REQUIRED COVER PAGE

APPLICATION FOR FACULTY RESEARCH GRANT

**All questions must be completed to be considered for grant award.

Choose one: [X] Creative [ ] Research	**Date of Last FRG Award** (Semester and Year awarded): _____
	Date of ATU Faculty Appointment (Semester and Year): Fall 2001

1. Project Title: Research in Actuarial Mathematics

2. Name of Principal Investigator/Project Director: Dr. Marcel B. Finan

3. School (abbrev): SS **4. Department:** Mathematics

5. Campus Mail Address: Corley 244 **6. PI/PD Campus Phone:** 964-0854

7. Amount Requested: $ 2,000 **8. Total Cost of Project: $** $6,000 - $8,000

9. Does this project involve: **10. Duration of Project:** 3 yr - 4 Yrs

Yes	No	
[ ]	[X]	human subjects?
[ ]	[X]	animals/animal care facility?
[ ]	[X]	radioactive materials?
[ ]	[X]	hazardous materials?
[ ]	[X]	biological agents or toxins restricted by the USA Patriot Act?
[ ]	[X]	copyright or patent potential?
[ ]	[X]	utilization of space **not** currently available to the PI/PD?
[ ]	[X]	the purchase of equipment/instrumentation/software currently **available** to the PI/PD?

NOTE: If the answer is "yes" to any of the above questions, the investigator must attach appropriate documentation of approval or justification for use/purchase.

SIGNATURES

Department Contribution (if applicable): **$**_____

Account Number: _____

Don Carnahan 1/9/07
Chairperson **Date**

School Contribution (if applicable): **$**_____

Account Number: _____

[signature] 1-17-07
Dean **Date**

This Section to be completed by the Office of Academic Affairs

FSBA Committee Award Recommendation: Yes ✓ No ____
FSBA Committee Proposal Rank: ____ of ____ Total Proposals.
Recommendation of VPAA: Yes ✓ No ____
Recommendation of President: Yes ____ No ____
Award Date: 1/25/07

PROPOSED BUDGET
FACULTY RESEARCH/DEVELOPMENT GRANT
(include budget categories as appropriate)

1.	Graduate assistant stipend	$ 500
	Fringe benefits: salary X .0012	
2.	Non-work study stipend	
	Fringe benefits: salary X .0012	
3.	*Supplies (please list items to be purchased and estimated price per item including taxes and shipping, if appropriate):	
	Item No. 1 (e.g., software) Estimated Price	
	Item No. 2 (e.g., copying costs) Estimated Price	
	Item No. 3 Books Estimated Price	$400
	(additional lines as needed)	
	Total estimated supplies	$400
4.	Travel (please list travel expenditures by date and estimated costs):	
	Travel No. 1 Estimated Price	$1,100
	Travel No. 2 Estimated Price	
	Travel No. 3 Estimated Price	
	(additional lines as needed)	
	Total estimated travel	$1,100
5.	*Capital Outlay (please list items to be purchased and estimated price per item including taxes and shipping, if appropriate):	
	Item No. 1 Estimated Price	
	Item No. 2 Estimated Price	
	Item No. 3 Estimated Price	
	(additional lines as needed)	
	Total estimated capital outlay	
	TOTAL PROPOSED BUDGET	$ 2,000

*Items purchased under $2,500 (including taxes and shipping) are considered supply items. Capital Outlay items are those which cost $2,500 or more (including taxes and shipping).

Arkansas Tech University
Russellville, Arkansas

Faculty Research Grant Submission

Title of Project

Research in Actuarial Mathematics

Project Director: Marcel B. Finan
Date Submitted: 01/15/2007
School of Systems Science
Department of Mathematics

Research in Actuarial Mathematics

Marcel B Finan
Department of Mathematics
Arkansas Tech University
Russellville, Ar 72801

Abstract

I am requesting support for my ongoing research in the field of actuarial mathematics. The support will cover a three-year subscription in the North American Actuarial Journal, some books needed for my research, conference expenses to attend the 42 Actuarial Research Conference in Pittsburg, and a stipend for an undergraduate student assisting with the research. The student will complete a Special Problem in Mathematics course under my supervision, and his grade for the course will be based on his performance in this research. At the completion of this research project, the student will take the first exam given by the Casualty of Actuarial Society.

The first phase of the project consists of authoring a manuscript in Probability Theory preparing students to successfully take the first exam offered by the Society of Actuaries or the Casualty Actuarial Society. Also, this manuscript will be used in MATH 4163 as a topic in Applied Mathematics. I am hopeful that the students for such a class will not be limited to just math majors but also include students majoring in Economics, Business, and Computer and Information Technology.

Actuarial programs do not exist in the State of Arkansas. My goals from the research project are to introduce our students to the field of actuarial sciences, add strength to our programs, and also provide additional job opportunities for our graduates.

1 A Brief Information on Actuarial Mathematics

Actuarial Science is the subject at the interface of mathematics and business relating to the assesment of areas involving risk management such as insurance and credit card processing. Actuaries find employment in the insurance industry, as professionals and consultants employed to certify the financial soundness of pension and insurance plans; and in government agencies such as the Social Security Administration, Pension Benefit Guaranty Corporation, and Department of Housing and Urban Development.

