Florida Atlantic University
Academic Program Review
Department of Mathematical Sciences
Self-Study Report

Program:	Mathematical Sciences
Program Director/ Coordinator Name:	Lee Klingler
Program Self-Study Contact:	Lee Klingler
Self-Study Contact Email:	klingler@fau.edu
Self-Study Contact Phone Number:	561-297-4136

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A. Mission and Purpose of the Program

The mission of the Department of Mathematical Sciences at Florida Atlantic University is to foster understanding of the mathematical sciences, including both pure and applied aspects of the discipline.

We strive to provide first-rate undergraduate and graduate education in the mathematical sciences to our students and to increase mathematical ability in the community at large.

We seek to advance the frontiers of mathematical knowledge by engaging in innovative research and tackling fundamental problems in the mathematical sciences.

We work to bridge research, education, and applications of the mathematical sciences to serve the needs of the local community and the larger global society.

B. Previous External Reviews

The Department of Mathematical Sciences was last reviewed in 2009. That review came at the end of a period of strong national economy and steady growth of FAU's budget, and its overall tone was positive and optimistic. It pointed out that the Department of Mathematical Sciences had made significant and quantifiable progress since the previous program review in 2001, especially in the growth of the doctoral program. The review also noted changes made in the undergraduate degree programs, in which standards were raised, and an improvement in the quality of instruction in lower-division service courses, including the implementation of an online placement test for undergraduate mathematics courses and formation of a "Math Learning Center" to centralize undergraduate tutoring. Research publications by mathematics faculty steadily increased during that period, which also saw the formation of the "Center for Cryptology and Information Security" and the creation of two mathematics research journals originating in the mathematics department. Community outreach focused on "Math Day", the annual high school mathematics competition hosted by FAU's mathematics department, begun in 2005.

Recommendations from the 2009 program review include:

- Continue to consolidate, strengthen, and simplify lower-division mathematics courses.
- Maintain the strength of the graduate program by increasing stipends and increasing numbers.
- Develop a doctoral program in mathematics education.
- Develop interdisciplinary research initiatives with biology.
- Hire in cryptology, mathematics education, dynamical systems, and bioinformatics.
- Strengthen our statistical program and services.
- Increase department space, eventually with the construction of a mathematics building.

Unfortunately, that program review came at the start of a sharp downturn in the national economy and a series of yearly budget cuts to the university. An attempt was made by the university to grow out of the budget shortfall by steadily increasing enrollments, even as faculty positions were lost to budget cuts. The mathematics department struggled to maintain the innovations and progress noted in the 2009 program review and found it difficult to secure resources to implement the recommendations from that review. Nevertheless, some progress has been made.

- Using funds from FAU technology fee grants, the department outfitted three instructional computer labs primarily for use in lower-division mathematics service courses. The department also hires undergraduate students as tutors to work in these labs helping other students with homework
- Graduate stipends have not increased since the last program review, but the number of PhD stipends available for mathematics graduate students increased from 41 to 46.
- The department attempted to hire an established researcher in mathematics education but was not successful. Instead, the department expanded its outreach efforts through expansion of Math Day to middle school and elementary school events, and by establishing both a Math Students' Circle and a Math Teachers' Circle.
- Interdisciplinary research collaborations remain an elusive goal. With the hiring this year of a researcher in dynamical systems with interests in biological modeling, as well as a biostatistician, we have hopes of closer research contacts with biology.
- Besides this year's hiring of two researchers in dynamical systems and one biostatistician, last year the mathematics department hired another researcher in cryptology, with special interest in biometric security.
- In addition to hiring a biostatistician this year, the mathematics department remains committed to expanding its efforts in mathematical statistics, with current discussions of adding a bachelor's degree program in statistics.

- With the completion of the Engineering East building a few years ago, the mathematics department inherited some space in the SE building vacated by the College of Engineering. Much of this space was used to construct instructional computer labs; the rest went to faculty and graduate student offices. Space remains a serious concern, and a new mathematics building is not yet on the horizon.

C. Instruction

1. Undergraduate Programs and Courses

Establishment of Goals

The department will continuously review its undergraduate programs in order to create an environment in which students succeed. In addition, we will attempt to enrich the students' educational experience by monitoring three learning outcomes: content knowledge, communication skills, and critical thinking (see Appendix 1).

Assessment of Student Learning Outcomes

Given the results of the imbedded questions to measure achievement of the Student Learning Outcomes (2013/2014) we concluded that the BA/BS program is in need of certain adjustments to improve its quality. Among them, and to complement the assessment based on the Student Learning Outcomes, the Department will implement "End of Course Reports" on a variety of courses and a committee will analyze the results in order to obtain a good diagnosis of the whole program.

Program Improvement

In the current academic year a new chair of the undergraduate committee has been appointed, and he already has the committee working on an overhaul of the assessment process for the BA/BS programs in mathematics. Specific items to be addressed include (i) examination of the assessment methods and criterion for success for this outcome, (ii) revision of the master syllabi for these three courses (in the case of STA 4442, construction of a master syllabus), (iii) updating of the embedded question pools for these three courses (in the case of STA 4442, construction of an embedded question pool), and (iv) determination of ways in which the analysis and evaluation of the department's undergraduate committee can feed back to the instructors in these courses to effect positive change in student achievement. In addition, the department will give a serious consideration to a proposal to include in our program a Bachelor of Science in Statistics, which should enhance the opportunities for our graduates to compete in the job market.

In the past few years, the efforts of the department at improving undergraduate instruction and student performance have been concentrated more on lower-division mathematics courses, but there have also been initiatives directed at undergraduate courses taken by students in the BA and BS programs in mathematics. Most notably, the establishment of the Math Learning Center in 2009 (see the "Pedagogy/Pedagogical Innovations" subsection below), just after the last academic program review, has centralized the tutoring efforts of the mathematics department. The MLC provides individual tutoring, by appointment, for students in all undergraduate courses, and the chair of the mathematics department works closely with the director of the MLC to provide group tutoring for any class in which students struggle. More recently, the mathematics department is piloting a Learning Assistant program (also described in the "Pedagogy/Pedagogical Innovations" subsection below) aimed at improving student performance in the calculus sequence (taken by all undergraduate mathematics majors and many engineering and science majors), after it became clear that this gateway sequence of courses has had an unacceptably low student success rate. Undergraduate mathematics students are trained and assigned to work with students in individual calculus classes, acting as tutors and mentors, in an attempt to motivate students to perform better. Finally, last year two faculty proposed and implemented an adaptation of the "Moore Method" of guided discovery to three upper-division mathematics courses required of all undergraduate mathematics majors (described in the subsection

"Pedagogy/Pedagogical Innovations" below as well). This initiative is also intended to motivate students to learn better and to provide opportunities for ambitious students to engage in undergraduate research.

State-Approved Prerequisites

Our Core Curriculum and General Education courses have been thoroughly reviewed by FAU's Core Curriculum Committee for compliance with FL SUS requirements (6.017). The University Undergraduate Programs Committee has recommended their approval to the senate, and we fully expect that all courses will be approved at the next senate meeting, thus keeping all of our courses in compliance with these regulations.

Limited Access

The BA and BS programs in mathematics are not limited access programs; they are open to all students admitted to FAU.

Admission Criteria

There are no admissions requirements for the BA or BS degree programs in mathematics. If an entering freshman lists mathematics as major, then they are admitted to our degree program. If a student wishes to change major, then the student must have at least a 2.00 GPA.

Enrollment Information

Table 1 (from IEA) gives headcount of undergraduate majors in mathematics.

Table 1

Annual Headcount (Program CIP: 270101)	Mathematics		College Total	University Total
	2011-2012	2012-2013	2012-2013	2012-2013
Bachelors	145	158	5,617	28,523

Tables 2 and 3 (also from IEA) give state-fundable FTE at the undergraduate level, first the total (Table 2), and then broken down between lower-division and upper-division, and between majors within the department or college and outside of the college (Table 3).

Table 2

Annualized State-Fundable FTE	Mathematics			College Total	University Total
	2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
Undergraduate Total	833.2	985.7	1,040.8	3,948.6	15,335.0

Table 3

Annualized Undergraduate State-Fundable FTE Produced In/Out of Department/College		Mathematics			College of Science	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
Course Level	FTE produced by students who are:					
Lower Division	Majors within the department	16.7	19.7	19.7	202.4	729.1
	Majors outside the department, but within the college	176.4	223.5	226.4	839.9	1,743.9
	Majors outside the college	571.5	664.1	702.6	1,606.2	4,111.2
	Total	764.7	907.3	948.7	2,648.5	6,584.2
Upper Division	FTE produced by students who are:					
	Majors within the department	21.1	22.5	27.6	785.7	5,103.4
	Majors outside the department, but within the college	2.8	3.9	5.0	268.5	2,343.8
	Majors outside the college	44.6	51.9	59.6	246.0	1,303.6
	Total	68.5	78.3	92.1	1,300.2	8,750.8

One sees the striking imbalance between lower-division versus upper-division FTE (by a factor of more than 10) and between FTE produced by non-mathematics majors versus mathematics majors (by a factor of more than 20). This imbalance is an issue which the mathematics department will want to address by strengthening our undergraduate degree programs.

Average Class Size and Faculty/Student Ratio

Table 4 (from IEA) summarizes average class sizes in undergraduate mathematics classes, compared with college and university averages, and also notes the number and percent which were faculty taught. (For mathematics classes, it is primarily the Lecture/Seminar classes which are of interest here.)

Table 4

Undergraduate Classes		Mathematics			College Total	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
Type						
Lecture/ Seminar	# Sections	252	288	303	692	5,154
	# Enrolled	10,749	12,708	13,362	47,552	192,004
	Avg Section Enrollment	42.7	44.1	44.1	68.7	37.3
	# Faculty Taught	174	192	197	475	3,487
	% Faculty Taught	69.0	66.7	65.0	68.6	67.7
Lab	# Sections	68	7	1	633	931
	# Enrolled	1,545	156	7	12,456	18,859
	Avg Section Enrollment	22.7	22.3	7.0	19.7	20.3
	# Faculty Taught	4	1	1	345	502
	% Faculty Taught	5.9	14.3	100.0	54.5	53.9
Discussion	# Sections		6	12	125	258
	# Enrolled		120	263	3,989	7,208
	Avg Section Enrollment		20.0	21.9	31.9	27.9
	# Faculty Taught		6	12	78	211
	% Faculty Taught		100.0	100.0	62.4	81.8
Other Course Types	# Sections	8	6	12	322	1,380
	# Enrolled	9	8	21	974	8,897
	Avg Section Enrollment	1.1	1.3	1.8	3.0	6.4
	# Faculty Taught	8	6	12	304	1,073
	% Faculty Taught	100.0	100.0	100.0	94.4	77.8

In addition, for the 2012-2013 academic year, there were 158 undergraduate majors and 37 faculty, for a student-to-faculty ratio of approximately 4.3 to 1.

The low student-to-faculty ratio reflects the small number of undergraduate mathematics majors compared with the size of the faculty. As noted earlier, non-mathematics majors produce a large proportion of the undergraduate FTE in the mathematics department. The average class size for lectures and seminar classes in mathematics compares favorably with the college and university (somewhat less than the college average but greater than the university average). Approximately two-thirds of these classes in mathematics are faculty-taught, nearly identical with the percentage for the college and for the university. We note here that a majority of the mathematics classes taught by non-faculty are in fact taught by graduate teaching assistants as part of their professional academic training.

Curriculum

The following is a comparison of the undergraduate degree programs in mathematics at FIU and FAU.

BS in Mathematics

Admission: At both institutions, students must satisfy the University requirements. Also, a minimum GPA is required to transfer students.

FIU: To qualify for admission to the program, FIU undergraduates must have met all the lower division requirements including CLAST, completed 60 semester hours, and must be otherwise acceptable into the program.

FAU: There are no admissions requirements for the BA or BS degree programs in mathematics. If an entering freshman lists mathematics as major, then they are admitted to our degree program. If a student wishes to change major, then the student must have at least a 2.00 GPA.

Description (excerpts)

FIU: "…offers students the depth and rigor required for graduate studies in mathematics or related fields and also offers a broad background appropriate for students planning to pursue a job in a variety of careers in business, industry, government, or teaching."

FAU: "…prepares students for career opportunities in the mathematical sciences. With suitably chosen electives, constitutes an excellent background for a wide range of careers, in particular as a systems analyst, mathematics teacher, actuary and statistician, including those that require further study at the graduate level."

Duration of program: 120 credits, both institutions.

FIU: 120 credits, 60 of which in Mathematics course. The completion of the remaining 60 credits must be done upon approval of their advisers.

FAU: 120 credits, 57 of which in Mathematics courses. The completion of the remaining 63 credits must be done upon approval of their advisers.

Graduation

FIU: Graduation requires a grade of C or higher in all courses required for the major.

FAU: Graduation requires that the GPA on the 57 credits in mathematics courses be at least 2.5

Courses

FIU: Lower division courses (similar to FAU). However, the two courses Discrete Mathematics and Matrix Theory do not seem to appear as required courses in FIU.

FAU: Lower division courses (similar to FIU). Discrete Mathematics and Matrix Theory are required courses in FAU.

FIU: Upper division required (similar to FAU). Electives: 18 credits.

FAU: Upper division required (similar to FIU). Electives: 15 credits.

Conclusion: The BS programs at FAU and FIU are quite similar. Admission requirements appear to be minimal for both programs; the number of required mathematics credits are nearly identical for the two programs; and graduation requirements (grade of C or higher in all courses required for the major versus GPA of 2.5 or higher in all mathematics courses) would not appear to make much difference in graduation rates for the two programs.

BA in Mathematics

FIU: BA in Mathematics with Major in Mathematics Education. The BA with a major in Mathematics Education program provides students with pedagogical content knowledge and skills necessary to ensure their successful induction and long-term participation in the teaching profession and leads to a professional teaching certificate awarded by the Department of Education.

FAU: BA in Mathematics. "…prepares students for career opportunities in the mathematical sciences. With suitably chosen electives, constitutes an excellent background for a wide range of careers, in particular as a systems analyst, mathematics teacher, actuary and statistician, including those that require further study at the graduate level."

The program offered by FAU does not include courses such as Science Education, Teaching and Learning Secondary Mathematics, and the like, because it is not the purpose of the program.

Conclusion: The two BA's programs are not comparable, because FIU's program is focused on preparing students to teach mathematics, while FAU's program is intended to prepare students for a variety of career options in addition to teaching. (FAU has a separate undergraduate degree program in secondary mathematics education, housed in the College of Education.) Consequently, FAU's program must be both broader and more flexible in its preparation of students for careers in mathematics.

Internships, Practicum, Study Abroad, Field Experiences

The department has contacted FAU alumni with a survey whose limited results showed the level of satisfaction with the education and training received with the BA/BS in Mathematics. The desirability of offering internships was frequently cited by respondents as a means to improve our undergraduate programs. Given that at local level internships are very rarely available to our mathematics graduates, the department will aggressively advertise to our students summer internship opportunities, usually available nationwide.

Two faculty members from the mathematics department have been working on study-abroad and exchange programs with a few universities in China, but these are still at the planning stage.

Pedagogy/Pedagogical Innovations

The Math Learning Center (MLC), a drop-in tutoring center staffed by graduate teaching assistants from the Department of Mathematical Sciences, was established in 2009 to increase the success rate of students in undergraduate mathematics classes. In 2011, the MLC received International Tutor Training Program Certification from the College Reading and Learning Association and provides tutor training to all graduate teaching assistants in mathematics. Faculty are asked to put the following in their course syllabi:

> FREE MATH TUTORING for FAU students: The Math Learning Center (MLC), located in GS211, is staffed by graduate students (and instructors) in mathematics. The MLC provides the following FREE academic support services for FAU students:
> 1. Drop-in tutoring during all hours of operation: Monday - Thursday: 9am - 6pm, and Friday: 9am - 4pm
> 2. One-on-one tutoring by appointment: Email mlc@sci.fau.edu OR see the Assistant Director in GS211E
> 3. eTutoring (remote online tutoring): Find the schedule at www.math.fau.edu/MLC/remote/
> 4. Review sessions:
> a. Find announcements at www.math.fau.edu/MLC for face-to-face reviews
> b. Find announcements at www.math.fau.edu/MLC/remote/ for online reviews
> c, Recordings of online reviews are posted here
> 5. Succeed At Methods: See your SAM Specialist at the MLC
> a. Additional homework help for Methods of Calculus is available in computer lab GS207
> b. Visit www.math.fau.edu/MLC for hours of operation

Table 5 gives the usage of the MLC for fall 2013 and spring 2014.

