LSB Bancshares, Inc.  
                 Carolinas AGC  
                 North Carolina Bankers Association  
                 Catawba Valley Bank  
                 North Carolina Banking Commission  
                 China Resources (Holdings) Co.  
                 North Carolina Center for the Advancement  
                 Coca Cola Consolidated, Inc.  
                 of Teaching  
                 Coddle Creek Financial Corp.  
                 Paragon Bank  
                 Cornerstone Bank & Trust  
                 Piedmont Bank  
                 Council Japan, Inc.  
                 Scottish Bank  
                 Duke Energy, Inc.  
                 Staton Investment Management Co.  
                 First Carolina State Bank  
                 Surrey Bank & Trust  
                 First Trust Bank  
                 U-Vest Investment Securities, Inc.  
                 First National Bank of Christiansburg  
                 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.


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
Research Interests

Education

Ph.D. in Applied Economics
Clemson University, Clemson, SC
Concentration: Financial economics
Ph.D. in Mathematical Sciences
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
University of Georgia, Athens, GA
B.A. in Mathematics
Valdosta State University, Valdosta, GA
B.A. in Philosophy
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”,
○ 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 Position: 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

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.


**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”  

November 2000  
“Effects of Analysts’ Ratings on Stock Returns: Evidence from the Insurance Industry”  

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 Wailatpu (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:**  

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, Massachusetts
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
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


PUBLICATIONS AND RESEARCH:

Editorial Activity:


Publications


Amato, Louis, "Firm Size, Leading Firms and Mobility" Studies In Economic Analysis, Spring 1984, pp. 5-25.


**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)


**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, “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**


"Alternative Profit Measures and The Structure-Performance Model," presented to the Western Economic Association, July 1986


**Citations**


**Articles Selected For Abstracts:**


**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.

Departmental Committees:


Economics Department, Graduate Affairs Committee, 1998-2000.


Member, Department of Economics Committee to Restructure Economics Major, elected 1988-1990.


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.


Chair, Search Committee for Department Chair In Department of Marketing, 1990-1991.

University Committees:


Member, Academic Integrity Board, appointed 1984-present.


Community Service:


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
B.A., Massey University, New Zealand, 1969.


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


“The Impact of the Paasche-Laspeyres Choice Upon Econometric Results,” with David


**Work In Progress**

**Submissions**


**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.


**Other Scholarly Products**


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.


**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.**

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:


Invited seminar presentations at:

- Wake Forest University, 1995.
- The University of Northern Arizona, 1996.
- Waikato University, New Zealand, 1997.
- Victoria University, New Zealand, 1997.

Research Grants

- Internal

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.

SERVICE

Departmental Committees

Economics Department Undergraduate Curriculum Committee (elected), 1988 - 1989.
Economics Department ad hoc committee on Ranking of Publication Outlets in Economics (volunteered), 2000.

College Committees


University Committees

Faculty Council (elected), 1983 - 1984.
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


Speeches

Senior Scholars, Charlotte, 1985.

Consulting

City of Raleigh (airport noise litigation), 1993.

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. Import-subsidy Coordination and the Gains from International Diffusion of


**Professional Citations**


**Papers under Review**


**Papers Presented at Professional Meetings/Workshops**


“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.


“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.


"Coordinating Bilateral Export Subsidies under Monopolistic Competition," at the International Economics/Development Workshop, Economics Department, the University of Illinois at Urbana-Champaign, October 1995.


Talked as a panelist on NAFTA and GATT at the Southeastern Economic Association Meetings, October 28 - 29, 1994.


Media Articles Publications

“Taiwan has over-invested in China.” The Taipei Times, October 31, 2002.
“One Taiwan but two economies.” The Taipei Times, August 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.
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.


Bachelor of Arts degree in economics with a minor in administration, Clemson University, 1982.

Work Experience


Graduate assistant in the Department of Economics, University of South Carolina, 1987-1991.

*Courses Taught*: Principles of Macroeconomics and Managerial Economics.

Courses Taught: Principles of Macroeconomics, Principles of Microeconomics, Consumer Economics, and Managerial Economics.


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


**Other Publications**


**Publications Forthcoming**


**Papers Under Review**


**Work in Progress**


Grant Reports

*The Economic Impact of the Affiliated Members of the Charlotte Arts and Science Council,* co-authored with John E. Connaughton.


Conference Presentations


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 1993 meeting of the Mid-Continent Regional Science Association in Duluth, Minnesota.