The training of Actuaries involves mathematical undergraduate coursework, as well as a solid grounding in business and economics. Actuarial certification issued by the Society of Actuaries (SA) or the Casualty Actuarial Society (CAS), is accomplished through a series of ETS-type examinations with a prescribed syllabus, which for the first several examinations consist primarily of mathematical finance and probability theory.

Nature of the Work
One of the main functions of actuaries is to help businesses assess the risk of certain events such as the risk for a bank or a mortgage company offering a loan to an applicant, and to formulate policies that minimize the cost of that risk. For this reason, actuaries are essential to the insurance industry. Actuaries assemble and analyze data to estimate the probability and likely cost of the occurrence of an event such as death, sickness, injury, disability, or loss of property.

Most actuaries are employed in the insurance industry, specializing in life and health insurance or property and casualty insurance. They produce probability tables which determine the likelihood that a potential future event might generate a claim. From these tables, they estimate the cost a company can expect to pay in claims. For example, property and casualty actuaries calculate the expected amount payable in claims resulting from automobile accidents; an amount that varies with the insured persons age, sex, driving history, type of car, and other factors. Actuaries ensure that the price, or premium, charged for such insurance policies will enable the company to cover claims and other expenses. The premium must be profitable,

yet competitive with other insurance companies. Within the life and health insurance fields, actuaries help in developping long-term-care insurance and annuity policies, the latter a growing investment tool for many individuals.

Employment
Actuaries held about 18,000 jobs in 2004, with 6 out of 10 employed in the insurance industry. A growing number of actuaries work for firms providing a variety of corporate services, especially management and public relations, or for firms offering consulting services. A relatively small number of actuaries are employed by security and commodity brokers and by government agencies.

Earnings
Median annual earnings of actuaries were $76,340 in May 2004. The middle 50 percent earned between $54,770 and $107,650. According to the National Association of Colleges and Employers, annual starting salaries for graduates with a bachelors degree in actuarial science averaged $52,741 in 2005. Insurance companies and consulting firms give merit increases to actuaries as they gain experience and pass examinations. Some companies also offer cash bonuses for each professional designation achieved.

2 Aims of the Project

The first phase of the proposed study consists of authoring a manuscript that prepares students to take the first exam known as Exam P/1. Such a manuscript will be used for a course in Applied Mathematics (MATH 4163) offered by the Mathematics Department (MATH 4163) at Arkansas Tech University. The manuscript will be prepared to accomodate students with background in Mathematics, Economics, and Finance. Three more manuscripts will follow for the next phases. Also, another goal of the study is to involve a senior math major in this ptoject.

References

[1] *42nd Actuarial Research Conference*, August 8 - 11, Sponsored by the Society of Actuaries and the Education and Research Section, Robert

Morris University, Moon Township, Pittesburgh.

[2] *North American Actuarial Journal*, published by the SOA

[3] Sheldon Ross, *A First Course in Probability*, Seventh Edition, Prentice Hall, ISBN 0-13-185662-6.

[4] Saeed Ghahramani, *Fundamentals of Probability*, Second Edition, Prentice Hall, ISBN 0-13-145340-8.

[5] Wackerly, D., Mendenhall III, W. Scheaffer, R., *Mathematical Statistics with Applications*, Sixth Edition, Duxbury Pr, ISBN 0-53-437741-6.

[6] John E. Freund, Irwin Miller, Marylees Miller , *John E. Freund's Mathematical Statistics: With Applications*, Seventh Edition, Prentice Hall, ISBN 0-13-142706-7.

[7] Hassett, M. and Stewart, D., *Probability for Risk Management*, ACTEX Publications INc, ISBN 1-56-698347-9.

[8] Bean, M.A., *Probability: The Science of Uncertainty with Applications to Investments, Insurance and Engineering*, Thomson Learning, ISBN 0-53-436603-1.

[9] Hogg, R.V. and Tanis, E.A., *Probability and Statistical Inference*, Seventh Edition, Prentice Hall, ISBN 0-13-129382-6.

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Department of Mathematics
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Education

Ph.D. Mathematics, University of North Texas, Denton, Texas. Aug. 1998.

M.S. Applied Mathematics, University of Tennessee , Knoxville, Aug. 1992.

M.S. Mathematics, American University of Beirut, Beirut, Lebanon, Dec. 1987

B.S. Mathematics, Haigazian University, Beirut , Lebanon, Aug. 1984.

Work History

Arkansas Tech University, Assistant Professor, 2001 - Present.

University of Texas at Austin, Lecturer, 1999 - 2001.

University of Texas at San Antonio, Visiting Assistant Professor, 1998 - 1999

University of North Texas, Teaching Fellow, 1992 - 1998

University of Tennesee at Knoxville, Teaching Fellow, 1988 - 1992

American University of Beirut, Teaching Assistant, 1984 - 1987

Research

Partial Differential Equations and its applications. Numerical Analysis. Mathematics Education.