Table 5

Course	***Visits***		***Unique Students***	
Semester	Fall 2013	Spring 2014	Fall 2013	Spring 2014
MAA4200 Total:	36	17	9	5
MAA4402 Total:	0	20	0	9
MAC1105 Total:	601	578	134	89
MAC1114 Total:	235	267	51	54
MAC1140 Total:	185	43	46	30
MAC1147 Total:	9	23	5	10
MAC2233 Total:	2662	2480	448	367
MAC2281 Total:	219	182	54	28
MAC2282 Total:	495	433	61	43
MAC2311 Total:	514	277	65	42
MAC2312 Total:	308	583	45	48
MAC2313 Total:	381	293	64	39
MAD2104 Total:	96	152	18	21
MAD2502 Total:	50	8	10	5
MAD3400 Total:	5	0	2	0
MAE4350 Total:	0	6	0	4
MAE4360 Total:	3	0	1	0
MAP2302 Total:	87	12	11	1
MAP3305 Total:	353	371	35	51
MAP4172 Total:	2	0	2	0
MAP4173 Total:	0	1	0	1
MAP4306 Total:	57	126	5	19

MAS2103 Total:	36	24	16	12
MAS3203 Total:	1	5	1	4
MAS4107 Total:	39	75	11	11
MAS4301 Total:	36	238	9	20
MAS4304 Total:	4	0	2	0
MAS5311 Total:	6	0	1	0
MAT1033 Total:	70	2	7	1
MAT4937 Total:	0	14	0	4
MAT6907 Total:	3	0	1	0
MGF1106 Total:	138	88	34	19
MGF1107 Total:	42	46	15	5
MHF3404 Total:	0	6	0	5
MTG3212 Total:	7	0	2	0
STA2023 Total:	165	188	56	80
STA3163L Total:	1	0	1	0
STA3173 Total:	3	1	2	1
STA4032 Total:	5	7	4	5
STA4102 Total:	0	5	0	2
STA4234 Total:	15	0	6	0
STA4442 Total:	38	41	8	8
STA4443 Total:	0	8	0	4
STA4821 Total:	8	8	6	6
STA7114 Total:	0	1	0	1
Totals	***6915***	***6629***	***1248***	***1054***

The MLC also began online tutoring for select mathematics classes two years ago, and at present this tutoring is available for the three largest-enrollment courses offered by the mathematics department, College Algebra, Methods of Calculus, and Introductory Statistics, as well as Trigonometry.

In addition to this tutoring training for graduate teaching assistants, the mathematics department supervises their classroom teaching by means of course coordinators, who are faculty who monitor the graduate teaching assistants' classes to aid in their professional growth while ensuring uniformity in course content. Course coordinators design course syllabi and exams, hold regular meetings with graduate teaching assistants, and observe their classes to provide valuable feedback in pedagogy.

In the current semester, the mathematics department is piloting a Learning Assistant (LA) program, with two LA's in Calculus 1. LA's are undergraduates who have done very well in their mathematics courses. They are closely supervised by the faculty instructor and receive ongoing pedagogical training. The LA's work closely with the students in the class, answering questions, providing tutoring, and motivating the students to learn. The Colorado LA model at the University of Colorado-Boulder uses the transformation of large-enrollment science courses as a mechanism for achieving four goals:

- To recruit and prepare talented science majors for careers in teaching;
- To engage science faculty in the recruitment and preparation of future teachers;
- To improve the quality of science education for all undergraduates; and
- To transform departmental cultures to value research-based teaching for ourselves and for our students.

Depending on the success of this pilot LA program in Calculus 1 this semester, we hope to increase the number of LA's and expand to the entire Calculus sequence.

The Department of Mathematical Sciences has been offering eLearning sections of a variety of lower-division courses since 2011, including College Algebra, Trigonometry, Precalculus Algebra, Methods of Calculus, Mathematics for Liberal Arts 2, and Introductory Statistics. The intent is to provide sufficient online courses

so that undergraduate students can satisfy the quantitative general education requirements as part of a fully-online undergraduate degree program. The mathematics department has recently begun offering eLearning sections of select upper-division courses.

We are also testing a student-centered approach this term with Introductory Statistics (STA 2023). This course is being redesigned to take a much more practical approach to the learning of statistics, centered on the use of Microsoft Excel to analyze and interpret large data sets. The emphasis is on correct application of statistical methodology and appropriate interpretation of results, and the course has eliminated the computation of formulas by hand that is endemic in the teaching of statistics. The response of the students is positive here also; we have already noted a substantial decrease in students who drop the class.

A few mathematics faculty have been active in incorporating project-based learning in their classes, especially in calculus classes. They have found that having students apply mathematics to real-world problems and present the results to the whole class is an effect way to motivate students to learn. There is growing interest among the more conservative faculty in trying this approach in calculus classes. A few mathematics faculty have also been active in the "Distinction through Discovery" program which grew out of FAU's Quality Enhancement Plan during the recent SACS accreditation review. Last year these faculty proposed and implemented an adaptation of the "Moore Method" of guided discovery to three upper-division mathematics courses required of all undergraduate mathematics majors. We hope to determine what impact this project has had on the undergraduate degree programs in mathematics and whether this effort should be continued and perhaps expanded.

(More pedagogical innovations are mentioned below in the section "Other Program Goals".)

Scope of Institutional Contributions

The Intellectual Foundations Program (IFP) is FAU's implementation of the general education requirements for entering freshman. The quantitative portion of the IFP requires that students complete two courses from the following lists, with at least one of the courses from Group A:

Group A	
MAC 1105	College Algebra
MAC 2311	Calculus-Analytic Geometry 1
MGF 1106	Mathematics for Liberal Arts 1
MGF 1107	Mathematics for Liberal Arts 2
STA 2023	Introductory Statistics

Group B	
MAC 1114	Trigonometry
MAC 1140	Precalculus Algebra
MAC 1147	Precalculus Algebra & Trigonometry
MAC 2233	Methods of Calculus
PHI 2102	Logic
MAC 2281	Calculus for Engineers 1
MAC 2282	Calculus for Engineers 2
MAC 2312	Calculus-Analytic Geometry 2

(In fact MAC 2281 and MAC 2282 are no longer offered at FAU.) All of these courses except PHI 2102 are offered through the mathematics department and account for approximately 77% of our undergraduate enrollments.

Service courses offered by the Department of Mathematical Sciences include the IFP courses above, together with MAC 2313 (Calculus-Analytic Geometry 3), MAD 2104 (Discrete Mathematics), MAP 3305 (Engineering Mathematics 1), MAP 4306 (Engineering Mathematics 2), and STA 4032 (Probability & Statistics for Engineers). The mathematics department regularly cross-lists STA 3173 (Introduction to Biostatistics), a course shared with the biology department, and frequently cross-lists honors mathematics courses offered by the honors college.

The Department of Mathematical Sciences offers certificate programs in Actuarial Science and Statistics. Enrollment in these programs is small, and data is not available.

Student Profile

Table 6 (from IEA) gives the student diversity and demographics of undergraduate mathematics majors, compared with college and university totals.

Table 6

Undergraduate (Program CIP: 270101)		Mathematics		College Total	University Total
		2011-2012	2012-2013	2012-2013	2012-2013
American Indian/ Alaskan Native	Female			23	96
	Male			13	77
	Total			36	173
Asian or Pacific Islander	Female	8	8	247	776
	Male	3	2	145	664
	Total	11	10	392	1,440
African American (Not of Hispanic Origin)	Female	22	16	769	3,535
	Male	14	20	334	2,129
	Total	36	36	1,103	5,664
Hispanic	Female	12	13	952	3,922
	Male	13	20	435	2,855
	Total	25	33	1,387	6,777
White (Not of Hispanic Origin)	Female	29	38	1,576	7,431
	Male	42	37	956	6,217
	Total	71	75	2,532	13,648
Non-Resident Alien	Female	1	3	87	318
	Male			30	294
	Total	1	3	117	612

Undergraduate (Program CIP: 270101)		Mathematics		College Total	University Total
		2011-2012	2012-2013	2012-2013	2012-2013
Not Reported	Female	1	1	33	130
	Male		0	17	79
	Total	1	1	50	209
Total	Female	73	79	3,687	16,208
	Male	72	79	1,930	12,315
	Total	145	158	5,617	28,523

From Table 6, one sees a good balance between female and male undergraduate mathematics majors, as well as strong representation of both African Americans and Hispanics.

No data is available on scholarly activity of undergraduate mathematics majors. Registration for Directed Independent Study (DIS) and Honors Thesis credit by undergraduate mathematics majors tends to be quite small. For example, there were no undergraduate DIS or Honors Thesis mathematics students in fall 2013, and only 5 undergraduate DIS students and 1 undergraduate Honors Thesis student in spring 2014. (Moreover, 3 of the 5 undergraduate DIS students were using the DIS credit to take a graduate class listed in the schedule.) The department has averaged approximately one undergraduate honors graduate per year over the last few years.

Little data is available for the number of undergraduate mathematics majors receiving scholarships and assistantships, other than the percentage of Pell eligible students (from IEA): 35.7% in fall 2009, 40.5% in fall 2010, 38.1% in fall 2011, 37.5% in fall 2012, and 39.3% in fall 2013. These percentages are comparable to those for FAU students in general.

Advising Procedures

All students are advised centrally through University Advising Services in their first and second years (up to 45 credits). Thereafter, advising of undergraduate science majors is centralized in the Charles E. Schmidt College of Science Student Services Office. The advisor assigned to mathematics majors works closely with faculty in the Department of Mathematical Sciences to ensure that students are given correct information.

Advising begins at orientation in the CESCOS Student Services Office and includes:

- Evaluation if IFP/General Education and Language Requirements.
- Initial advising for foundational coursework in the major: Calculus 1, 2, and 3, Discrete Mathematics, Matrix Theory, Introduction to Computational Mathematics, and Chemistry or Physics.
- Preparation of evaluation of mathematics courses by faculty advisors if necessary.
- Guidance in minors and certificates appropriate to vocational career objectives.

Ongoing advising occurs in the CESCOS Student Services Office for at least two semesters; this includes:

- Follow up on IFP/General Education and Language Requirements.
- Recommendations for required core courses.
- Referral to faculty advisors (generally after foundational coursework is near completion)
- Continued guidance in minors and certificates appropriate to vocational career objectives.

After three semesters, students are directed to seek faculty advising for all advanced courses and electives. The CESCOS Student Services Office continues to serve as a resource for clerical and administrative advising functions, guidance in minors and certificates appropriate to vocational career objectives, and any related advising issues of a general nature.

Licensure Rates

There is no licensing program for mathematicians.

Placement Rates/Employment Profile

The Department of Mathematical Sciences does not collect or receive placement data for undergraduate mathematics majors. Some students do stay on to do graduate studies in mathematics at FAU; for example, 3 of the last 10 students graduating with a PhD in mathematics from FAU completed their undergraduate degrees at FAU as well. It would appear that most undergraduate mathematics majors, however, seek employment after graduation.

Retention rates

Tables 7 and 8 (from IEA) show retention (and graduation) rates for FTIC undergraduate mathematics majors through second and fourth years, since the year 2000.

Table 7

Outcomes through year 2		Entering Year												
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total	#	10	14	8	4	6	10	6	10	7	16	19	19	16
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Graduate @ FAU	#	-	-	-	-	-	-	-	-	-	-	-	1	-
	%	-	-	-	-	-	-	-	-	-	-	-	5.3	-
Graduate @ other SUS Institution	#	-	-	-	-	-	-	-	-	-	-	-	-	-
	%	-	-	-	-	-	-	-	-	-	-	-	-	-
Persist	#	8	10	6	3	5	6	6	8	6	12	13	16	-
	%	80.0	71.4	75.0	75.0	83.3	60.0	100.0	80.0	85.7	75.0	68.4	84.2	-
Transfer to other SUS	#	-	1	-	-	-	2	-	-	-	1	-	-	-
	%	-	7.1	-	-	-	20.0	-	-	-	6.3	-	-	-
Leave	#	2	3	2	1	1	2	-	2	1	3	6	2	-
	%	20.0	21.4	25.0	25.0	16.7	20.0	-	20.0	14.3	18.8	31.6	10.5	-

Table 8

Outcomes through year 4		Entering Year												
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total	#	10	14	8	4	6	10	6	10	7	16	19	19	16
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Graduate @ FAU	#	5	4	3	-	1	2	-	1	-	3	-	-	-
	%	50.0	28.6	37.5	-	16.7	20.0	-	10.0	-	18.8	-	-	-
Graduate @ other SUS Institution	#	-	-	-	1	-	1	-	-	-	1	-	-	-
	%	-	-	-	25.0	-	10.0	-	-	-	6.3	-	-	-
Persist	#	3	5	3	1	3	4	4	5	4	5	-	-	-
	%	30.0	35.7	37.5	25.0	50.0	40.0	66.7	50.0	57.1	31.3	-	-	-
Transfer to other SUS	#	-	1	-	-	-	1	2	1	-	-	-	-	-
	%	-	7.1	-	-	-	10.0	33.3	10.0	-	-	-	-	-
Leave	#	2	4	2	2	2	2	-	3	3	7	-	-	-
	%	20.0	28.6	25.0	50.0	33.3	20.0	-	30.0	42.9	43.8	-	-	-

Table 9 (from IEA) shows retention (and graduation) rates for undergraduate mathematics majors transferring from a Florida public community college (with or without an AA degree), through second year, since the year 2000.

Table 9

Outcomes through year 2		Entering Year												
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total	#	14	12	14	12	13	14	10	9	12	21	17	17	22
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Graduate @ FAU	#	3	3	4	-	2	4	3	3	2	2	3	3	-
	%	21.4	25.0	28.6	-	15.4	28.6	30.0	33.3	16.7	9.5	17.6	17.6	-
Graduate @ other SUS Institution	#	1	-	-	-	-	-	-	-	-	-	-	-	-
	%	7.1	-	-	-	-	-	-	-	-	-	-	-	-
Persist	#	8	8	8	10	9	8	5	5	5	16	9	10	-
	%	57.1	66.7	57.1	83.3	69.2	57.1	50.0	55.6	41.7	76.2	52.9	58.8	-
Transfer to other SUS	#	1	1	-	-	-	-	-	-	-	-	-	1	-
	%	7.1	8.3	-	-	-	-	-	-	-	-	-	5.9	-
Leave	#	1	-	2	2	2	2	2	1	5	3	5	3	-
	%	7.1	-	14.3	16.7	15.4	14.3	20.0	11.1	41.7	14.3	29.4	17.6	-

For FTIC undergraduate mathematics majors, the average two-year retention plus graduation rate is approximately 78.6%, and the four-year retention plus graduation rate is approximately 60.5%. For undergraduate mathematics majors transferring from a Florida public community college (with or without an AA degree), the average two-year retention plus graduation rate is approximately 80.8%. The numbers are rather small, however, and hard to evaluate.

Graduation rates

Table 10 (from IEA) shows the six-year graduation rate for FTIC undergraduate mathematics majors, since the year 2000.

Table 10

Outcomes through year 6		Entering Year												
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total	#	10	14	8	4	6	10	6	10	7	16	19	19	16
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Graduate @ FAU	#	7	7	4	-	5	5	2	4	-	-	-	-	-
	%	70.0	50.0	50.0	-	83.3	50.0	33.3	40.0	-	-	-	-	-
Graduate @ other SUS Institution	#	-	-	-	1	-	2	1	-	-	-	-	-	-
	%	-	-	-	25.0	-	20.0	16.7	-	-	-	-	-	-
Persist	#	1	1	1	1	-	1	1	2	-	-	-	-	-
	%	10.0	7.1	12.5	25.0	-	10.0	16.7	20.0	-	-	-	-	-
Transfer to other SUS	#	-	-	1	-	-	-	1	-	-	-	-	-	-
	%	-	-	12.5	-	-	-	16.7	-	-	-	-	-	-
Leave	#	2	6	2	2	1	2	1	4	-	-	-	-	-
	%	20.0	42.9	25.0	50.0	16.7	20.0	16.7	40.0	-	-	-	-	-

Table 11 (from IEA) shows the four-year graduation rate for undergraduate mathematics majors transferring from a Florida public community college (with or without an AA degree), since the year 2000.

Table 11

Outcomes through year 4		Entering Year												
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total	#	14	12	14	12	13	14	10	9	12	21	17	17	22
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Graduate @ FAU	#	7	9	10	5	7	11	7	7	6	12	-	-	-
	%	50.0	75.0	71.4	41.7	53.8	78.6	70.0	77.8	50.0	57.1	-	-	-
Graduate @ other SUS Institution	#	2	-	-	-	-	-	-	-	-	-	-	-	-
	%	14.3	-	-	-	-	-	-	-	-	-	-	-	-
Persist	#	4	1	2	5	1	2	-	-	-	8	-	-	-
	%	28.6	8.3	14.3	41.7	7.7	14.3	-	-	-	38.1	-	-	-
Transfer to other SUS	#	-	1	-	1	-	-	-	-	-	-	-	-	-
	%	-	8.3	-	8.3	-	-	-	-	-	-	-	-	-
Leave	#	1	1	2	1	5	1	3	2	6	1	-	-	-
	%	7.1	8.3	14.3	8.3	38.5	7.1	30.0	22.2	50.0	4.8	-	-	-

Table 12 (from IEA) shows the total number of BA/BS degrees in mathematics awarded, by year, since 2001-2002. (A degree awarded with a single major contributes one degree, and a double major contributes one-half degree.)

Table 12

	Year Degree Granted													All
	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	
Single major	19.0	16.0	20.0	28.0	24.0	20.0	29.0	24.0	25.0	28.0	27.0	27.0	33.0	320.0
Double major		1.0		0.5			1.5			1.0		1.0		5.0
Total	19.0	17.0	20.0	28.5	24.0	20.0	30.5	24.0	25.0	29.0	27.0	28.0	33.0	325.0

For FTIC undergraduate mathematics majors, the average six-year graduation rate is approximately 47.1%. For undergraduate mathematics majors transferring from a Florida public community college (with or without an AA degree), the average four-year graduation rate is approximately 62.5%. As in the case of retention, the numbers are rather small and hard to evaluate, but they compare favorably with the university graduate rates.