Other Presentations


Presented “Municipalities, Economic Growth, and Convergence,” co-authored with Gaines H. Liner, on the Economics Department’s research seminar series, Clemson University, October 1999.


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 Publications Committee, Department of Economics, University of North Carolina at Charlotte, 1986-1987.

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.


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 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.


**Honors**

Recipient of the 1998 Distinguished Scholarship Award, Belk College of Business Administration, 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

**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

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.

Refereed Publications


Revise and Resubmit


Abstract


Other Publications


"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-December 2002

Government Reports


Working Papers

“State and Local Tax Bases at Risk: A Computer Analysis of Suggested Reforms.”


“The Elasticity of Taxable Income and the Revenue-maximizing Tax Rate.”

Selected Presentations


“Interest Rate-Induced Wealth Effects,” 1992, seminar, Fordham University Economics Department.

Referee


Masters Theses


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
"Cross-Subsidization in Nursing Homes: Explaining Rate Differentials Among Payer Types."
"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
"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.
"Cost Shifting In Nursing Homes: Explaining Rate Differentials Among Payer Types." Presented at the American Economic Association Meetings, Boston, January 2000.

Honors and Grants:
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.
Faculty Research Support Grant, UNC Charlotte, awarded for academic year 2001-2002.

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).
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.
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.

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.
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
   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

   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
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:


2. Articles in Refereed Journals


3. Papers Presented

American Economic Association Annual Meeting, 1986
Atlantic International Economic Association Annual Meeting, 1980
Atlantic Economic Association Annual Meeting, 1980
Midwestern Finance Association Annual Meeting, 1986
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
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*.


5. Manuscripts in Progress

“Reconsidering the Efficiency of the Point Spread Betting Market on NFL Games,” with John Gandar and William Dare.


“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.


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


Testing Efficiency in the Foreign Currency Options Market, UNCC Faculty Reassignment Duties, 1985-86, $-N/A

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.


**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
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 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.

Evaluator’s Signature: Jeanie M. Welch  11/5/02
Date: 11/5/02

Evaluator’s Signature: Barbara G. Tierney  11/5/02
Date: 11/5/02
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 Buttiner, 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
3. Holdings are adequate only if Dept. purchases additional items.
4. Holdings are inadequate

Comments: Please see attached note.

Evaluator's Signature

\[Signature\]

Date

10/17/02
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 McElrath
10/17/02
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
3. Holdings are adequate only if Dept. purchases additional items.
   4. Holdings are inadequate

Comments: Please see attached note.

Evaluator's Signature

Date

10/16/02
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 available.

Please let me know if you need any further information.

Jeanie M. Stilson
10/16/02
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


A search of JASMINE (the Atkins online library catalog) using the following Library of Congress Subject Headings reveals the following:

<table>
<thead>
<tr>
<th>LC Subject Heading</th>
<th>Total # of Titles</th>
<th># of Titles 1992+</th>
<th>% Titles 1992+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Forecasting</td>
<td>96</td>
<td>28</td>
<td>29%</td>
</tr>
<tr>
<td>Commercial Statistics</td>
<td>55</td>
<td>8</td>
<td>15%</td>
</tr>
<tr>
<td>Economic Forecasting</td>
<td>123</td>
<td>42</td>
<td>34%</td>
</tr>
<tr>
<td>Mathematical Statistics</td>
<td>290</td>
<td>55</td>
<td>19%</td>
</tr>
<tr>
<td>Multivariate Analysis</td>
<td>123</td>
<td>32</td>
<td>26%</td>
</tr>
<tr>
<td>Probabilities</td>
<td>363</td>
<td>76</td>
<td>21%</td>
</tr>
<tr>
<td>Regression Analysis</td>
<td>142</td>
<td>37</td>
<td>26%</td>
</tr>
<tr>
<td>Time-Series Analysis</td>
<td>100</td>
<td>25</td>
<td>25%</td>
</tr>
</tbody>
</table>

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.