Publications

A. Castro and M. B. Finan, "*Existence of Many Positive Nonradial Solutions for a superlinear Dirichlet Problem on Thin Annuli*", Nonlinear Differential

Equations, Electron. J. Diff. Eqns, Conference 05, 2000, pp. 21 - 31.

A. Castro and M. B. Finan, "*Existence of Many Sign-Changing Nonradial Solutions for Semilinear Elliptic Problems in Thin Annuli*", Topological Methods in Nonlinear Analysis, Vol. 13, No. 2 (1999), pp. 273 - 9.

Electronic Textbooks

M. B. Finan, " *A Second Course in Elementary Differential Equations* ", Arkansas Tech University, June 2006.

M. B. Finan, " *A First Course in Elementary Differential Equations: Problems and Solutions* ", Arkansas Tech University, January 2006.

M. B. Finan, " *A First Course in Elementary Differential Equations* ", Arkansas Tech University, January 2006.

M.B. Finan, " *A Second Course in Mathematics Concepts for Elementary School Teachers: Theory, Problems, and Solutions* ", Arkansas Tech University, August, 2005.

M.B. Finan, " *A First Course in Mathematics Concepts for Elementary School Teachers: Theory, Problems, and Solutions*", Arkansas Tech University, May, 2005.

M.B. Finan, " *A Basic Course in Abstract Algebra* ", Arkansas Tech University, December, 2003.

M.B. Finan, " *Functions Modeling Change: A Precalculus Course* ", Arkansas Tech University, March 2003.

M.B. Finan, "*A Semester Course in Trigonometry* ", Arkansas Tech University, March 2003.

M.B. Finan, " *Reform Calculus: Part I* ", Arkansas Tech University, January 2003.

M.B. Finan, " *Reform Calculus: Part II* ", Arkansas Tech University, January 2003.

M.B. Finan, " *A Reform Approach to Business Calculus* ", Arkansas Tech University, December 2002.

M.B. Finan, " *A Reform Approach to College Algebra* ", Arkansas Tech University, October 2002.

M.B. Finan, "*A Problem-Solving Approach to College Algebra* ", Arkansas Tech University, December 2001.

M.B. Finan, "*Lecture Notes in Discrete Mathematics*", University of Texas at Austin, May 2001.

M. B. Finan, "*Fundamentals of Linear Algebra*", University of Texas at Austin,Aug. 2000.

Honors

Listed in *Who's Who in America*, 58th Edition, 2003.

Professional Activities

Marcel B. Finan,"*Existence and Uniqueness Proof for nth Order Linear Differential Equations with Constant Coefficients*", MAA Ok-Ar Proceedings, March 2006.

Marcel B. Finan,"*A Suggested Approach in the Teaching of Reform Mathematics*", MAA Ok-Ar meeting, University of Tulsa, Oklahoma, March 2003.

Marcel B. Finan, "*Existence of many sign-changing non-radial solutions for a superlinear Dirichlet problem on thin annuli*", Texas Partial Differential Equations Seminar, Texas State University, San Marcos, April 2000.

Marcel B. Finan,"*Existence of many positive non-radial solutions for a superlinear Dirichlet problem on thin annuli*", Fourth Mississippi State Conference on Differential Equations and Computational Simulations, Mississipi State University, Starkville, May 1999.

Professional Services

Judge for the *Arkansas Junior Science and Humanities Symposium* (2004 - Present)

AP Calculus Reader (2004 - 2005)

Book Reviewer of *Single Variable Calculus*, Second Edition, by Ostebee/Zorn, Houghton Mifflin Publishing Company (2004)

Book Reviewer of *Functions and Change: A Modeling Approach to College Algebra*, Second Edition, by Crauder/Evans/Noell, Houghton Mifflin Publishing Company (2004)

Book Reviewer of *Advanced Calculus*, by W.A. Kosmala, Prentice Hall Publishing Company (2003)

Referee for the *Electronic Journal of Differential Equations* (1998 - 2000)

Membership

American Mathematical Society
Mathematical Association of America
Project NExT fellow (Ok-Ar Chapter)

Computer Skills

Languages: COBOL, FORTRAN, C++, HTML.
Platforms : MS Dos, Unix, Linux, Windows, Sun OS.

Last updated:December 25, 2006

OFFICE OF ACADEMIC AFFAIRS

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January 25, 2007

Dr. Marcel Finan
Corley 244
Arkansas Tech University
Russellville, AR 72801

Dear Dr. Finan:

Congratulations! Academic Affairs is pleased to announce your application for the Spring, 2007 Faculty Research Grant has been recommended by the Faculty Salary, Benefits, and Awards Committee. Based on this recommendation, Academic Affairs has approved the $2000.00 budget. Requisitions regarding the grant will be processed through your Dean's office and should be expended by June 30, 2007.

Your research on this project is sure to not only benefit your department, but Arkansas Tech University as a whole. We wish you success with this endeavor.

Sincerely,

Jack Hamm
Vice President for Academic Affairs

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Carnahan
File