Student Recruitment

On its web page, the department offers students information on research and other job options for those pursuing a BA/BS in Mathematics. Prospective students are also contacted by phone by faculty members to encourage them to become BA/BS Mathematics students at FAU. The Department of Mathematical Sciences offers a series of events designed to increase interest in mathematics, recognize mathematical excellence and inspire local elementary, middle and high school students to pursue careers in mathematics and feel attracted to join the BA/BS Mathematics program. Some of these events are:

High School Math Day:
A day of competitions and for high school students and their teachers with an opportunity to share an appreciation of mathematics, to exchange ideas, and to interact with FAU Mathematics faculty.

Mini-Math Day:
One whole grade from a local elementary school is hosted to participate in a program of mathematically related fun and games. This event is designed to promote mathematical excellence and inspire mathematical talent early in our youth.

Middle School Math Day:
This event combines a national competition, mathematical talks and a team game. Students have a chance to interact with FAU Mathematics faculty while engaging in both national and local competition.

Internet Competition:
An online competition for high school students to encourage students' problem solving skills and mathematical ingenuity, as well as, prepare students for the formal MAA competition.

American Mathematics Competition (AMC):
Top scoring participants high school students have the chance to qualify for the National Team to represent the USA in the International Mathematical Olympiad.

Math Students' Circle at FAU:
In this newest addition to our Math Days program, faculty members meet approximately eight Saturdays per semester with local middle-school students and solve challenging mathematical problems together.

Math Teachers' Circle at FAU:
Allows middle school teachers to interact with FAU faculty and create a dynamic community of math educators.

2. Graduate Programs and Courses

Assessment and Program Improvement

For assessment purposes we do not implement a fine-grained distinction between the different pathways towards the MS degree, and mainly distinguish between the MS program and the Ph.D. program. For each of these programs we look at three outcomes.

MS program.

- Outcome 1: Students completing the program will have a solid foundation of knowledge in the fields of algebra, analysis and/or statistics (depending on their track).
- Outcome 2: Students completing the program will have acquired critical thinking skills.
- Outcome 3: Students completing the program will have acquired skills in the communication of mathematical ideas.

Ph.D. program.

- Outcome1: Students completing their first two years in the program will have a solid foundation of knowledge in the fields of algebra and analysis.
- Outcome 2: Students completing the program will have acquired the skills to become independent researchers which may include: the ability to recognize substantial research problems, original and critical thinking, the ability to analyze critically and evaluate one's research results and those of others.
- Outcome 3: Students completing the program will have acquired skills in the communication of mathematical ideas.

To evaluate the outcomes, we have developed two dedicated assessment forms. For qualifying examinations, MS exams, Prelim examinations, and thesis defenses, faculty completes the pertinent sections of this form. The resulting data is analyzed and brought to the departmental graduate committee for evaluation. Depending on the outcome, this committee initiates changes to the graduate program.

For example, when it became clear that graduate students were struggling to pass the PhD qualifying exams in mathematics, qualifier preparation courses were added to the summer schedules beginning in 2010, resulting in a modest increase in the number of students passing these exams and admitted to candidacy. In spring 2014, the department began a seminar for beginning graduate students, introducing them to the research interests of the faculty and instructing them in the study and research skills necessary for success in the mathematics doctoral program.

The MST in mathematics aims at enriching students' knowledge of advanced mathematics and skills of critical analysis relevant to their teaching careers. We assess students' achievement through written exams and classroom presentations. The results indicate that these goals have been achieved, and we shall continue with a balance of written exams and oral presentations.

Limited Access

The MS, MST, AMST, and PhD programs are not limited access programs.

Admission Criteria

For admission into the doctoral program, applications are evaluated individually, but the following credentials are required:

- A Bachelor's degree in Mathematics with at least 3.0 GPA (or equivalent). For Applicants without a Bachelor's degree with a major in Mathematics, as a minimum completion of coursework (equivalent to) with a 3.0 GPA is expected:
    - MAC 2311 Calculus-Analytic Geometry 1
    - MAC 2312 Calculus-Analytic Geometry 2
    - MAC 2313 Calculus-Analytic Geometry 3
    - MAS 2103 Matrix Theory (MAS 4107 Linear Algebra 2 is strongly recommended)
    - MAD 2104 Discrete Mathematics
    - MAA 4200 Modern Analysis
    - MAS 4301 Modern Algebra
    - STA 4442 Probability and Statistics 1
- Three letters of recommendation documenting the applicant's prior work in mathematics focusing on preparation and suitability for success in graduate-level mathematics courses.
- A quantitative general GRE (revised) score of at least 157, and approval of the departmental graduate committee. In addition, it is recommended to include scores of the GRE subject test mathematics as part of the application package.

For admission into the Master's program the formal criteria are identical with the exception of the GRE (revised) score, where a minimum of 155 on the quantitative reasoning section is required.

Admission into the MST in mathematics degree program requires a bachelor's degree in mathematics or the equivalent. Applicants who do not meet this criterion are required to complete the equivalent of Modern Algebra (MAS 4301) and Modern Analysis (MAA 4200).

Enrollment information

Table 13 (MS, MST, and PhD) and Table 14 (AMST), both from IEA, give headcount of graduate majors in mathematics.

Table 13

Annual Headcount (Program CIP: 270101)	Mathematics		College Total	University Total
	2011-2012	2012-2013	2012-2013	2012-2013
Masters/Specialist	32	21	228	4,675
Doctoral	47	54	279	927

Table 14

Annual Headcount (Program CIP: 270301)	Applied Mathematics & Statistics		College Total	University Total
	2011-2012	2012-2013	2012-2013	2012-2013
Masters/Specialist	11	6	228	4,675

Tables 15 and 16 (also from IEA) give state-fundable FTE at the graduate level, broken down according to course level and between classroom versus thesis-dissertation (Table 15), and broken down between majors within the department or college and outside of the college (Table 16).

Table 15

Annualized Graduate State-Fundable FTE	Mathematics			College Total	University Total
	2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
Graduate Total	50.1	41.8	36.4	228.2	2,223.7
Grad I	18.2	17.6	12.4	98.5	1,838.4
Grad II	31.9	24.2	23.9	129.7	385.2
Classroom	38.6	36.5	32.6	183.2	2,085.9
Thesis-Dissertation	11.6	5.3	3.8	45.1	137.7

Table 16

Annualized Graduate State-Fundable FTE Produced In/Out of Department/College	Mathematics			College of Science	University Total
	2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
FTE produced by students who are:					
Majors within the department	40.7	35.5	31.6	188.3	1,730.7
Majors outside the department, but within the college	0.4	1.1	0.7	17.0	348.5
Majors outside the college	9.1	5.2	4.2	22.9	144.4
Total	50.1	41.8	36.4	228.2	2,223.7

The decrease in graduate FTE in mathematics over the period 2010-2013 appears to have two primary causes. First, the middle school track of the MST degree program saw a sharp decline in enrollments after the end of the NSF-sponsored project which had initiated that track six years earlier, probably because the department was no longer able to pay stipends to students in the program. Second, changes in university policy concerning tuition waivers enacted during this period resulted in a reduction of dissertation credits from 9 credits per semester to 1 credit per semester, for doctoral students admitted to candidacy. More difficult to explain is the decrease in graduate FTE in mathematics by majors outside of the department during this period. Most of the decline occurs from 2010-2011 to 2011-2012; no data is available to account for this decrease.

Average Class Size and Faculty/Student Ratio

Table 17 (from IEA) summarizes average class sizes in graduate mathematics classes, compared with college and university averages, and also notes the number and percent which were faculty taught. (For mathematics classes, it is primarily the Lecture/Seminar classes which are of interest here.)

Table 17

Graduate Classes		Mathematics			College Total	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
Type		252	288	303	692	5,154
Lecture/ Seminar	# Sections	35	33	25	167	1,575
	# Enrolled	419	388	289	1,386	22,406
	Avg Section Enrollment	12.0	11.8	11.6	8.3	14.2
	# Faculty Taught	35	33	25	158	1,318
	% Faculty Taught	100.0	100.0	100.0	94.6	83.7
Lab	# Sections				1	42
	# Enrolled				20	465
	Avg Section Enrollment				20.0	11.1
	# Faculty Taught				1	26
	% Faculty Taught				100.0	61.9
Other Course Types	# Sections	68	72	72	756	1,951
	# Enrolled	108	100	101	1,080	4,840
	Avg Section Enrollment	1.6	1.4	1.4	1.4	2.5
	# Faculty Taught	68	72	72	703	1,831
	% Faculty Taught	100.0	100.0	100.0	93.0	93.8

Not surprisingly, all graduate classes are taught by faculty.

In addition, for the 2012-2013 academic year, there were 81 graduate mathematics majors and 23 tenure-track faculty, for a student-to-faculty ratio of approximately 3.5 to 1. For the graduate programs, this ratio is rather high, since mentoring graduate students is more labor-intensive than undergraduate students and is primarily the responsibility of tenure-track faculty; hence, the pool of potential mentors is much smaller.

Curriculum

Ph.D. program. The department offers a Ph.D. degree in Mathematics, and this is as of now the only Ph.D. degree offered—students with a research interest in statistics have the flexibility to specialize in their research accordingly, but no dedicated degree requirements are offered for them. All Ph.D. students have to complete the following courses (3 credits each)

- MAS 5311 Introductory Abstract Algebra 1
- MAS 5312 Introductory Abstract Algebra 1
- MAA 5228 Introductory Analysis 1
- MAA 5229 Introductory Analysis 2
- MAS 5145 Linear Algebra
- MAA 5105 Multivariable Analysis

To complete the minimum of 80 credits for the Ph.D. degree, students can select from a wide variety of courses on pure and applied topics within the Mathematical Sciences (counting courses from a different department is possible as well; e.g., for students specializing in cryptology taking a course in computer science is a natural choice). To ensure a sufficiently broad training in Mathematics, we currently impose that students take 6000-level courses (or higher) whose course number covers at least four of the prefixes MAA, MAD, MAP, MAS, MHF, MTG, and STA. Further, at least two 6000-level courses of the same prefix must be taken in at least two of the seven prefixes. This requirement is motivated by preventing students from specializing too early. Core courses are offered on a rotation, the exact frequency being determined by the amount of students who can be expected to take a course. The following course projection should give an idea of the variety of courses offered; the offering is complemented by special topics courses as need or opportunity arises.

- Spring 2015:
    - MAA 5229 Introductory Analysis 2
    - MAS 5312 Introductory Abstract Algebra 2
    - MAA 5105 Multivariable Analysis
    - MAD 6478 Cryptanalysis
    - MAA 6536 Introduction to Functional Analysis
    - STA 6446 Stochastic Calculus
    - MAS 6215 Algebraic Number Theory
    - STA 6197 Biostatistics - Longitud. Analysis
    - MAD 6209 Design Theory & Finite Geometry
    - MHF 6107 Set Theory
- Fall 2015:
    - MAA 5228 Introductory Analysis 1
    - MAS 5311 Introductory Abstract Algebra 1
    - MAS 5415 Linear Algebra
    - MAD 5474 Introduction to Cryptology and Information Security
    - MAP 6436 Partial Differential Equations
    - STA 6444 Mathematical Probability
    - MAS 6396 Introduction to Commutative Algebra
    - STA 6857 Applied Time Series
    - MAD 6209 Enumerative Combinatorics
    - MAP 6211 Introduction to Dynamical Systems & Chaos 1
- Spring 2016:
    - MAA 5229 Introductory Analysis 2
    - MAS 5312 Introductory Abstract Algebra 2
    - MAA 5105 Multivariable Analysis
    - MAD 6607 Coding Theory
    - MAA 6306 Real Analysis
    - STA 6326 Mathematical Statistics
    - MAS 6396 Algebraic Curves
    - MAD 6207 Combinatorics 2
    - MHF 6306 Mathematical Logic

- Fall 2016:
    - MAA 5229 Introductory Analysis 2
    - MAS 5311 Introductory Abstract Algebra 1
    - MAS 5415 Linear Algebra
    - MAD 5474 Introduction to Cryptology and Information Sec urity
    - MAA 6406 Complex Analysis
    - STA 6444 Mathematical Probability
    - MAS 6396 Group Theory
    - STA 6446 Regression Analysis
    - MAD 6302 Graph Theory
    - MAT 6933 Computational Mathematics

Within two years of admission into the Ph.D. program, students must successfully complete the qualifying examination of algebra and analysis. No part may be attempted more than three times. The above-mentioned two-semester sequences MAS 5311/MAS 5312 and MAA 5228/MAA 5229 prepare the student for the qualifying examination. In addition we offer during the summer a seminar in which students have the opportunity to work through problems of previous qualifying examinations. Once students have passed the qualifying examination, they have to form a thesis committee of at least four members.

Besides completing and defending a dissertation, Ph.D. students are required to complete a Preliminary Exam—it can only be attempted twice, has to be completed within two years after admission to candidacy (and before submission of the Ph.D. thesis). The purpose of the Prelim is to test the student's in-depth understanding of an area of mathematics which goes beyond any particular course. The Prelim is intended to check the student's mathematical maturity and knowledge, at a high level, in more than one area of concentration. This understanding is usually the consequence of several years of graduate studies. In particular, the exam is not intended to rehash tests given in other courses that the student took. Prelims are individually tailored by the student's Ph.D. committee with the approval of the Departmental Graduate Committee. The exam is conducted by the student's Ph.D. committee and one representative from the Departmental Graduate Committee.

MS Program. The Master's program does not require that students complete a qualifying examination, and different pathways to complete the degree are available.

- Non-thesis option: This option is commonly used by Ph.D. students who earn an MS degree 'en passant' on their way to the Ph.D. degree. It requires completion of the above-mentioned MAA 5228/MAA 5229 and MAS 5311/MAS 5312 sequences with at least a 3.0 GPA. A total 36 credits is needed to complete the degree, and at least 18 of these have to be at the 6000-level (or above) of which 12 or more are in mathematics. Finally, a Master's Examination needs to be completed, which currently is typically conducted in the form of a presentation on a published result in mathematics.
- Thesis option: Unlike the non-thesis option, this pathway only mandates the completion of *three* courses of the introductory MAA 5228/MAA 5229 and MAS 5311/MAS 5312 sequences, again with at least a 3.0 GPA. A total of only 32 credits are needed, at least of 12 of which are at the 6000-level or above, and at least 9 being in mathematics aside from thesis credit. At least 6 credits of thesis credits

Master of Science in Applied Mathematics and Statistics. Students who choose this option for the MS degree have less leeway in their course choices, and they have to choose one of several prescribed tracks. Currently we offer three tracks: biostatistics, cryptology, and financial mathematics. A common requirement in all three tracks is the completion of a thesis or internship for at least 6 credits. Moreover, students in this track have to complete at least two of the courses

- MAA 5228 -- Introductory Analysis 1
- MAS 5311 -- Introductory Abstract Algebra 1
- STA 6326 -- Mathematical Statistics

with a GPA of 2.7 or better. The total number of credits needed for the degree is 36. At least 18 of these have to be at the 6000-level (excluding thesis credit), and at least 24 credits must be from the chosen track—in each track, no less than five required courses and at three electives are to be chosen:

Biostatistics Track:

Table 18

Course	Number	Credits	Required / Elective
Mathematical Probability	STA 6444	3	Required
Biostatistics	STA 5195	3	Required
Regression Analysis	STA 6208	3	Required
Biostatistics - Longitudinal Data Analysis	STA 6197	3	Required
Survival Analysis & Clinical Trials	STA 6177	3	Required
Statistical Methods for Environmental Sciences	STA 6206	3	Elective
Applied Statistical Methods	STA 6207	3	Elective
Topics in Probability and Statistics	STA 6446	3	Elective
Analysis of Multivariate Data	STA 6707	3	Elective
Survey Sampling	STA 5225	3	Elective
Analysis of Categorical Data	STA 6505	3	Elective
Applied Time Series Analysis	STA 6857	3	Elective
Statistical Computing	STA 6106	3	Elective

Cryptology Track:

Table 19

Course	Number	Credits	Required / Elective
Cryptography	MAD 6477	3	Required
Cryptanalysis	MAD 6478	3	Required
Coding Theory	MAD 6607	3	Required
Algebraic Number Theory	MAS 6215	3	Required
Analysis of Algorithms	COT 6405	3	Required

Computer Networks	CNT 5008	3	Elective
Enumerative Combinatorics	MAD 6206	3	Elective
Combinatorics 2	MAD 6207	3	Elective
Introduction to Cryptology and Information Security	MAD 5474	3	Elective
Information Theory	EEL 6532	3	Elective
Computer Data Security	CIS 6370	3	Elective
Computational Group Theory	MAT 6933	3	Elective

Financial Mathematics Track:

Table 20

Course	Number	Credits	Required / Elective
Mathematical Probability	STA 6444	3	Required
Stochastic Calculus	STA 6446	3	Required
Financial Mathematics 1	STA 6907	3	Required
Financial Mathematics 2	STA 6908	3	Required
Financial Management	FIN 6406	3	Elective
Financial Markets	FIN 6246	3	Elective
Portfolio Theory	FIN 6525	3	Elective
Applied Statistical Methods	STA 6207	3	Elective
Regression Analysis	STA 6208	3	Elective
Topics in Stochastic Processes	STA 6446	3	Elective
Statistical Computing	STA 6106	3	Elective
Applied Time Series Analysis	STA 6857	3	Elective
Numerical Methods in Finance	STA 6909	3	Elective

Comparison with FIU as peer institution: Similarly as FAU's Department of Mathematical Sciences, FIU's Department of Mathematics & Statistics integrates Mathematics and Statistics in one department. While at FAU we basically offer two degrees—one at the M.S. level, one at the Ph.D. level—FIU offers three different types of MS degrees[1], but no Ph.D. degree: an MS in Mathematical Sciences, an MS in Statistics, and an Accelerated MS in Statistics. The admission requirements for the MS in Mathematical Sciences are comparable to the admission requirements to FAU's MS program (the GRE requirement at FIU is slightly

[1] Both departments offer a combined BS/MS program, but due to recent changes in the possible double-counting of credits, such programs loss attraction, and we do not discuss them here.

lower), but the admission requirement for the MS in Statistics clearly caters more strongly to students who want to specialize in statistics (only): the minimum list of courses does not impose upper-division training in modern algebra or modern analysis, no training in discrete mathematics is required.