Evaluator's Signature: Barbara G. Tierney
Date: November 8, 2000
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:

<table>
<thead>
<tr>
<th>Library of Congress Subject Heading</th>
<th>Total # Titles</th>
<th>#Titles 1992+</th>
<th>% Titles 1992+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Flow-Mathematical Models</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>Derivative Securities</td>
<td>37</td>
<td>37</td>
<td>100%</td>
</tr>
<tr>
<td>Derivative Securities–Mathematical Models</td>
<td>5</td>
<td>5</td>
<td>100%</td>
</tr>
<tr>
<td>Differential Equations</td>
<td>222</td>
<td>21</td>
<td>9%</td>
</tr>
<tr>
<td>Finance Mathematical Models</td>
<td>17</td>
<td>9</td>
<td>53%</td>
</tr>
<tr>
<td>Interest Rates – Mathematical Models</td>
<td>9</td>
<td>1</td>
<td>11%</td>
</tr>
<tr>
<td>Investment Analysis-Mathematical Models</td>
<td>8</td>
<td>8</td>
<td>100%</td>
</tr>
<tr>
<td>Investments-Mathematical Models</td>
<td>26</td>
<td>10</td>
<td>38%</td>
</tr>
<tr>
<td>Options (Finance)-Prices–Mathematical Models</td>
<td>5</td>
<td>5</td>
<td>100%</td>
</tr>
<tr>
<td>Risk Management</td>
<td>94</td>
<td>64</td>
<td>68%</td>
</tr>
<tr>
<td>Risk Management – Mathematical Models</td>
<td>4</td>
<td>4</td>
<td>100%</td>
</tr>
</tbody>
</table>

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
Signature of Evaluating Librarian  Date

November 8, 2000
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


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


A search of JASMIN (the Atkins online library catalog) using the following list of subject headings revealed the following current holdings:

<table>
<thead>
<tr>
<th>Lib. of Congress Subject Heading</th>
<th>Total # Titles</th>
<th>#Titles 1992+</th>
<th>% Titles 1992+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brownian Motion Processes</td>
<td>24</td>
<td>8</td>
<td>33%</td>
</tr>
<tr>
<td>Derivative Securities-Prices</td>
<td>3</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>Kolmogorov Theory</td>
<td>2</td>
<td>1</td>
<td>50%</td>
</tr>
<tr>
<td>Martingales (Mathematics)</td>
<td>30</td>
<td>5</td>
<td>17%</td>
</tr>
<tr>
<td>Stochastic Analysis</td>
<td>31</td>
<td>15</td>
<td>48%</td>
</tr>
<tr>
<td>Stochastic Differential Equations</td>
<td>18</td>
<td>5</td>
<td>28%</td>
</tr>
</tbody>
</table>

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 Czačzkos (2000); and Stochastic Calculus, A Practical Introduction, by Richard Durrett (1996).

Signature of Evaluating Librarian  
Date

[Signature]

November 8, 2000
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:

<table>
<thead>
<tr>
<th>Lib. of Congress Subject Heading</th>
<th>Total # Titles</th>
<th>#Titles 1992+</th>
<th>% Titles 1992+</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Derivative Securities-Mathematical Models&quot;</td>
<td>5</td>
<td>5</td>
<td>100%</td>
</tr>
<tr>
<td>&quot;Options (Finance)-Prices-Mathematical Models&quot;</td>
<td>5</td>
<td>5</td>
<td>100%</td>
</tr>
</tbody>
</table>

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
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 JASMINNE (the Atkins online library catalog) using the following Library of Congress subject headings reveals the following current holdings:

<table>
<thead>
<tr>
<th>Lib. of Congress Subject Headings</th>
<th>Total # Titles</th>
<th>#Titles 1995+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binomial Distribution (Probability)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>C++ Computer Program Language</td>
<td>62</td>
<td>41</td>
</tr>
<tr>
<td>Capital Assets Pricing Models</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>Credit Derivatives</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Derivative Securities-Mathematical Models</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Exotic Options (Finance)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Finance-Mathematical Models</td>
<td>29</td>
<td>20</td>
</tr>
<tr>
<td>Finance-Statistical Methods</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Financial Engineering</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Fixed-income Securities</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>Investments-Mathematical Models</td>
<td>32</td>
<td>13</td>
</tr>
<tr>
<td>Investments-Mathematics</td>
<td>22</td>
<td>11</td>
</tr>
<tr>
<td>Lib. of Congress Subject Headings</td>
<td>Total # Titles</td>
<td>#Titles 1995+</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>----------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Java Computer Program Language</td>
<td>79</td>
<td>79</td>
</tr>
<tr>
<td>Javascript Computer Program Language</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Mathematica Computer File</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>MATLAB Computer File</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>Options (Finance)-Prices-Mathematical Models</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Random Number Generators</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Risk Management</td>
<td>154</td>
<td>108</td>
</tr>
<tr>
<td>Statistical Decision</td>
<td>89</td>
<td>12</td>
</tr>
<tr>
<td>Stochastic Differential Equations</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>Stochastic Processes</td>
<td>215</td>
<td>35</td>
</tr>
</tbody>
</table>

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 Rüdiger 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.