With 36 credits FIU's MS degree in Statistics is best compared with FAU's MS in Applied Mathematics and Statistics. Main differences are that FIU's program does not offer an internship option, but a comprehensive examination can be chosen instead of writing a thesis. Being in standalone degree, in statistics the requirements at FIU are more clearly focused on statistics alone, whereas FAU's program contains a more emphasized mathematical component. With the Accelerated MS, FIU offers a possibility for students in the BS program in Statistics to obtain an MS degree within a short amount of time. At FAU many of the students who specialize in statistics are in the Ph.D. program (rather than in an MS-level program) and thus have to pass qualifying exams in classical mathematical areas. So a stronger mathematical component is needed for students to be able to succeed in the program. If FAU's Department of Mathematical Sciences should choose to establish a dedicated concentration in statistics, dropping some of the mandatory mathematical training could become a viable option; this might enable a faster path to graduation for some students.

FIU's MS in Mathematical Sciences offers, similarly as FAU's MS in Mathematics, a thesis and a non-thesis option. The course selection at FIU offers appears more restrictive and a total of only 30 credits is sufficient for graduation. The strong role of cryptography as an application domain is very prominent on FAU's side and absent in FIU's curriculum. Notwithstanding this, FIU's program also encourages interdisciplinary work and explicitly offers the option to take courses in other departments.

The MST in Mathematics degree program consists of 8 mathematics courses and 2 education courses. Students usually take 8 semesters to complete the degree. By consensus this is a solid mathematics program for teachers of mathematics, compared for example, with the degree of Master of Education in Curriculum and Instruction.

Internships, Practicum, Study Abroad, Field Experiences

Internships are not part of the Ph.D. program at FAU's Department of Mathematical Sciences, and at the Master's level, only the Master of Science with Major in Applied Mathematics and Statistics explicitly includes an internship as part of the degree requirements—counting 6 credits. Students within this applied version of the MS degree have to complete a thesis instead. Studies abroad and field experiences are currently not an explicit part of the graduate program. If a student is interested in taking some credits at a different institution (possibly out of the country), this needs to be discussed on a case-by-case basis.

In the MST in Mathematics degree program there are no internships, practicums, study abroad options, or field experiences; students are mostly full-time teachers at high schools and state colleges.

Pedagogy/Pedagogical Innovations

The vast majority of graduate classes at FAU's Department of Mathematical Sciences is at this point taught in a traditional lecture/discussion style, which seems an adequate approach for teaching advanced mathematical contents. Some classes on the more applied spectrum of the department's scope involve a stronger use of technology, but online components remain an exception.

The mathematics department is in the process of revising courses in the MST in Mathematics degree program to be available online.

Scope of Institutional Contributions

Service courses of the department focus on the undergraduate level. However, it is not unusual to have a student majoring in a different department in a graduate course—specifically on the applied side of the departmental course spectrum, in courses falling in the STA classification. From Table 16 above, we see that, in the 2012-2013 academic year, approximately 13.5% of the graduate FTE in mathematics were from majors outside of mathematics.

Student profile

Tables 21 and 22 (from IEA) give the student diversity and demographics of graduate mathematics majors (with Applied Mathematics and Statistics listed separately), compared with college and university totals.

Table 21

Graduate (Program CIP: 270101)		Mathematics		College Total	University Total
		2011-2012	2012-2013	2012-2013	2012-2013
American Indian/ Alaskan Native	Female			2	11
	Male				8
	Total			2	19
Asian or Pacific Islander	Female	1	1	14	155
	Male	5	5	13	119
	Total	6	6	27	274
African American (Not of Hispanic Origin)	Female	1	2	10	624
	Male	9	7	20	265
	Total	10	9	30	889
Hispanic	Female		1	27	495
	Male	3	5	25	318
	Total	3	6	52	813
White (Not of Hispanic Origin)	Female	8	7	158	1,926
	Male	21	20	143	1,233
	Total	29	27	301	3,159
Non-Resident Alien	Female	9	8	38	177
	Male	22	19	53	200
	Total	31	27	91	377

Graduate (Program CIP: 270101)		Mathematics		College Total	University Total
		2011-2012	2012-2013	2012-2013	2012-2013
Not Reported	Female			4	41
	Male				30
	Total			4	71
Total	Female	19	19	253	3,429
	Male	60	56	254	2,173
	Total	79	75	507	5,602

Table 22

Graduate (Program CIP: 270301)		Applied Mathematics & Statistics		College Total	University Total
		2011-2012	2012-2013	2012-2013	2012-2013
American Indian/ Alaskan Native	Female			2	11
	Male				8
	Total			2	19
Asian or Pacific Islander	Female	1	1	14	155
	Male	1		13	119
	Total	2	1	27	274
African American (Not of Hispanic Origin)	Female			10	624
	Male	2	1	20	265
	Total	2	1	30	889
Hispanic	Female			27	495
	Male	1		25	318
	Total	1		52	813
White (Not of Hispanic Origin)	Female	1		158	1,926
	Male	4	3	143	1,233
	Total	5	3	301	3,159
Non-Resident Alien	Female			38	177

Graduate (Program CIP: 270301)		Applied Mathematics & Statistics		College Total	University Total
		2011-2012	2012-2013	2012-2013	2012-2013
	Male	1	1	53	200
	Total	1	1	91	377
Not Reported	Female			4	41
	Male				30
	Total			4	71
Total	Female	2	1	253	3,429
	Male	9	5	254	2,173
	Total	11	6	507	5,602

From these tables one sees a reasonable representation of both African Americans and Hispanics among graduate mathematics majors but a poor representation of female students. This imbalance is an issue which the mathematics department will want to address by more actively recruiting female graduate students. Indeed, the Department of Mathematical sciences is sending two faculty members to the Southeastern Conference for Undergraduate Women in Mathematics at Clemson University in November, both to recruit female students into the doctoral program at FAU, and to investigate ideas for generating more interest among female undergraduates for pursuing graduate work in mathematics.

At the time of writing this text, 46 Ph. D. students are supported through a Graduate Teaching Assistantship (GTA). Support in the form of a GTA through federally funded research projects is still the exception, and the typical Ph.D. student's work obligations consist of tutoring and mentoring. Graduate students are actively involved in writing publications, for both conference and journal publications, including (over the last three years): *Advances in Mathematics, Advances in Differential Equations; Dynamics of Continuous, Discrete and Impulsive Systems, Series A: Mathematical Analysis; Journal of Systems Science and Mathematical Sciences; Proceedings of the 53rd Conference on Decision and Control; Discrete and Continuous Dynamical Systems; European Journal of Operations Research; Operations Research Letters; International Scholarly Research Notices: Probability and Statistics; Communications in Statistics; Quantum Information Processing; Quantum Information & Computation; International Journal of Information Security; Journal of Combinatorial Mathematics and Combinatorial Computing; Journal of Cryptology, Journal of Combinatorial Designs; Communications in Algebra, Forum Geometricorum,* and *Congressus Numerantium.*

Due to limited financial resources, conferences attended by students are typically regional AMS meetings, but there are positive exceptions. Cryptology conferences sometimes offer travel support or/and waive registration fees, and students with this specialization have made use of specific offerings in this field. As a recent example, in Spring 2015 a graduate student attended a summer school on post-quantum cryptography in Waterloo, Canada.

Advising Procedures

New graduate students obtain an initial plan of study listing a possible pathway of courses to complete the course requirements of their graduate degree. Every semester students update this plan in coordination with

their advisor. While students have not reached candidacy status yet, the graduate director helps with ensuring an adequate course selection. After admission to candidacy the student's thesis committee can help to advise the student on adequate course choices. A staff member helps graduate students to navigate the pertinent bureaucracy for tuition waivers, removing holds, etc., and for new students to complete their initial paperwork, attend required trainings, etc. For graduate students who are about to enter job market, the department offers regular presentations of FAU's career development center.

In the MST in Mathematics degree program, advising is handled by interview with the MST director.

Licensure Rates

There is no licensing program for mathematicians.

Placement Rates/Employment Profile

The Department of Mathematical Sciences does not maintain placement data for graduate students in its programs. However, anecdotal evidence indicates that most PhD graduates in mathematics from FAU obtain academic positions. For example, 9 of the last 10 PhD graduates in mathematics from FAU are known to have (temporary or permanent) academic positions at one of the following: Florida Southwestern State College, the University of Southern California, Instituto de Ciências Matemáticas e de Computação in São Carlos (Brazil), Broward College, Yıldız Technical University (Turkey), FAU's Harriet L. Wilkes Honors College, Cornell University, and Salt Lake Community College.

Retention Rates

Table 23, compiled from department data, shows retention rates for the MS and PhD programs in mathematics over the last four years.

Table 23

	Semester:	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013
Graduate students admitted into degree programs (other than MST)	# PhD admitted	9	3	8	1	18	2	12
	# left with MS	1	1	3	0	3	0	0
	# left without MS	4	0	3	0	8	0	3
	# still in program	**4**	**2**	**2**	**1**	**7**	**2**	**9**
	# MS admitted	4	0	14	1	5	0	2
	# left with MS	3	0	4	0	0	0	0
	# left without MS	1	0	8	0	4	0	0
	# still in program	**0**	**0**	**2**	**1**	**1**	**0**	**2**

Thus, of the students admitted into the doctoral program over the four-year period 2010-2013, it appears that approximately half remain in the program, and approximately 15% left the program with an MS degree. Of the students admitted into the MS program over that period, approximately a quarter remain in the program and a quarter graduated with an MS degree. These retention rates may seem rather low but are probably comparable to rates for graduate programs in mathematics at other universities.

The mathematics department's graduate committee has begun to explore the possibility of offering more options for PhD qualifying exams, in an effort to tailor the program more to the needs of the various disciplines within the department. No action has yet been taken by the department on this suggestion.

No retention data is available for the MST program.

Graduation Rates

Tables 24 and 25 (from IEA) list the graduation rates for master's degrees (Table 24) and doctoral degrees (Table 25) in mathematics, since 2001-2002.

Table 24

Master's Degrees	Year Degree Granted													All
	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	
Single major	8.0	6.0	12.0	16.0	13.0	21.0	11.0	9.0	14.0	9.0	13.0	26.0	9.0	167.0
Double major								1.0				1.0		2.0
Total	8.0	6.0	12.0	16.0	13.0	21.0	11.0	10.0	14.0	9.0	13.0	27.0	9.0	169.0

(A degree awarded with a single major contributes 1 degree, and a double major contributes ½ degree.)

Table 25

Doctoral Degrees	Year Degree Granted										All
	2002-2003	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	
Total	1.0	2.0	3.0	1.0	4.0	8.0	6.0	7.0	8.0	1.0	41.0

The mathematics department has averaged 6 doctoral degrees granted per year over the last 5 years, which indicates the graduate program is currently at a sustainable level.

Student Recruitment

Recruitment at the graduate level relies on a variety of strategies, and a main source of funding is FAU's Graduate College. To complement these recruitment funds we use other FAU-internal grant and support opportunities to provide a more competitive work environment. Over the last years we have been able to upgrade to office furniture and improve computational resources. By the end of 2015 we aim at all GTAs having an individual work stations at their desk.

While we have very limited leeway in the amount of financial support we can offer, we offer Presidential or Provost Fellowships to particularly strong applicants. To attract applications, in the past we used poster campaigns, but by now have moved to more effective e-mail campaigns. In addition to targeting selected international markets, we launch domestic e-mail campaigns, relying on state-university-system and GRE lists. We think our campaign strategy to be successful in-so-far as we could diversify our applicant pool significantly. In our recruitment efforts we can now also exploit FAU's designation as a National Center of Academic Excellence in Information Assurance/Cyber Defense Research (CAE-R) for academic years 2014-2019, which is pertinent for students who aim at a specialization in cryptology.

As mentioned above, the Department of Mathematical sciences has sent two faculty members to the Southeastern Conference for Undergraduate Women in Mathematics at Clemson University in November, in an attempt to recruit female students into the doctoral program at FAU.

For the MST in Mathematics degree program, high school and state college teachers actively seeking to enter the program. There is no particular recruitment of students for the program.

3. Faculty

Administrative Structure

The Department of Mathematical Sciences is overseen by a department chair who is elected by the faculty (and appointed by the dean) for a three-year term. The chair is responsible for the department. Assisting the chair in various advising and bureaucratic tasks are the associate chair, who chairs the department's executive committee, and the graduate director and the undergraduate director, who chair the graduate committee and undergraduate committee, respectively. These committee chairs, as well as the committee members, are approved by vote of the department each spring semester. The executive committee is primarily an advisory committee, while the graduate and undergraduate committees manage the graduate and undergraduate mathematics degree programs. Changes to the programs are eventually decided by vote of the faculty. Other committees include an evaluation committee who advises the chair on faculty evaluations each spring (and whose membership changes each year), an honors committee which decides on student scholarship and award recipients, and an IFP committee which oversees assessment of all of the IFP ("Intellectual Foundation Program", that is, general education) courses.

Most of the large-enrollment lower-division courses (accounting for approximately three-fourths of the mathematics departments undergraduate FTE) are coordinated by non-tenure-track instructors. These courses include Intermediate Algebra, College Algebra, Trigonometry, Precalculus Algebra, Methods of Calculus, Calculus 1, 2, and 3, and Introductory Statistics. These coordinators oversee all instructors (including graduate teaching assistants) who teach these courses, ensuring some degree of uniformity of content and grading across all sections of the course. Course coordinators report to the chair.

Administration of the department is facilitated by three and a half staff positions: a budget coordinators, a secretary/receptionist, an instructional computer lab coordinators (all full-time), and a half-time graduate secretary/coordinator. The Math Learning Center (MLC), housed in the Division of Undergraduate Studies but staffed by graduate students from the Department of Mathematical Sciences, handles much of the mathematics tutoring on campus. The director of the MLC has a quarter-time appointment in the mathematics department and a three-quarters-time appointment in undergraduate studies, and the assistant director of the MLC has a full-time appointment in undergraduate studies. They work with the chair and graduate director to oversee the duties of all graduate teaching assistants in the mathematics department.

Faculty Profile

Faculty diversity in the mathematics department can be read from tables 26 and 27 (from IEA).

Table 26

Instructional Faculty (Tenured, tenure-earning, & non-tenure-earning)		Mathematics			College Total	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
American Indian/Alaskan Native	Male					1
	Total					1
Asian or Pacific Islander					1	1
	Female	4	4	5	7	28

Instructional Faculty (Tenured, tenure-earning, & non-tenure-earning)		Mathematics			College Total	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
	Male	5	5	5	15	78
	Total	9	9	10	23	107
African American (Not of Hispanic Origin)						1
	Female				1	30
	Male	1	1	1	3	18
	Total	1	1	1	4	49
Hispanic				1	1	1
	Female		1	1	3	34
	Male	1	1	0	4	23
	Total	1	2	2	8	58
White (Not of Hispanic Origin)		0	0	0	0	3
	Female	2	3	4	23	276
	Male	26	25	23	86	382
	Total	28	28	27	109	661
Total		0	0	1	2	6
	Female	6	8	10	34	368
	Male	33	32	29	108	502
	Total	39	40	40	144	876

Table 27

Adjuncts		Mathematics			College Total	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
American Indian/Alaskan Native	Female					1
	Total					1
Asian or Pacific Islander	Female		1	1	1	11
	Male				1	11

Adjuncts		Mathematics			College Total	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
	Total		1	1	2	22
African American (Not of Hispanic Origin)	Female				3	33
	Male					14
	Total				3	47
Hispanic	Female	1				10
	Male					10
	Total	1				20
White (Not of Hispanic Origin)	Female	2	1		14	288
	Male	2	2	1	13	219
	Total	4	3	1	27	507
Total	Female	3	2	1	18	343
	Male	2	2	1	14	254
	Total	5	4	2	32	597

As one can see from these tables, the faculty of the mathematics department does not share the diversity of the undergraduate mathematics majors, although it does reflect pretty well the lack of diversity within the profession.

Table 28 summarizes faculty rank in the mathematics department and (to compare the mix between full-time and part-time faculty) includes information about adjuncts and supported graduate students. (Except for the 2012-2013 data, all information is taken from IEA. Note minor discrepancies with the previous table.)

Table 28

	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Assistant Professors	3	4	2	2	2	1	0
Associate Professors	6	6	5	3	4	4	4
Professors	18	18	20	22	21	20	19
Instructors	9	12	11	11	11	13	14
Total Full-time	**36**	**40**	**38**	**38**	**38**	**38**	**37**
Adjuncts	7	2	7	3	3	2	2
Graduate						54	

	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Students	45	47	50	51	54		48

The Department of Mathematical Sciences includes a balance of research interests between pure and applied mathematics. Including visiting assistant professors and non-tenure-track faculty, twelve faculty members have an interest in analysis, with five of these active in dynamical systems (including one focusing on computational mathematics and one on biological models), two active in control theory, and one in partial differential equations. In addition, two faculty members have an interest in probability and stochastic processes, three have an interest in statistics, and one is active in the actuarial program. On the discrete side, eight faculty members have an interest in algebra with two of these active in representation theory, to active in group theory, one in algebraic geometry. In addition, three faculty members have an interest in cryptology and information security, with another in graph theory and another in combinatorics. Finally, one faculty member is interested in logic (with another interested in constructive mathematics), one is interested in classical geometry, and six faculty members are interested in mathematical education.

Hiring in 2013 and 2014 has added five tenure-track assistant professors to the mathematics department and bolstered the research groups in analysis, statistics, and cryptology. The algebra and combinatorics groups are struggling with decreased numbers due to recent retirements and retirements expected in the next few years. As one can see from the table above, from 2006 till 2013 the number of tenure-track faculty decreased from 27 to 23, a decline of 15%, even as the doctoral program held steady at approximately 50 students. The five faculty hired during the last two years barely compensates for the three retirements during the same period.

Faculty Teaching Load

In the 2013-2014 academic year, the average teaching load of a full-time faculty member in the mathematics department was approximately 7.2 credit-hours in the fall and 6.9 credit-hours in the spring. (We use credit-hours rather than courses to take into account the fact that the department offers several 4-credit courses and one 5-credit course.) Not included in this calculation are directed independent studies, advanced research, and thesis and dissertation credits. Several faculty spend a great deal of instructional time in these "uncounted" classes.

Officially, the goal is two courses per semester for each tenure-track faculty member and four courses per semester for each non-tenure-track faculty member, but there are reductions in some cases. The chair, associate chair, and graduate director are normally assigned one course per term, as are first-year tenure-track faculty. Faculty with significant research grants are frequently given a one-course reduction in the spring semester, when enrollments are somewhat lower. Coordinators for large lower-division courses are given a one-course reduction each semester.

Table 29 (annualized FTE produced per instructional person-year, from IEA) provides additional information:

Table 29

	Mathematics			College Total	University Total
	2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
Undergraduate	18.2	21.8	24.2	19.4	19.1
Graduate	1.1	0.9	0.8	1.1	2.8

	Mathematics			College Total	University Total
	2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
Total	19.3	22.8	25.1	20.5	21.9

From the average teaching load calculation and the table of annualized FTE produced by mathematics department faculty, one can easily see that teaching loads in the department are rather heavy, especially compared with the rest of the college and university. The rapid rise in annualized FTE produced by the mathematics department over those three years corresponds to the rapid rise in FAU enrollments over that period at the same time that yearly budget cuts produced a decline in the number of tenure-track faculty in the department. This is another indication of the increasing strain under which the mathematics faculty have been working in the last few years.

Summary of Faculty Research Productivity

Faculty research productivity is summarized in section D below, under the review of part II of the Department Dashboard Indicators.

Strategic Planning for Hires

Faculty positions are decided by the provost and dean, following requests made by the department. The provost and dean also determine the rank of the hires, which in recent years has been limited to non-tenure-track instructors and tenure-track assistant professors (because of budget constraints). The research area for tenure-track hires is a departmental decision, decided by discussion and vote at open departmental meetings. The department attempts to strike a balance between pure and applied areas, but often in recent years, because of the paucity of tenure-track positions allocated to the mathematics department, decisions have been motivated more by urgent immediate needs rather than long-range strategic plans.

In 2013 the one tenure-track hire was an assistant professor in cryptology and information security, to replace an assistant professor in that area who left the previous year. In 2014 the department agreed to request three assistant professor positions, in analysis, computational mathematics, and statistics; in the end we were allowed to hire a fourth assistant professor also in computational mathematics. At a department meeting in April, 2014, the decision was made to request three more assistant professor positions for next year, in algebra, probability/stochastics/financial mathematics, and cryptology. Depending on the outcome of this request, the department will request at least two additional assistant professor positions, in control theory and combinatorics, for the following year.

Abbreviated Faculty CV's

Faculty CV's are included in Appendix B.

D. Research

Review of Part II of the Department Dashboard Indicators

Table 30 (from IEA) summarizes mathematics department research person-years and FTE based on annual assignments.

Table 30

					Mathematics			College Total	University Total
					2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
Departmental Research	Tenured & tenure-earning faculty	Professor, Assoc Professor, Asst Professor	Person-Years		5.2	4.8	4.1	20.0	92.7
			FTE		6.9	6.4	5.5	26.7	123.6
	Non-tenure-earning faculty	Instructors, Lecturers, Visiting Faculty	Person-Years		0.2	0.2	0.5	1.4	4.1
			FTE		0.3	0.3	0.7	1.8	5.5
	Other personnel paid on faculty pay plan	--	Person-Years					1.6	15.9
			FTE					2.1	21.2
	Total		Person-Years		5.4	5.1	4.7	22.9	112.8
			FTE		7.2	6.7	6.2	30.6	150.4
Sponsored Research	Tenured & tenure-earning faculty	Professor, Assoc Professor, Asst Professor	Person-Years		0.5	0.5	0.2	6.4	24.9
			FTE		0.7	0.7	0.3	8.5	33.2
	Non-tenure-earning faculty	Instructors, Lecturers, Visiting Faculty	Person-Years			0.2	0.0	0.3	3.7
			FTE			0.3	0.0	0.4	4.9
	Other personnel paid on faculty pay plan	--	Person-Years					7.3	38.2
			FTE					9.8	50.9

				Mathematics			College Total	University Total
				2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
	Total	Person-Years		0.5	0.7	0.2	14.0	66.8
		FTE		0.7	1.0	0.3	18.7	89.0

Tables 31 and 32 (from IEA) list various aspects of research in the mathematics department over the period 2010-2013, both in absolute numbers and in numbers per faculty member in the department, and compares these with the college and the university, as reported in the Department Dashboard Indicators.

Table 31

		Mathematics			College Total	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
1. Books (including monographs & compositions)	#	3	3	3	22	146
2. Other peer-reviewed publications	#	58	44	29	229	1,161
3. All other publications	#	36	11	6	31	501
4. Presentations at professional meetings or conferences	#	67	39	40	308	1,435
5. Productions/Performances/Exhibitions	#	1	4	1	36	377
6. Grant Proposals Submitted	#	9	10	11	109	385
Sponsored Research & Program Expenditures						
7. Organized Research	#	$767,881	$343,834	$196,529	$8,625,887	$15,603,749
8. Sponsored Instruction	#	$18,464	$26,602	$5,113	$1,242,409	$6,138,254
9. Other Sponsored Activities	#	$0	$9,999	$16,787	$620,037	$2,565,166

Table 32

	Mathematics			College Total	University Total
	2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
1. Books (including monographs & compositions) per faculty member	0.1	0.1	0.1	0.2	0.2
2. Other peer-review publications per faculty member	2.2	1.7	1.2	2.1	1.8
3. All other publications per faculty member	1.4	0.4	0.3	0.3	0.8
4. Presentations at professional meetings or conferences per faculty member	2.6	1.5	1.7	2.9	2.3
5. Productions/Performances/Exhibitions per faculty member	0.0	0.2	0.0	0.3	0.6
6. Grant proposals submitted per faculty member	0.3	0.4	0.5	1.0	0.6
Sponsored Research & Program Expenditures					
7. Organized research expenditures per faculty member	$29,534	$13,224	$8,189	$80,616	$24,534
8. Sponsored instruction expenditures per faculty member	$710	$1,023	$213	$11,611	$9,651
9. Other sponsored activity expenditures per faculty member	$0	$385	$699	$5,795	$4,033

From these tables, one sees that the research productivity of the mathematics department has declined sharply over the three year period 2010-2011 through 2012-2013, with a 50% drop in peer-reviewed publications and a 40% drop in presentations at professional meetings. During this period, sponsored research decreased by nearly 75%, with a slight increase in the number of grant proposals submitted. The decreases per faculty member are not quite so sharp, reflecting the fact that the number of tenure-track faculty declined during this same period. In any case, these numbers are cause for concern.

Interdisciplinary Efforts

The Department of Mathematical Sciences (as many mathematics departments) has, historically, tended to be rather isolated, but in recent years the department has made attempts at interacting with other departments and colleges. Interdisciplinary efforts have concentrated around the dynamical systems and control theory research groups and the cryptology and information security research group, summarized as follows.

- For several years, the mathematics department maintained a joint dynamical systems seminar with the Center for Complex Systems and Brain Science. This seminar was co-organized by Dr. Larry Liebovitch from the center and Dr. Vincent Naudot from the mathematics department but was discontinued when Dr. Liebovitch left FAU. Besides the regular meetings of the seminar, two joint research papers were

produced.

- Dr. Naudot and a doctoral student has also collaborated with Dr. Eric Noonberg of the Department of Biological Sciences in joint research and grant proposals.

- Recently the Department of Mathematical Sciences added Dr. Laurent Cherubin of Harbor Branch as affiliated faculty member and member of the mathematics graduate faculty. Dr. Cherubin shares research interests with the dynamical systems group in the mathematics department.

- Faculty from the mathematics department have recently approached the chair of the Department of Computer & Electrical Engineering and Computer Science about initiating a joint research seminar in control theory and related topics, but so far this seminar has yet to be realized.

- In 2003 the Department of Mathematical Sciences established the Center for Cryptology and Information Security (CCIS), and over the years, CCIS has evolved to a university-wide center, with collaborative membership from four FAU Colleges. Through this center, FAU has been designated a National Center of Academic Excellence in Information Assurance/Cyber Defense Research (CAE-R) for academic years 2014-2019. Mathematics faculty in the center have had considerable collaborative efforts with computer science faculty in joint research, publications, submission of proposals, and co-ownership of at least one patent.

- Dr. Erik Lundberg, newly hired assistant professor in the mathematics department, has collaborated with Dr. Charles Keeton of Rutgers University in the area of astrophysics, coauthoring a paper in gravitational lensing which grew out of an REU organized by Dr. Lundberg at Purdue University.

- Dr. Yoram Sagher was hired by the World Bank and spent a week in Rio de Janeiro in June 2012 studying their school mathematics program. He reported on his findings to the World Bank and the Rio Department of Education.

Establishment of Goals for Research

The mission of the Department of Mathematical Sciences is "to advance the frontiers of mathematical knowledge by engaging in innovative research and tackling fundamental problems in the mathematical sciences" and by creating "applications of the mathematical sciences to serve the needs of the local community and the larger global society." With this mission in mind, the department sets the following research goals.

- Basic research is one of the defining features of a university. The American Mathematical Society, in "2009 Assistantships and Graduate Fellowships in the Mathematical Sciences," defines a "published mathematician" as one who has published at least one book or scholarly paper in the last three years. The Department of Mathematical Sciences expects its tenure-track faculty to meet this minimum criterion for research activity.

- "Interdisciplinary research" has become an important buzzword in our universities. The Department of Mathematical Sciences seeks to support research in other areas by interacting with faculty and students in other departments and colleges, as well as other universities.

- Grants are important in scientific research and indicate the status of a research program. In mathematics, grants are somewhat less crucial, but can provide PhD stipends and travel support for doctoral students. The Department of Mathematical Sciences expects its tenure-track faculty to submit research grant proposals regularly, with periodic success.

- Visibility of the department's research program is crucial for recruiting first-rate faculty and attracting excellent students to the graduate program. The Department of Mathematical Sciences expects its tenure-track faculty to showcase department research by publishing internationally-recognized research journals and hosting international research conferences.

Assessment of Research Goals

For the 2013-2014 year, 20 of 23 tenure-track faculty in the mathematics department were research active, as were 6 of 15 non-tenure track instructors and 3 of 4 visiting assistant professors. Thus, the department is rather successful in meeting the goal of basic research. Beginning in fall 2014, the increased energy in the department resulting from the four new hires is already apparent, with several active seminars meeting weekly, including a graduate student seminar run by and for graduate students.

The list above indicates that interdisciplinary efforts by mathematics faculty are already under way. The mathematics department will continue to encourage its faculty to engage in collaborative work with researchers in other disciplines. Special attention will be paid to bioinformatics (with the Jupiter Life Science initiative), environmental science (with the Florida Center for Environmental Studies, whose director has a background in mathematics), and the Center for Complex Systems and Brain Sciences (which until recently maintained a joint seminar in dynamical systems with the mathematics department and formerly had a mathematician on staff).

The department has been actively submitting research grant applications; what are needed are more successes. Promising for the future are the strong research activity of the cryptology center and its recent grant proposal submissions, energetic new faculty already submitting proposals, and the mathematics education group, led by Dr. Roger Goldwyn, submitting collaborative proposals with the College of Engineering and the College of Education.

The goal of visibility of the mathematics department's research efforts is well met. The department publishes *Forum Geometricorum*, a freely accessible electronic journal on classical Euclidean geometry and related areas, which aims at bringing to a wide, international readership the beauty, elegance, and usefulness of elementary geometry, in research and in teaching. The department also originated the *Journal of Mathematical Cryptology*, published by De Gruyter, which provides a forum for original research articles in the area of mathematical cryptology. The Department of Mathematical Sciences hosts the Southeastern International Conference on Combinatorics, Graph Theory and Computing each year, an NSA-funded conference which provides an important venue for mathematical inquiry, last year for more than 300 participants. The department is also co-organizer (with the editorial board of Annals of Mathematics and Artificial Analysis) of the biennial International Symposium on Artificial Intelligence and Mathematics, held in Fort Lauderdale. Periodically, the department has hosted other conferences, including the Southeastern Sectional Meeting of the American Mathematical Society (Meeting #1053) in the fall of 2009, the 13th Information Security Conference in fall of 2010, and the Mid-Atlantic Mathematical Logic Seminar honoring the Alan Turing Centenary in January 2012. The department expects to continue to promote its research efforts through the publishing of these journals and organizing of international research conferences.

E. Service and Community Engagement

Review of Part II of the Department Dashboard Indicators

Table 33 (from IEA) summarizes mathematics service data, as reported in the Department Dashboard Indicators.

Table 33

		Mathematics			College Total	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
1. Faculty memberships on department, college or university committees	#	66	45	55	273	2,348
2. Faculty memberships on community or professional committees	#	18	17	19	69	972
3. Faculty serving as editors or referees for professional publications	#	147	24	23	96	611

From table 33, one sees little variation in service data over the three year period 2010-2011 through 2012-2013, other than "faculty serving as editors or referees for professional publications." In fact, the entry for 2010-2011 was a mistake due to a misunderstanding by the department chair, who counted individual papers refereed and journals edited for that year, rather than number of faculty who performed these tasks. Beginning in the next year, instructions in the Department Dashboard Indicators were made explicit, and later entries are correct. The modest decreases in numbers can be easily explained by the decrease in number of tenure-track faculty in the mathematics department over this period.

Community Engagement

In addition to the service to the mathematical profession summarized in the table above, the Department of Mathematical Sciences engages the local South Florida education community by offering a number of competitions and meetings for local students and teachers designed to stimulate interest in mathematics. This series of interrelated competitions and meetings is named, collectively, "FAU Math Days," and includes the following activities.

High School Math Day

Begun in 2005, this annual event features a day of competitions and seminars designed to provide high school students and their teachers with an opportunity to share an appreciation of mathematics, to exchange ideas, and to interact with FAU mathematics faculty. High School Math Day typically attracts between 225 and 275 high school students per year, mostly from Palm Beach, Broward, Miami-Dade counties, but extending as far north as Seminole county.

Mini-Math Day

The mathematical department invites one whole grade from a local elementary school to participate in a day-long program of mathematically related fun and games. This "Mini-Math Day," which began in 2008, is designed to promote mathematical excellence and inspire mathematical talent in South Florida's youngest students. Approximately 120 elementary students from either a Palm Beach or Broward county school attend our event each year.

Middle School Math Day

The mathematical department invites local middle schools to participate in a combination of the American Mathematics Competition (AMC-8) and our traditional Math Day events. Begun in 2010, this event combines a national competition, mathematical presentations, and a team game. Students have a chance to interact with FAU mathematics faculty while engaging in both national and local competition. Approximately 100 middle school students from public, private and charter schools in Broward and Palm Beach counties attend each year.

Internet Competition

Begun in 1995, this challenging online competition for high school students is designed to encourage students' problem solving skills and mathematical ingenuity, as well as, prepare students for the formal MAA competition. This event typically attracts approximately 10 of the top students from the local high schools.

American Mathematics Competition (AMC)

The Mathematical Association of America (MAA) administers a multiple choice exam for middle school students (AMC-8 in November) and high school students (AMC- 10/12 in February) designed to develop and enhance students' problem solving skills and to recognize mathematical excellence. Top scoring high school students have the chance to qualify for the National Team and represent the USA in the International Mathematical Olympiad. Approximately 30 students from Broward and Palm Beach counties attend each year. This contest has also attracted students visiting from New York and California during their spring break, allowing them to compete in this contest.

Mu Alpha Theta Regional Competition

The Florida Association of Mu Alpha Theta organizes regional high school mathematics competitions each winter, and in recent years FAU has hosted one of these regional competitions at FAU's Davie campus. Mathematics department faculty and graduate students volunteer at the event, interacting with more than a thousand of South Florida's brightest high school students. This contest typically attracts as many as 1000 high school students from Mu Alpha Theta's Region 5, which consists of a large section of south Florida.