[Signature of Evaluating Librarian] [Oct. 25, 2002]
Consultation on Library Holdings

To: Prof. Gandar
From: Jeanie M. Welch
Date: Oct. 31, 2002
Subject: ECON 6203/FIN 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
3. Holdings are adequate only if Dept. purchases additional items.
4. Holdings are inadequate

Comments: Please attached note.

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.
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
3. Holdings are adequate only if Dept. purchases additional items.
4. Holdings are inadequate

Comments:
Please see attached note.

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)

<table>
<thead>
<tr>
<th>Program Category</th>
<th>Change in Student Credit Hours</th>
<th>Instructional - Position Funding Factors</th>
<th>Instructional Positions Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Undergrad</td>
<td>Masters</td>
<td>Doctoral</td>
</tr>
<tr>
<td>Category I</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td>487.37</td>
<td>249.94</td>
<td>146.74</td>
</tr>
<tr>
<td>Category III</td>
<td>364.88</td>
<td>160.93</td>
<td>122.95</td>
</tr>
<tr>
<td>Category IV</td>
<td>230.52</td>
<td>102.45</td>
<td>70.71</td>
</tr>
</tbody>
</table>

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 Inst Support 54.04980% 0

Neg Adj Factor 50.00000% n/a

In-state SCHs 0

Financial Aid (in-state) 67.99800% 0

Total Requirements $0

Fringes for faculty salaries

FICA @ 7.65%; $0
Retirement @ 9.71%; $0
Medical @ $2,933 $0

Total $0
### SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

<table>
<thead>
<tr>
<th>Program (API#, Name, Level)</th>
<th>Institution</th>
<th>Date</th>
<th>Program Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.9999 Multidisciplinary Studies, Other (Mathematical Finance)</td>
<td>UNC Charlotte</td>
<td>March 5, 2003</td>
<td>2003-2004</td>
</tr>
</tbody>
</table>

#### 101 Regular Term Instruction

<table>
<thead>
<tr>
<th>Account</th>
<th>Description</th>
<th>Present Resources</th>
<th>Increase Funds</th>
<th>Federal/State or Other Non-state Funds</th>
<th>New Allocations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1210 SPA Regular Salaries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>1110 EPA Non-teaching Salaries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1310 EPA Academic Salaries</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1810 Social Security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1820 State Retirement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1830 Medical Insurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>2000 Supplies and Materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>2300 Educational Supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>2600 Office Supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>3000 Current Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>3100 Travel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>3200 Communications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>3400 Printing &amp; Binding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>5000 Capital Outlay (Equipment)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>5100 Office Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>5200 EDP Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>TOTAL Regular Term Instruction</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
</tbody>
</table>

#### 151 Libraries

<table>
<thead>
<tr>
<th>Account</th>
<th>Description</th>
<th>Present Resources</th>
<th>Increase Funds</th>
<th>Federal/State or Other Non-state Funds</th>
<th>New Allocations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000 Capital Outlay (Equipment)</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>5600 Library Book/Journal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>TOTAL Libraries</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
</tbody>
</table>

#### 189 General Institutional Support

<table>
<thead>
<tr>
<th>Account</th>
<th>Description</th>
<th>Present Resources</th>
<th>Increase Funds</th>
<th>Federal/State or Other Non-state Funds</th>
<th>New Allocations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 Supplies and Materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>2600 Office Supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>3000 Current Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>3200 Communications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>3400 Printing &amp; Binding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>5000 Capital Outlay (Equipment)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>5100 Office Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>5200 EDP Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>TOTAL General Inst. Support</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
</tbody>
</table>

TOTAL ADDITIONAL COSTS | $0 | $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)

<table>
<thead>
<tr>
<th>Program Category</th>
<th>Change in Student Credit Hours</th>
<th>Instructional - Position Funding Factors</th>
<th>Instructional Positions Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Undergrad</td>
<td>Masters</td>
<td>Doctoral</td>
</tr>
<tr>
<td>Category I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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%**

Purpose 101 Total Academic Requirements: **$118,989**

Purpose 151 Library: **11.48462%**

Purposes 152, 160, 170 180 General Inst Support: **54.04980%**

Neg Adj Factor: **50.00000%**

In-state SCHs: **0**

Financial Aid (in-state): **67.99800%**

Total Requirements: **$196,967**

Fringes for faculty salaries:
- FICA @ 7.65%: **$6,282**
- Retirement @ 9.71%: **$7,974**
- Medical @ $2,933: **$3,849**
- Total: **$18,106**
### SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