Math Students' Circle at FAU

This recent addition to our Math Days program, begun two years ago, is one of only two Math Students' Circles in the state of Florida. Several faculty members meet with local middle-school students two Saturday afternoons each month and solve challenging mathematical problems together. Between 15 and 30 students from Palm Beach and Broward counties typically attend these meetings.

Math Teachers' Circle at FAU

This newest addition to our Math Days program, the only Math Teachers' Circle in the state of Florida, began in summer 2014 with a week-long workshop for approximately 20 local middle-school mathematics teachers.

The Math Teachers' Circle continues with monthly meetings during the academic year, allowing teachers to interact with FAU mathematics faculty and supporting their development as mathematics practitioners and enthusiasts.

Finally, several faculty members from the mathematics department volunteer their time at the "Fun Math Competition" at the Chinese Association of Science, Education and Culture (CASEC) of south Florida.

Establishment of Goals for Service

The mission of the Department of Mathematical Sciences is "to increase mathematical ability in the community at large" and "serve the needs of the local community and larger global society." With this mission in mind, the department sets the following service goals.

- The Department of Mathematical Sciences strives to serve the profession, expecting its tenure-track faculty to participate on committees within the university and in the larger mathematical community, and act as referees or editors for professional publications.

- The Department of Mathematical Sciences endeavors to serve the South Florida community and meet the needs of local schools and businesses, expecting its faculty to engage the community, participate in established programs, and initiate new projects as the need arises.

Assessment of Service Goals

The mathematics department clearly meets its service obligations to the university and the professional community through committee work as well as referee and editorial responsibilities, as evidenced by the DDI data.

The mathematics department's "Math Days" activities reveal a strong and successful commitment to engaging the local community of students and teachers through competitions and circles, in order to inspire excellence in mathematics teaching and learning. The department expects to continue these educational interactions with students and teachers, and to build upon them to enhance the partnership with the local schools.

The mathematics department has been less successful in forging partnerships with local businesses, although recent activities show promise. For example, this summer Dr. Koray Karabina has received an enthusiastic commitment from the president of the Research Park at FAU for collaboration on a biometrics project. The department has shown its commitment to applied mathematics by hiring a second statistician (in biostatistics) this year, in hopes of establishing ties with the CES College of Medicine and the Department of Biological Sciences, and to position the department to participate in the Jupiter life sciences initiative and the growing bioinformatics industry in south Florida. This fall the department added Dr. Laurent Cherubin of Harbor Branch as affiliated faculty member and member of the mathematics graduate faculty, in an effort to connect the department's dynamical systems research group with FAU's oceanographic research and the important ocean engineering and technology industry in south Florida.

The Department of Mathematical Sciences recognizes the importance of making connections with local business and industry, both as a responsibility of a university academic department and as an opportunity for research collaborations and funding.

F. Other Program Goals

Description of Other Program Goals

- The mathematics department strives to improve student performance in undergraduate mathematics courses in order to increase retention and graduation rates. Thus, the department is especially interested in increasing student success rates in courses in the IFP (listed above). Improving student performance in lower-division service courses can also increase retention and graduation rates for the undergraduate programs in mathematics by sending better-prepared students into upper-division courses taken by mathematics majors.
- The mathematics department seeks to strengthen its undergraduate degree programs and attract more undergraduate mathematics majors.

Assessment of Other Program Goals

Table 34 summarizes DFW rates in courses in the IFP (together with Intermediate Algebra, MAT 1033), since fall of 2006

Table 34

DFW RATES IN LOWER-DIVISION MATHEMATICS COURSES

		F 06	S 07	F 07	S 08	F 08	S 09	F 09	S 10	F 10	S 11	F 11	S 12	F 12	S 13
MAT 1033	Intermediate Algebra	--	--	30	25	27	28	29	16	22	15	25	21	17	29
MAC 1105	College Algebra	62	62	53	42	39	32	27	29	28	36	40	30	20	34
MAC 1114	Trigonometry	30	65	52	47	42	47	38	33	41	38	45	40	27	44
MAC 1140	Precalculus Algebra	49	51	43	48	59	38	35	47	36	32	22	30	38	44
MAC 1147	Precalc. Alg. & Trig	58	50	54	62	72	51	10	32	21	23	25	10	45	59
MAC 2233	Methods of Calculus	51	47	38	43	27	22	24	28	35	48	33	27	54	41
MAC 2281	Calculus for engineers 1	39	45	53	41	48	44	54	48	42	40	38	39	37	34
MAC 2282	Calculus for engineers 2	44	38	42	58	31	40	32	51	57	55	57	22	32	12
MAC 2311	Calculus 1	31	51	42	27	49	32	47	40	64	27	26	35	56	34
MAC 2312	Calculus 2	21	67	19	18	38	32	27	34	32	41	27	58	35	66
MGF 1106	Math for Liberal Arts	39	56	64	44	64	38	22	22	20	22	14	10	10	10
MGF 1107	Math for Liberal Arts	33	17	47	22	64	26	26	10	12	10	11	13	10	11
STA 2023	Introductory Statistics	35	24	27	30	22	27	27	13	16	33	24	15	19	21

For some courses, one can see a downward trend during the period 2006 to 2013, but there is a disturbing fluctuation in many of the courses. The mathematics department has implemented a number of pedagogical changes aimed at improving student performance, and it is impossible to separate out their individual effects on DFW rates in the various courses. Here we discuss a few of these changes and the courses which they were intended to affect.

In the fall of 2008, a new course coordinator for College Algebra was appointed, and the course was completely redesigned, with emphasis on students working on homework exercises during weekly recitation sessions in small classes. From fall of 2009 through spring of 2011, another new course coordinator maintained this format and continued the improved success rate. In fall of 2011 two new course coordinators took over and switched the weekly recitation sessions to computer lab sessions in which students worked on homework online, under supervision of undergraduate tutors, in large classes. (We refer to this as a "2+2" model, because students attend two one-hour lectures per week plus one two-hour homework session in a computer lab.) One can see a slight fluctuation of DFW rates in College Algebra over this period, but they remain much better than the high rates prior to fall of 2008.

This "2+2" model has been implemented in several of these lower-division courses: Trigonometry and Precalculus Algebra in spring of 2011, Intermediate Algebra in fall of 2011, and Introductory Statistics in fall 2012. The DFW rates in these courses do not appear to be much affected by this change, but DFW rates are only one possible measure of student success. Many of these courses are taken as prerequisites for other mathematics courses, and anecdotal information suggests that the "2+2" model has improved student performance among students who have passed a given course. Certainly more investigation is needed on this question.

In fall of 2008, FAU implemented a mandatory placement test (using the software "ALEKS") for entering students who do not have prerequisite coursework in mathematics. Over the next few years FAU adjusted the cutoff scores for various courses, to find suitable levels, and tightened up the proctoring to obtain more honest scores. The impact on DFW rates appears to be minimal. A recent study by Dr. Roger Goldwyn (director of the MLC) shows that barely 10% of the students taking Methods of Calculus used the ALEKS test to place in the course, but instead passed the prerequisite course (College Algebra). Thus, the effect of the placement test on DFW rates could be quite spread out over the data.

Another major change over the last few years has been a gradual switch from "MyMathLab" to ALEKS as an online homework system in many of the lower-division classes. In fall of 2008, MyMathLab was the system for Intermediate Algebra, College Algebra, Trigonometry, Precalculus Algebra, Methods of Calculus, Math for Liberal Arts 1 and 2, and Introductory Statistics. Eventually it became evident that many students learned how to game the system and answer online questions on MyMathLab correctly without really understanding what they were doing. So the mathematics department began switching to ALEKS as an alternative in courses which are used as prerequisites for other mathematics courses, namely, Intermediate Algebra, College Algebra, Trigonometry, and Precalculus Algebra. This change might have effected a short-term rise in DFW rates in these courses, but if this change in online system results in better student understanding of mathematics, student success rates will improve as students progress through the sequence of courses. Here again more investigation is needed.

Other pedagogical innovations (already mentioned above in the section "Instruction") include the Math Learning Center (MLC), begun in 2009. Also relevant here is the "Succeed at Methods" (SAM) lab, which opened as part of the MLC in spring 2014, in response to the increasing DFW rate in Methods of Calculus. The SAM lab is a computer lab in which Methods of Calculus students can work on online homework under supervision of tutors from the MLC. Preliminary data indicate that students who visited the SAM lab regularly had a much higher pass rate than those who did not. Also mentioned already in the "Instruction" section is the Learning Assistant (LA) program begun as a pilot program in Calculus 1 this fall. The mathematics

department will train additional LA's and expand the program to Calculus 2 and 3 over the next few years subject to adequate funding.

Finally, to improve student preparation for calculus, this past year the Department of Mathematical Sciences and the College of Engineering have instituted a boot camp for engineering students. Preliminary data indicate that ALEKS scores have improved for those who took the boot camp, but results are not currently available to determine whether there is a translation to improved success in Calculus 1. Unfortunately, the number of students participating in the boot camp has been small, so far.

The second goal, the strengthening of the undergraduate degree programs, has clearly not been met. As one can see from the tables above, the number of undergraduate mathematics majors in 2012-2013 stood at approximately 160, and the number of BA and BS degrees in mathematics awarded showed only a modest increase from about 20 per year ten years ago to about 30 per year in recent years. Recruitment efforts summarized above under the "Math Days" events summarized above do not seem to have had much impact on enrollments in the undergraduate programs, but perhaps more time is needed for the effects to be seen.

Overhaul of the undergraduate degree programs in mathematics seems to be what is needed in order to properly address this goal. Currently the Department of Mathematical Sciences is working to diversify the offering of courses to prepare students in areas beyond the traditional activities of research and teaching, in an effort to entice more majors into the programs. In this direction, the department is preparing a proposal to develop a BS program in statistics, which will also help to emphasize the applied side of mathematics at the undergraduate level.

G. Strengths and Opportunities

A primary strength of the Department of Mathematical Sciences is its dedicated and hard-working faculty and staff. Despite the heavy burden from repeated budget cuts coupled with massive enrollment growth over the last few years, the faculty and staff have maintained a positive attitude and friendly working environment. The faculty and staff spend many hours of their own time volunteering in community outreach activities, including the numerous "Math Days" events. As one can see from the numerous pedagogical innovations implemented by various faculty members, they also genuinely care about students and their education. The faculty let their passion for mathematics drive their research interests (as evidenced by the regular international conferences hosted by the department and the numerous well-attended departmental seminars). Certainly the future of the mathematics department will be built on its current faculty, which must be its strength.

The mathematics department has several strong research groups, which will continue to be a major strength of the department. Foremost, perhaps, is the cryptology group, who have numerous publications, regularly submit research grant proposals (with periodic success), and direct a sizable fraction of the doctoral dissertations. Moreover, the NSA/DHS designation of FAU as a National Center of Academic Excellence in Information Assurance/Cyber Defense Research (spearheaded by the Center for Cryptology and Information Security) offers the department the opportunity to obtain much-needed externally funded GTA positions through CyberCorps (Scholarship for Service). Another strong research group in analysis, dynamical systems, and control theory was invigorated by three new hires this year and is currently very active with weekly seminars and two long-term visiting researchers. This group has recently submitted several research grant proposals and has more on the way. The hiring of a second statistician this year (in biostatistics) establishes statistics as a "group" in the department, with the expectation that the statistics group will expand its influence on campus and beyond. The research groups in algebra, combinatorics, and probability look forward to their turn to strengthen by hiring in the next couple of years, and the department will seek to hire in important currently unrepresented areas (e.g., topology and algebraic geometry).

While some faculty in the Department of Mathematical Sciences carry out joint research projects with other departments and colleges, there are nevertheless many more interdisciplinary research opportunities for the future, and the department will continue to encourage its faculty to engage in collaborative work with researchers in other disciplines. Special attention will be paid to bioinformatics (with the Jupiter Life Science initiative), environmental science (with the Florida Center for Environmental Studies, whose director has a background in mathematics), the Center for Complex Systems and Brain Sciences (which until recently maintained a joint seminar in dynamical systems with the mathematics department and formerly had a mathematician on staff), and of course the Research Park at FAU.

The graduate program is an obvious strength of the mathematics department. As noted above, the department has averaged 6 doctoral degrees granted per year over the last 5 years, which indicates that the doctoral program in mathematics is currently at a sustainable level. Clearly the graduate program will play a vital role in the future of the department, both by stimulating research activity and by providing a large pool of teaching assistants for staffing the Math Learning Center and helping to cover the department's large lower-division teaching load. The active research seminars in the current semester, for example, including a seminar organized by the graduate students themselves, attest to the importance of the graduate program to the research health of the department. In recent years the department has made a significant effort to supervise the graduate students' teaching, both to improve the quality of instruction by the mathematics department and to provide professional training for the graduate students as future academics.

Although the BA/BS in mathematics programs are far from a strength of the department, a number of current initiatives present opportunities for improvements that will better serve undergraduate students at FAU. Over the last six years, the department has slowly grown an actuarial mathematics program which now enrolls

approximately 20 students in a certificate program. Recently the department's undergraduate committee has begun work on a proposal to introduce a BS degree program in statistics. By giving students the opportunity to study actuarial mathematics and statistics, the department hopes to provide more options in applied mathematics to strengthen the undergraduate program while better serving the needs of the students. The mathematics department has also recently overhauled its undergraduate honors program, both "honors in the major" and the "honors compact" policy for university honors students. Moreover, as noted above, several mathematics faculty have been active in incorporating project-based learning in calculus classes, and last year several faculty proposed and implemented an adaptation of the "Moore Method" of guided discovery to three upper-division mathematics courses required of all undergraduate mathematics majors, funded by a grant from the Office of Undergraduate Research and Inquiry. By challenging students with honors options and learning by discovery, the Department of Mathematical Sciences hopes to increase undergraduate students' opportunities for learning while deepening their educational experience.

The mathematics department has initiated several pedagogical innovations over the last six years in an effort to improve student success in lower-division mathematics courses, and many of these have already been mentioned above in the "Instruction" section and in the "Other Program Goals" section. These initiatives have helped to produce a steady improvement in the pass rate in many of these courses and can be summarized as follows.

- In 2008, the mathematics department and the undergraduate studies office implemented a mandatory placement test (using "ALEKS") for undergraduate students entering the university without prerequisite mathematics classes from another university. This placement test has been a major factor in lowering DFW rates by preventing students from registering in courses for which they are not prepared.
- In 2008-2009, the mathematics department overhauled the College Algebra course by focusing more on students working homework under supervision of teaching assistants. College Algebra serves as a major gateway to the undergraduate mathematics curriculum and had an unacceptably high DFW rate, reaching 53% in fall 2007. By fall 2009 the DFW rate dropped to 27% and has remained relatively low since that time.
- In 2009, the mathematics department and the undergraduate studies office formed the "Math Learning Center" (MLC). Staffed by graduate teaching assistants from the mathematics department and housed in the Center for Teaching and Learning, the MLC performs the majority of the mathematics tutoring on campus. Table 5 above, for example, shows that the MLC receives between 6000 and 7000 visits per semester. The MLC also provides reviews for exams in large lower-division courses as well as group tutoring for select "at risk" classes.
- Inspired by the successful restructuring of College Algebra, the mathematics department adopted a "2+2" model of instruction in several lower-division mathematics courses, including Trigonometry and Precalculus Algebra (beginning spring 2011), Intermediate Algebra and College Algebra (beginning fall 2011), and Introductory Statistics (beginning fall 2012). In this model, students attend two one-hour lectures per week plus one two-hour homework session in a computer lab, in which students work on homework online, under supervision of the instructor (and, in large classes, undergraduate tutors). Although DFW rates have not been significantly affected, preliminary (and informal) data seems to indicate that students who pass the courses average higher grades than in prior semesters before the 2+2 model was implemented.
- In order to improve student preparation for calculus, last year the mathematics department and the College of Engineering jointly offered a precalculus boot camp for engineering students. The number of students participating has been small, but the undergraduate studies office has taken an interest and is seeking outside funding to expand this precalculus boot camp university-wide.
- In the current semester, the mathematics department is piloting a Learning Assistant (LA) program, with two LA's in Calculus 1. LA's are undergraduates who have done very well in mathematics and work closely with the students in the class, answering questions, providing tutoring, and motivating the students to learn. The mathematics department plans to train additional LA's and expand the program to Calculus 2 and 3 over the next few years.

H. Weaknesses and Threats

Just as its faculty and staff are a primary strength of the Department of Mathematical Sciences, the increased workload imposed on the faculty and staff over the last few years must rank as a primary threat to the department's future. This threat is compounded by the fact that, despite hiring 5 new assistant professors in the last couple of years, the average age in the department stands at 54, and 7 of the 39 faculty members in the department are over 70. Thus, with a number of retirements imminent, additional tenure-track faculty hiring over the next few years will be crucial to the continued improvement of the mathematics department.

A related threat to continued faculty strength and morale are faculty salaries. Of particular concern are assistant professor salaries (5 assistant professors with an average annual salary of $71,200) and associate professor salaries (3 associate professors with an average annual salary of $71,700), but full professor salaries are also low (18 professors with an average annual salary of $96,900). These salaries place FAU's mathematics department at the lower quartile of the American Mathematical Society's "2013-2014 Faculty Salaries Report" of newly-hired assistant professors ($71,900) and associate professors ($72,900), and between the lower quartile ($92,900) and middle quartile ($106,200) of full professors at comparable doctoral degree-granting departments.[2] Indeed, two years ago the mathematics department lost its only assistant professor at the time, when he accepted an offer from another university at a salary of $100,000 per year. The Department of Mathematical Sciences faces a continuing threat of losing its most productive faculty due to low salaries.

A current weakness of the mathematics department is the relatively low number and amounts of external research grants. Admittedly research grant funding in the discipline of mathematics tends to be rather less than that of the other sciences, mainly due to the general lack of need for expensive equipment, but increasing the level of research funding in the Department of Mathematical Sciences has to be a high priority in the years ahead. Such funding is necessary to support travel for faculty, visitors, and especially graduate students, and to support research assistantships for graduate students. In fact, a major threat to the department's graduate program is that currently students in the doctoral program are funded almost entirely by teaching assistantships which depend (ultimately) on lower-division enrollments. The department needs more external funding, just as it needs to attract more paying graduate students.

As already mentioned in the "Instruction" section, a glaring weakness of the mathematics department is its small undergraduate programs. The department will work to strengthen its bachelor's degree programs in the years ahead. Several current initiatives have already been mentioned in the "Opportunities" section; a few more changes should be added here. This year the mathematics department appointed a new chair of its undergraduate committee, who has brought discipline and focus to the committee. In the current semester he is tackling assessment of the undergraduate programs in an effort to make assessment a tool for improvement, and next semester he will consider further improvements such as a proposed BS in statistics degree program (already mentioned above) as well as ways to expand the internship program for undergraduate mathematics majors. Also, this year one of the new assistant professors in the department has taken over leadership of the Math Club, and he has infused the club with renewed energy, in an attempt to bring an esprit de corps to the undergraduate mathematics majors. Attendance at Math Club meetings has increased, and the department is optimistic about the future.

Undergraduate retention and graduation rates are a serious threat to the university, and the Department of Mathematical Sciences shares the university's concern with this problem. The mathematics department recognizes its responsibility to provide effective instruction to all students, giving them the opportunity to succeed. Numerous innovations and initiatives by the department directed at improving student performance

[2] Public university mathematics departments with annual rate of production of PhD's ranging between 3.9 and 6.9 per year.

in mathematics classes have already been discussed above and summarized in the "Strengths and Opportunities" section. Two important questions are how does one define and measure student success, and how does one measure the effectiveness of the various innovations and initiatives promoting student success? The first of these questions could be addressed at least in part by this academic program review. (See the first "Question for the Review Team" below.) One might ask the statisticians to address the second question by means of a controlled study to identify the effectiveness of the various efforts.

I. Resource Analysis

Human Resources

The Department of Mathematical Sciences currently employs 18 professors, 3 associate professors, 5 assistant professors, 3 visiting assistant professors, 15 non-tenure-track instructors, 3 and 1/2 staff, and 46 graduate students supported by stipends, plus a number of undergraduates working as tutors in the instructional computer labs. The total number of faculty has barely changed since the last program review six years ago; the number of supported graduate students has increased by 5; and the number of staff has increased by 1 (with the hiring of an instructional computer lab coordinator this year). The department also hires a few adjunct instructors each semester, usually chosen from recent master's degree graduates of the department still in the region.

Enrollments over the last five years (from fall 2009 through fall 2014) have exploded without a corresponding increase in faculty size: While graduate enrollments held relatively steady over this period (a moderate increase in doctoral enrollments was offset by a decrease in enrollments in the MST in Mathematics for middle school teachers degree program), undergraduate enrollments increased by more than 43%, from 4379 to 6268. Accommodating these burgeoning enrollments without increasing the size of the faculty required creative scheduling and a steady increase in average class sizes. (See the subsections "Average Class Size and Faculty/Student Ratio" and "Faculty Teaching Load.") This "creative scheduling" has its limits, as does availability of large classrooms, and the mathematics department appears to have reached this limit. This problem is exacerbated by pressures to improve student performance because of the university's need to increase retention and graduation rates. Increasing class sizes in lower-division mathematics classes may well have hampered efforts to raise the pass-rate in those classes.

Growth in the doctoral program has helped to relieve some of the pressure on instruction in lower-division classes, by allowing the department to assign more classes to graduate teaching assistants. As noted above, a priority of the mathematics department has been to supervise the graduate students' teaching, both to improve the quality of instruction and to provide professional training for the graduate students as future academics. Nevertheless, the growth of the doctoral program without a corresponding growth in the number of faculty places an increasing burden on these faculty, who must supervise both the research and the teaching of these graduate students, and puts the quality of the doctoral program at risk.

Despite hiring 5 new assistant professors in the last two years, the Department of Mathematical Sciences currently has approximately the same number of full-time faculty as at the last program review six years ago. Given the growth in the doctoral program, the need for tenure-track faculty hiring is especially acute, and given the anticipated retirement of senior faculty in the next few years, this hiring needs to begin almost immediately.

Space Needs

Since the last program review six years ago, the mathematics department received new office and lab space when the College of Engineering move out of the SE building a few years ago. Currently the department has sufficient private offices for all faculty (including the 3 visiting assistant professors this year) and shared offices for all graduate students, but insufficient space for short-term visiting researchers. With anticipated growth of the department in the next few years, additional office space will become necessary.

The department currently has two seminar rooms (one of which also serves as a library and one of which also serves as classroom for select upper-division and graduate classes), and these appear to be adequate. Since the last program review the department has constructed 2 new instructional computer labs (bringing the total

to 3) with funds from technology fee grants, and these 3 instructional computer labs are heavily used and at capacity. The department seeks to construct an additional instructional computer lab for use with the Methods of Calculus course, which currently enrolls approximately 2500 students per year; this lab is needed to keep the department's student success initiatives on the right path. The Center for Cryptology and Information Security has a small computing lab and does not appear to need additional space at this time.

Funding

- As noted under "Weaknesses and Threats," faculty salaries (especially among newer faculty) are low. Graduate stipends have not changed in more than ten years and are also quite low.

- OPS (Other Personal Services) funding, which pays the salaries of adjuncts and tutors (working in the instructional computer labs), is currently adequate.

- Expense funding is currently low, and the department finds it difficult to support faculty and graduate student travel to professional meetings. Travel to professional meetings promotes research contacts, which in turn improve chances for successful external grant funding. Ultimately this grant funding can be used to supplement expense money for travel, and the department expects more successful research grants in the future to take some of the pressure off of expense funding.

- Start-up funding for new faculty hires has been generous.

Math Learning Center

The Math Learning Center (MLC) is a joint effort between the Department of Mathematical Sciences and the Office of Undergraduate Studies. Its director, Dr. Roger Goldwyn, has a joint appointment in mathematics and undergraduate studies. The mathematics department has a close working relationship with the MLC, providing tutoring support from graduate teaching assistants funded by the department. The mathematics department cooperates in the pedagogical initiatives of the MLC mentioned above, including the SAM ("Succeed at Methods") lab, online tutoring, and the LA ("Learning Assistant") program. Funding for these projects is split between mathematics and undergraduate studies, and has not been much of a problem to date.

J. Future Directions

Anticipated Changes

The anticipated changes discussed here are items on which to focus the mathematics department's efforts over the next few years. These changes are grouped into four categories, the first of which will require significant funding from the university, and the remainder of which are primarily the responsibility of the department.

To secure the future of its faculty, the mathematics department must hire tenure-track faculty on a regular basis over the next several years, ideally one or two new hires each year. The department must also make faculty salaries competitive with those of mathematics departments at peer universities, especially for those faculty hired in the last ten years who are the foundation for the future of the department.

The mathematics department must continue to encourage faculty to seek external research funding. The department must also continue to encourage faculty to take advantage of interdisciplinary research opportunities in the university, as a way of strengthening applied mathematics within the department and strengthening the department within the college and university.

The mathematics department must overhaul its undergraduate degree programs so that its majors will be better prepared for their careers. The department must also encourage faculty, where appropriate, to incorporate project-based and discovery learning techniques in their classes and promote undergraduate research and honors among their students.

The mathematics department and the university must continue to work to improve student performance, retention rates, and graduation rates. The department and university have already implemented a number of initiatives aimed at improving student success, and the mathematics department must be a part of these. The mathematics department, with the support of the university, must take the lead in studying the effectiveness of these initiatives on student success.

Questions for Review Team

1. How can we further improve student success in our mathematics classes? How can we stimulate more undergraduate research? What metrics would you recommend to measure success?

2. How might we recruit more students for our undergraduate and graduate degree programs?

3. How might we restructure our undergraduate and graduate degree programs to enhance the career options of our majors? To provide more interdisciplinary opportunities? How might we secure more internship positions for our students?

4. What are effective strategies for increasing research grant funding? For establishing more connections with local industry?

5. What are successful models that exist for integrating mathematics into the teaching and research of other areas of the university, cutting across departments and colleges (e.g., joint hires, creation of interdisciplinary centers, etc.)?

K. Student Feedback

IEA does not collect student feedback on the mathematics programs, other than Tables 35 and 36 listing the "Student Perception of Teaching" responses for the quality of instruction and instructor in mathematics classes, compared with college and university averages.

Table 35

Scale 1=Excellent 5=Poor		20. Rate the quality of instruction as it contributed to your learning in the course.				
		Mathematics			College Total	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
Undergraduate	**# Sections**	291	264	273	1,510	5,771
	Mean Rating	**2.4**	**2.4**	**2.4**	**2.0**	**1.9**
Graduate	**# Sections**	32	31	19	130	1,016
	Mean Rating	**1.4**	**1.6**	**1.8**	**1.7**	**1.7**
Total	**# Sections**	323	295	292	1,640	6,787
	Mean Rating	**2.3**	**2.3**	**2.3**	**2.0**	**1.8**

Table 36

Scale: 1=One of Most Effective 5=One of Least Effective		21. What is your rating of this instructor compared to other instructors you have had?				
		Mathematics			College Total	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
Undergraduate	**# Sections**	291	264	273	1,510	5,771
	Mean Rating	**2.5**	**2.5**	**2.5**	**2.2**	**2.0**
Graduate	**# Sections**	32	31	19	130	1,016
	Mean Rating	**1.5**	**1.7**	**2.0**	**1.9**	**1.9**
Total	**# Sections**	323	295	292	1,640	6,787
	Mean Rating	**2.4**	**2.5**	**2.4**	**2.1**	**2.0**

For both the "quality of instruction" and the "quality of instructor" questions, the mean rating for graduate mathematics classes is comparable to college and university means, but for undergraduate mathematics

classes the mathematics rating is somewhat worse (but consistent over the three-year period). Without having the data broken into class sizes and level (large lower-division service classes versus small upper-division classes for mathematics majors), it is difficult to interpret this data or how it applies to the mathematics programs.

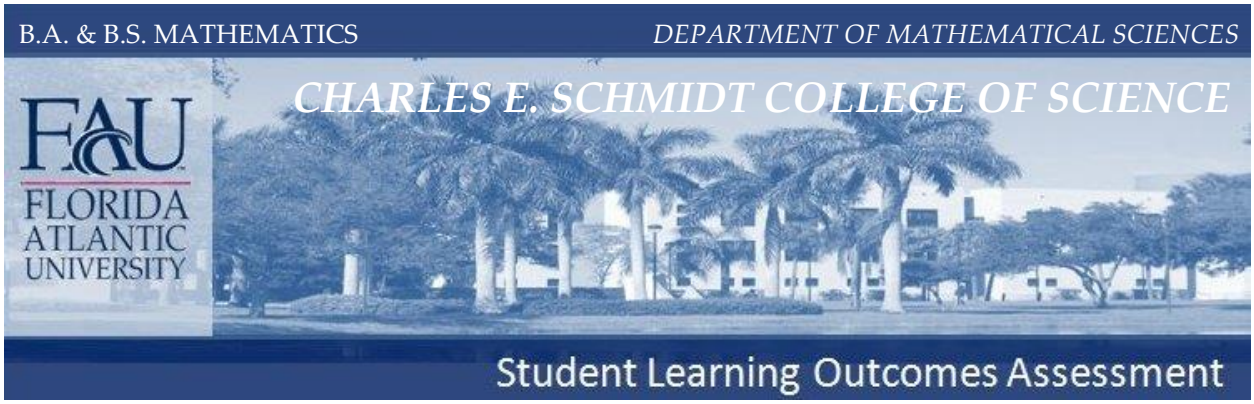
In spring 2014, two faculty from the mathematics department sent out a survey to a sample of (primarily undergraduate) alumni of the department's degree programs. Not surprisingly, all who responded were happy with their mathematics education at FAU, given that they are the ones who took the time to reply. We summarize the responses of those who graduated since 2000.

There were five responses from BA degrees, three of whom are currently public school mathematics teachers, one assistant director of a math learning center, and one a senior statistics analyst. The teachers and math learning center assistant director expressed satisfaction with most of the mathematics classes taken at FAU and emphasized the importance of critical thinking, problem-solving, and communication skills in general, especially the ability to explain difficult concepts in simple terms, and one recommended the addition of an interdisciplinary course to broaden the educational experience of the students. The senior statistics analyst found most useful the classes in computational mathematics, probability and statistics, and linear algebra, also stressing the importance of communication skills, and recommended that students gain more experience with programming and statistical software.

There were three responses from BS degrees, one senior operations research analyst, one quality management director, and one fulltime doctoral student at another university. The operations research analyst and the quality management director expressed satisfaction with the probability and statistics coursework at FAU, as well as the discrete mathematics class, and emphasized the importance of communication and problem-solving skills, stressing the need for more coursework in programming and data manipulation. The doctoral student appreciated the yearlong course sequences in analysis and abstract algebra and recommended giving undergraduates more research experiences in mathematics.

As mentioned near the beginning of this self-study, a new chair of the undergraduate committee has been appointed this fall (in fact one of the faculty who conducted the pilot alumni survey last spring), and he will be expected to continue and expand the survey of alumni of the department's undergraduate programs, to provide more useful feedback and recommend changes to improve these programs.

Appendix 1: Student Learning Outcomes Assessment



CONTENT KNOWLEDGE. Students graduating with a B.A. or B.S. degree in mathematics will demonstrate knowledge in three core areas of mathematics: algebra, analysis, and probability and statistics.

All undergraduate mathematics majors are required to complete the capstone courses Modern Algebra (MAS 4301), Modern Analysis (MAA 4200), and Probability and Statistics 1 (STA 4442). In these courses, students submit solutions to homework problems and take examinations designed to assess their understanding of the basic concepts in the three core areas.

COMMUNICATION. Students graduating with a B.A. or B.S. degree in mathematics will produce writing that is well organized and grammatically correct, and they will express mathematical ideas clearly and concisely.

All undergraduate mathematics majors are required to complete Mathematical Problem Solving (MAT 4937). In this course, students write up and submit detailed solutions to a wide variety of mathematical problems and present solutions orally in class.

CRITICAL THINKING. Students graduating with a B.A. or B.S. degree in mathematics will correctly analyze and determine the validity of mathematical arguments. They will apply abstract mathematical concepts to solve concrete problems.

Students in Modern Algebra (MAS 4301) and Modern Analysis (MAA 4200) are exposed to mathematical arguments and produce their own proofs of simple mathematical propositions, both on submitted homework and in-class examinations. Students in Probability and Statistics 1 (STA 4442) and Mathematical Problem Solving (MAT 4937) use their mathematical knowledge to solve numerous applied problems, both on submitted homework and in-class examinations.

Appendix 2: Abbreviated Faculty CVs

Ronald Adams

Contact Information

Department of Mathematics
Florida Atlantic University
636 NW13th street apt:33
Boca Raton, FL USA

radams22@fau.edu
(561)-297-1344

Research Interests

Dynamical systems, algebraic topology, and differential topology– especially curve shortening, and applications to lagrangian systems.

Education

Department of Mathematical Sciences, Florida Atlantic University
Ph.D. in Mathematics, August 2014

- Dissertation Topic: Applications of Curve Shortening to Second Order Lagrangian Systems
- Advisor: William Kalies

M.S. in Mathematics, August 2009

B.S. in Mathematics, August 2007

Conferences

IMA Summer School on Topological Methods. UPenn (June 2011)

The 9th AIMS Conference on Dynamical Systems, Differential Equations and Applica- tions. Orlando, Florida (July 1 - 5, 2012)

Teaching Experience

Spring	2013	Lecturer, Trigonometry
Fall	2012	Lecturer, Calculus for Engineers 1
Summer	2012	Lecturer, Calculus-Analytic Geometry 3
Spring	2012	Lecturer, Precalculus Algebra
Fall	2011	Lecturer, Calculus for Engineers 2
Spring	2011	Lecturer, Calculus-Analytic Geometry 1
Fall	2010	Lecturer, Intermediate Algebra
Spring	2010	Lecturer, Trigonometry
Fall	2009	Lecturer, Methods of Calculus

Awards

2012–2013	FAU Graduate Grant
Spring–2014	Leanne & Spyros Magliveras Graduate Scholarship

Graduate Coursework

Real Variables, Complex Variables, Linear Algebra, Ordinary Differential Equations, Partial Differential Equations, Algebraic Topology, Differential Geometry, Topology, Functional Analysis, Algebraic Curves, Dynamical Systems, Mathematical Logic

Professional Research Experience

2012–2013 Assistant Director of eLearning for the FAU Mathematics Department
http://www.math.fau.edu/MLC/remote/

Relevant Skills

Programming Languages: C, C++, Python
Numerical Computation: MATLAB

Abbreviated Faculty CV
Dr. Barry Booton

PROFESSIONAL PREPRARATION

University of Illinois at Chicago
Department of Mathematics, Statistics, and Computer Science
Ph.D. in Mathematics, May 2005.
Teaching Assistant, August, 1992 to December, 1998.
M.S. in Statistics, May, 1998.