**Institution**
\[ \text{UNC Charlotte} \]

**Program (API#, Name, Level)**
\[ 30.9999 \text{ Multidisciplinary Studies, Other (Mathematical Finance)} \]

**Degree(s) to be Granted**
\[ \text{M.S.} \]

**Program Year**
\[ 2004-2005 \]

### ADDITIONAL FUNDING REQUIRED - BY SOURCE

<table>
<thead>
<tr>
<th>Description</th>
<th>Realloc of Present</th>
<th>Enrollment Increase</th>
<th>Federal/State Other Non-state Funds (Identify)</th>
<th>New Allocations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 Regular Term Instruction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1210 SPA Regular Salaries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>1110 EPA Non-teaching Salaries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1310 EPA Academic Salaries</td>
<td>0</td>
<td>82,122</td>
<td>0</td>
<td></td>
<td>82,122</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1810 Social Security</td>
<td>0</td>
<td>6,282</td>
<td></td>
<td></td>
<td>6,282</td>
</tr>
<tr>
<td>1820 State Retirement</td>
<td>0</td>
<td>7,974</td>
<td></td>
<td></td>
<td>7,974</td>
</tr>
<tr>
<td>1830 Medical Insurance</td>
<td>0</td>
<td>3,849</td>
<td></td>
<td></td>
<td>3,849</td>
</tr>
<tr>
<td>2000 Supplies and Materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2300 Educational Supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2600 Office Supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3000 Current Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3100 Travel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3200 Communications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3400 Printing &amp; Binding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5000 Capital Outlay (Equipment)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5100 Office Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5200 EDP Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL Regular Term Instruction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$0</td>
<td>$118,989</td>
<td>$0</td>
<td>$0</td>
<td>$118,989</td>
</tr>
<tr>
<td>151 Libraries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5000 Capital Outlay (Equipment)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5650 Library Book/Journal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL Libraries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$0</td>
<td>$13,665</td>
<td>$0</td>
<td>$0</td>
<td>$13,665</td>
</tr>
<tr>
<td>189 General Institutional Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000 Supplies and Materials</td>
<td>15,000</td>
<td></td>
<td></td>
<td></td>
<td>15,000</td>
</tr>
<tr>
<td>2600 Office Supplies</td>
<td>15,000</td>
<td></td>
<td></td>
<td></td>
<td>15,000</td>
</tr>
<tr>
<td>3000 Current Services</td>
<td>25,000</td>
<td></td>
<td></td>
<td></td>
<td>25,000</td>
</tr>
<tr>
<td>3200 Communications</td>
<td>12,500</td>
<td></td>
<td></td>
<td></td>
<td>12,500</td>
</tr>
<tr>
<td>3400 Printing &amp; Binding</td>
<td>12,500</td>
<td></td>
<td></td>
<td></td>
<td>12,500</td>
</tr>
<tr>
<td>5000 Capital Outlay (Equipment)</td>
<td>24,313</td>
<td></td>
<td></td>
<td></td>
<td>24,313</td>
</tr>
<tr>
<td>5100 Office Equipment</td>
<td>10,000</td>
<td></td>
<td></td>
<td></td>
<td>10,000</td>
</tr>
<tr>
<td>5200 EDP Equipment</td>
<td>14,313</td>
<td></td>
<td></td>
<td></td>
<td>14,313</td>
</tr>
<tr>
<td>TOTAL General Inst. Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$0</td>
<td>$64,313</td>
<td>$0</td>
<td>$0</td>
<td>$64,313</td>
</tr>
<tr>
<td>TOTAL ADDITIONAL COSTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$0</td>
<td>$196,967</td>
<td>$0</td>
<td>$0</td>
<td>$196,967</td>
</tr>
</tbody>
</table>

*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)*

### Change in Instructional - Position

<table>
<thead>
<tr>
<th>Program Category</th>
<th>Undergrad</th>
<th>Masters</th>
<th>Doctoral</th>
<th>Undergrad</th>
<th>Masters</th>
<th>Doctoral</th>
<th>Undergrad</th>
<th>Masters</th>
<th>Doctoral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category I</td>
<td>255</td>
<td>171.44</td>
<td>138.41</td>
<td>0.000</td>
<td>1.487</td>
<td>0.000</td>
<td>1.487</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td>487.37</td>
<td>249.94</td>
<td>146.74</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td>364.88</td>
<td>160.93</td>
<td>122.95</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Category IV</td>
<td>230.52</td>
<td>102.45</td>
<td>70.71</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

### Instructional - Position Salary Rate

- **Total Positions Required**: 1.487
- **Instructional - Position Salary Rate (FY 02)**: $62,573

### Other Academic Costs

- **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

- **General Inst 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

- **Total Requirements**: $223,228

### Fringes for faculty salaries

- **FICA @ 7.65%**: $7,120
- **Retirement @ 9.71%**: $9,037
- **Medical @ $2,933**: $4,363

- **Total Fringes**: $20,520
summary of estimated additional costs for proposed program/track

<table>
<thead>
<tr>
<th>Institution</th>
<th>Date</th>
<th>30.9999 Multidisciplinary Studies, Other (Mathematical Finance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program (AP#, Name, Level)</td>
<td>March 5, 2003</td>
<td>M.S.</td>
</tr>
<tr>
<td>Degree(s) to be Granted</td>
<td>2005-2006</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Institution</th>
<th>Enrollment Increase Funds</th>
<th>Federal/State or Other Non-state Funds (Identify)</th>
<th>New Allocations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 Regular Term Instruction</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1210 SPA Regular Salaries</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1110 EPA Non-teaching Salaries</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1310 EPA Academic Salaries</td>
<td>93,071</td>
<td></td>
<td></td>
<td>93,071</td>
</tr>
<tr>
<td>1810 Social Security</td>
<td>7,120</td>
<td></td>
<td></td>
<td>7,120</td>
</tr>
<tr>
<td>1820 State Retirement</td>
<td>9,037</td>
<td></td>
<td></td>
<td>9,037</td>
</tr>
<tr>
<td>1830 Medical Insurance</td>
<td>4,363</td>
<td></td>
<td></td>
<td>4,363</td>
</tr>
<tr>
<td>2000 Supplies and Materials</td>
<td>7,000</td>
<td></td>
<td></td>
<td>7,000</td>
</tr>
<tr>
<td>2300 Educational Supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2600 Office Supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3000 Current Services</td>
<td>7,262</td>
<td></td>
<td></td>
<td>7,262</td>
</tr>
<tr>
<td>3100 Travel</td>
<td>3,262</td>
<td></td>
<td></td>
<td>3,262</td>
</tr>
<tr>
<td>3200 Communications</td>
<td>2,000</td>
<td></td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td>3400 Printing &amp; Binding</td>
<td>2,000</td>
<td></td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td>5000 Capital Outlay (Equipment)</td>
<td>7,000</td>
<td></td>
<td></td>
<td>7,000</td>
</tr>
<tr>
<td>5100 Office Equipment</td>
<td>2,000</td>
<td></td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td>5200 EDP Equipment</td>
<td></td>
<td></td>
<td></td>
<td>5,000</td>
</tr>
<tr>
<td>TOTAL Regular Term Instruction</td>
<td>134,853</td>
<td></td>
<td></td>
<td>134,853</td>
</tr>
</tbody>
</table>

| 151 Libraries                                    |                            |                                                   |                 |           |
| 5000 Capital Outlay (Equipment)                 | 15,487                     |                                                   |                 | 15,487    |
| 5600 Library Book/Journal                       | 15,487                     |                                                   |                 |           |
| TOTAL Libraries                                  | 15,487                     |                                                   |                 | 15,487    |

| 189 General Institutional Support               |                            |                                                   |                 |           |
| 2000 Supplies and Materials                     | 20,000                      |                                                   |                 | 20,000    |
| 2600 Office Supplies                            | 20,000                      |                                                   |                 | 20,000    |
| 3000 Current Services                           | 25,000                      |                                                   |                 | 25,000    |
| 3200 Communications                             | 12,500                      |                                                   |                 | 12,500    |
| 3400 Printing & Binding                         | 12,500                      |                                                   |                 | 12,500    |
| 5000 Capital Outlay (Equipment)                 | 27,888                      |                                                   |                 | 27,888    |
| 5100 Office Equipment                           | 12,000                      |                                                   |                 | 12,000    |
| 5200 EDP Equipment                              | 15,888                      |                                                   |                 | 15,888    |
| TOTAL General Inst. Support                     | 72,888                      |                                                   |                 | 72,888    |
| TOTAL ADDITIONAL COSTS                          | 223,228                     |                                                   |                 | 223,228   |

Note: Accounts may be added or deleted as required.