Institute for Mathematics and Science Education
Graduate Research Assistant, January, 1999 to August, 2003

Northwestern University
Department of Mathematics
M.A. in Mathematics, June, 1992.

Northeastern Illinois University
Department of Mathematics
B.A. in Mathematics, August, 1990.

APPOINTMENTS

Florida Atlantic University (FAU)
Department of Mathematical Sciences
Senior Instructor, August, 2014 to present
Instructor, August, 2003 to August, 2014

Loyola University of Chicago
Department of Mathematical and Computer Sciences
Lecturer, January, 1999 to May, 1999.

PUBLICATIONS

Peer-refereed articles under review
"General monotone functions and their Fourier coefficients", 22 pages.

Peer-refereed articles in print
"General monotone sequences and trigonometric series", Mathematische Nachrichten, Vol. 287, Issue 5-6, Apr., 2014, pp. 518-529.

"Asymptotic behavior of Hardy operators", with Yoram Sagher, Journal of Mathematical Inequalities, Vol. 5, Issue 3, Sept., 2011, pp. 383-400.

"Norm inequalities for certain classes of functions and their Fourier transforms", with Yoram Sagher, Journal of Mathematical Analysis and Applications, Vol. 335, Issue 2, Nov. 15, 2007, pp. 1416-33

COURSES TAUGHT AT FAU (last 7 years)

MAA 4200, Modern Analysis
MAC 1105, College Algebra
MAC 1114, Trigonometry
MAC 1140, Precalculus Algebra
MAC 1147, Precalculus Algebra and Trigonometry
MAC 2281, Calculus for Engineers 1
MAC 2282, Calculus for Engineers 2
MAC 2311, Calculus-Analytic Geometry 1
MAC 2312, Calculus-Analytic Geometry 2
MAP 3305, Engineering Mathematics 1
MAT 1033, Intermediate Algebra
MAT 4937, Mathematical Problem Solving
MGF 1106, Mathematics for Liberal Arts 1
MGF 1107, Mathematics for Liberal Arts 2
STA 2023, Introductory Statistics
STA 4032, Probability and Statistics for Engineers
STA 4442, Probability and Statistics 1

SERVICE

Service to FAU
Service to the Department of Mathematical Sciences
Course co-coordinator, MAC 1105, College Algebra, August, 2014 to present
Substitute course coordinator, MAC 1105, College Algebra, May, 2013 to August, 2013
Course coordinator, MAC 1140, Precalculus Algebra, January, 2011 to May, 2013
Course coordinator, MAC 1114, Trigonometry, and MAC 1147, Precalculus Algebra and Trigonometry, August, 2011 to May 2013
Lower Division (IFP) Committee member, Academic Years 2011-2012 and 2012-2013
Engineering/Mathematics Committee member, Academic Year 2010-2011
Undergraduate Committee member, Academic Year 2009-2010

Ana T. Escuder

Department of Mathematical Sciences
Florida Atlantic University
777 Glades Road
Boca Raton, Florida 33431
Ph: 461.297.3399
aescuder@fau.edu

EDUCATION

- Doctor of Philosophy in Curriculum and Instruction, Florida Atlantic University, Boca Raton, FL. Title of dissertation: "Middle School Teachers' Usage of Dynamic Mathematics Learning Environments as Cognitive Instructional Tools". August 2013.
- Masters of Science in Teaching, Mathematics. Florida Atlantic University, Boca Raton, FL. May 2007
- Bachelors of Arts in Education, Mathematics. Arizona State University, Tempe, AZ. May 1984

FLORIDA CERTIFICATION

- Florida Professional Educator's Certificate in Mathematics (grades 6 - 12). Valid through June 30, 2017

WORK EXPERIENCE

Florida Atlantic University (June 2004 to present) **777 Glades Rd Boca Raton, FL 33431**

- Full time instructor in the Mathematics Department.
- Chair of the GeoGebra Chapter at FAU that cooperates with the GeoGebra institutes of North America and the International GeoGebra Institute
- Coworker of Professors Dr. Heinz-Otto Peitgen and Dr. Richard Voss, in the National Science Foundation grant "Standards Mapped Graduate Education and Mentoring". The central goal of this program is to develop and implement a new track in the FAU mathematics department for middle school teachers in partnership with the School Board of Broward County.
- Responsible for developing, planning, and teaching workshops and semester long courses for middle school teachers, coaching, mentoring and guiding the participating teachers in the best teaching practices, organizing and coordinating pedagogy conferences, and structuring the schedule, groups, and assignments of the classes.

School Board of Broward County (Summer 2007 to May 2008) **600 SE 3rd Ave. Ft. Lauderdale, FL 33301**

- Curriculum Program Specialist; improving, increasing and enhancing staff and student performance at nine designated superintendent schools.
- Consultant; designing, coordinating, implementing, and teaching a new mathematics summer program for incoming 9th graders that will empower students with reasoning skills, critical thinking, as well as mathematical concepts and technology applications.

St. Thomas Aquinas High School (August 1999 to September 2007) **2801 SW 12 St. Ft. Lauderdale, FL 33312**

- Mathematics teacher; teaching students from 9th grade to 12th grade in Algebra 1, Algebra 1 Honors, Geometry, Geometry Honors, Pre-Calculus and Statistics Advanced Placement
- Responsibilities in the Math department included leading the Geometry teachers in developing curriculum and instruction. Developed the syllabus for the AP statistics course, which was approved by the College Board in 2007
- Created curriculum for Geometry Honors class, taught in a computer lab using the Dynamic Geometry Software, Cabri

- Teaching after school programs for PSAT preparation
- Moderator of the Algebra 1 competition team
- Developed a 15-day summer program named "Creative Mathematics" tailored for high school students with various degrees of skill in mathematics
- Assisted in the preparation and execution of "Math Field Day", a competition for middle school students
- Moderator of Cailini, a school-wide annual sport competition event involving 300 girls

St. Andrew Catholic School (Aug 1989 - May 1999) **9950 NW 29 St**
Coral Springs, FL 33065

- Teaching mathematics classes to 6^{th} to 8^{th} graders
- Coordinator of the middle school program across all disciplines
- Teaching Kindergarten to 8^{th} grades mathematics skills using computer software and instructed other teachers in the use of computer innovations to support their own teaching
- Reason for leaving: seeking opportunity to grow professionally in a High School.

PROFESSIONAL PRESENTATIONS

- Presenter at the annual International GeoGebra Conference in Linz, Austria. 2011
- Presenter at the International Conference in Technology and Collegiate Mathematics at Denver, CO. 2011
- Presenter at Society for Information Technology and Teacher Education Annual Conference at Nashville, TN. 2011
- Presenter at Math Day at FAU, Florida, 2007, 2008, 2010, 2011
- Presenter at the Nation Science Foundation National Teacher of the Year Award Ceremony in Washington D.C., 2006
- Presenter at the FCTM Annual Conference in 2005, 2007, 2008, 2009, 2010, 2011.
- Presenter at the Third Cabri International Conference in Rome, Italy, 2004.

PROFESSIONAL MEMBERSHIPS AND LEADERSHIP POSITIONS

- Chair of the Florida Chapter of the International Institute of GeoGebra
- Society for Information Technology and Teacher Education
- Association of Mathematics Teacher Educators
- Broward County Council of Teachers of Mathematics: Coordinator of Special Programs, 2006-2007; Treasurer, 2007-current; Volunteer in the Middle School Math Competition, 2007.
- Florida Council of Teachers of Mathematics: presenter in the annual conference 2005.
- National Council of Teachers of Mathematics.

PUBLICATIONS:

- Ana T. Escuder and Heinz-Otto Peitgen, "The Impact of GeoGebra in an MSP Project", Proceedings Society for Technology & Teacher Education, p., vol., (2011). Accepted.
- Ana T. Escuder and Heinz-Otto Peitgen, "GeoGebra in the Math Classroom", Proceedings Society for Technology & Teacher Education, p. vol., (2011). Accepted.

VITA OF TIMOTHY J. FORD

Personal Data. Professor of Mathematics.

Education: Ph. D. Colorado State University 1980.

E-mail: Ford@fau.edu

Mailing Address:

Office:

Department of Mathematics
Florida Atlantic University
Boca Raton, Florida 33431
(561) 297-3348

Home:

4477 N.W. 5th Avenue
Boca Raton, Florida 33431
(561) 368-6185

Professional Experience.

Full-time appointments: Florida Atlantic University: 1981–present. Current rank: Professor.

Recent part-time appointments: IDA Center for Communications Research, Princeton: Adjunct Research Staff Member, June – August, 2009 and June – August, 2010.

Committees and Service Activities.

Department of Mathematics undergraduate advisor, 1995 – present.

Bibliography.

RECENT PUBLICATIONS

[1] *The relative Brauer group of a cyclic cover of affine space*, J. Pure Appl. Algebra **215** (2011) pp. 847–865.

[2] *The relative Brauer group of an affine double plane*, Comm. Algebra **41** (2013) pp. 3277–3298.

[3] (with D. N. Bulj and D. M. Harmon), *Generically trivial Azumaya algebras on a rational surface with a non rational singularity*, Comm. Algebra **41** (2013) pp. 4333–4338.

[4] *The group of units on an affine variety*, J. Algebra Appl. **13** (2014) 1450065 (27 pages).

[5] *The Brauer group of an affine double plane associated to a hyperelliptic curve*, submitted. Preprint available at: http://arxiv.org/abs/1303.5690.

[6] (with D. M. Harmon), *The relative Brauer group and generalized cross products for a cyclic covering of affine space*, J. Pure Appl. Algebra **218** (2014) pp. 721–730.

[7] (with D. M. Harmon), *The Brauer group of an affine rational surface with a non-rational singularity*, J. Algebra **388** (2013) pp. 107–140.

[8] *The relative Brauer group and generalized Cyclic Crossed Products for a Ramified Covering*, submitted. Preprint available at: http://math.fau.edu/ford/preprints/rBggcpcc/rBggcpcc.pdf.

ROGER M. GOLDWYN

Professional Preparation

Electrical Engineering	Rice University	B.A.	1958	Electrical
Engineering	Rice University	B.S.	1959	Electrical
Engineering	Rice University	M.S.	1960	Applied
Mathematics	Harvard University		A.M.	1961
Applied Mathematics	Harvard University		Ph.D.	1964

Appointments/Professional Experience

2011-present:	Research Professor, Department of Mathematical Sciences, Florida Atlantic University, Boca Raton, FL
2009- present:	Director of Math Learning Center, Florida Atlantic University, Boca Raton, FL
2005-2011:	Senior Instructor, Department of Mathematical Sciences, Florida Atlantic University, Boca Raton, FL
1998-2004:	Founder and Chief Technical Officer, Global Voice Technologies, Boca Raton, FL; Integrated Speech Solutions, Long Island, NY and Boca Raton, FL
1997-1998	Vice President Worldwide Research and Development, Registry Magic, Boca Raton, FL
1992-1996	Worldwide Development Manager, IBM, Speech Business Unit, Boca Raton, FL
1988-1992	Senior Consultant, IBM, Personal Computer Division, Boca Raton, FL 1984-1987
	Manager, Advanced Systems Products, IBM, Information Systems and Storage Group, Harrison, NY
1968-1983	Promoted through series of technical/management positions from Research Staff Member to Senior Manager in Computer Sciences to Assistant to the Vice-President, Systems, IBM, Research Division, Yorktown Heights, NY
1964-1968	Assistant Professor, Electrical Engineering, Rice University, Houston, TX

Synergistic Activities

- Chair, Joint Engineering-Math Committee, Florida Atlantic University, 2004-Present
- Introduced and currently evaluating Learning Assistant Program for Calculus
- Introduced at FAU 2+2 format for instruction in College Algebra and Calculus, 2 hours of lab with 2 hours of lecture
- Introduced inverted classroom at FAU for eLearning Methods of Calculus—prerecorded lectures and interactive sessions (tutoring) to review problems with the class.
- Research in complex data analysis in general with some specific applications in particular to the biomedical area

and critically ill patients.

- Research and management in Digital Signal Processing and Digital Line Switching including software, hardware and DB structures to ensure reliability.
- Technology and product solutions for Query-by-Example Relational Data Base (DB) System, Speech Terminal, Speech Filing, Speech Recognition, Image Technologies, Robotics/CADAM.
- Introduced IBM's first expert system products coupled to corporate databases and IBM's first image storage/retrieval/display commercial solutions.
- Charged with start-up and implementation of IBM's entrance into speech recognition market. Architected product strategy and plans. Identified technical solutions and led development, moving research results into products.
- Chair, Lower Division Undergraduate Mathematics Course Committee. As chair, responsible for Assessment Database input to General Education--Quantitative. Organized and collected results on embedded questions. Convened faculty to discuss ways to improve. Included summary in Assessment Database. Assessment accepted.
- Member, Core Curriculum Committee. Responsible for review and monitoring of assessments in General Education, Intellectual Foundation Program (IFP).

Selected Courses Taught

- MAC 1140—College Algebra—introduced 2 + 2 format
- MAC 2233—Methods of Calculus
- MAC 2311/MAC 2281—Calculus 1 for Engineers
- MAC 2312/MAC 2282—Calculus 2 for Engineers
- MAC 3305—Engineering Mathematics I (ODE)
- MAC 4306—Engineering Mathematics II (PDE)

Lisa S. Greenberg

9209 Southampton Place
Boca Raton, FL 33434
lisagreenberg0119@gmail.com
(954) 383-3163

EXPERIENCE:

FLORIDA ATLANTIC UNIVERSITY August 2011 – Present
Boca Raton, Florida
Instructor

Responsibilities include teaching Intermediate Algebra, College Algebra and Precalculus Algebra. Solely responsible for teaching and coordinating all sections of Precalculus Algebra and Trigonometry. Coordinated Intermediate Algebra and the computer labs associated with these sections. Hired, trained and managed peer tutors.

Attended and was certified to teach Online Courses through the Center for e-Learning at FAU. Began teaching online in the Fall 2011 semester and am currently conducting an online Precalculus course. All online courses have been synchronous using Blackboard Collaborate. Have been consulted by faculty members in the Mathematics Department regarding computer issues.

Other responsibilities include liaison between the Department of Mathematics and McGraw-Hill/ALEKS regarding online software issues.

KEISER UNIVERSITY October 2010 – Present
Fort Lauderdale, Florida
Online Adjunct Instructor

Teach Intermediate Algebra and College Algebra Online using Elluminate. Have been consistently evaluated by faculty in the Mathematics department and have always scored in the upper ninety percentile. Student evaulations have always been excellent.

FLORIDA ATLANTIC UNIVERSITY August 2009 – May 2010
Boca Raton, Florida
Graduate Student Instructor

Taught College Algebra Lab in the Fall Semester 2009. Had very good student reviews. Taught Intermediate Algebra in the Spring 2010 Semester. Responsible for all aspects of the class including preparing lesson plans and exams.

LG SOLUTIONS February 2001 – Present
Fort Lauderdale, Florida
Internet Sales/President

Liquidation company specializing in internet sales of computers and computer related items. I manage and train an office staff. We repair and refurbish many different types of electronic equipment.

VISION DESIGN GROUP July 1994 – February 2001

Fort Lauderdale, Florida

Computer Consultant/Owner

Computer consulting firm specializing in all facets of hardware and software service and support. Projects have included: complete system programming for retail and wholesale businesses including inventory and accounts receivables; hardware and software troubleshooting and training for a variety of businesses; existing program modifications; setting up a Local Area Network using Windows 95 and 98, Novell 3.x; and computer sales and service. Software expertise includes: Microsoft Word (as well as other word processing software), Novell, Windows, FoxPro, FoxPro 2.6 and Visual FoxPro 5, dBase, QuarkExpress, CorelDraw, as well as numerous other software packages.

IMX PHARMACEUTICALS June 1996 – November 1999

Boca Raton, Florida

Computer Programmer

Responsibilities include design and implementation of two separate programs to manage clients and orders. These programs were designed to allow client and order entry, history, automated shipping procedures (including interfacing with credit card companies) and multiple reports and utilities. Both of these programs were originally written in Microsoft Foxpro 2.6 and Neon Technologies FoxExpress 2.6 software. The Eczema/Psoriasis program has since been updated and rewritten in Visual FoxPro 5 and F1 Technologies Visual FoxExpress 5.

EDUCATION:

FLORIDA ATLANTIC UNIVERSITY

Boca Raton, Florida

Master of Science in Mathematics, May 2010

FLORIDA ATLANTIC UNIVERSITY

Boca Raton, Florida

Bachelor of Science in Computer Science, August, 2004

TULANE UNIVERSITY

New Orleans, Louisiana

Electrical Engineering, 1976 - 1981

Major Courses: Programming, Digital Electronics, Mathematics.

HONORS:

PHI KAPPA PHI, Academic Honor Society, Florida International University, *1989.*

PROFESSIONAL CERTIFICATION:

CERTIFIED NOVELL ENGINEER / CERTIFIED NOVELL ADMINISTRATOR

ENGINEER-IN-TRAINING, Registration #T8188

FREDERICK HOFFMAN

Degrees Awarded:

B.S. Georgetown University Ph.D.
University of Virginia

Scholarships, Fellowships, Research Grants/Contracts:

Woodrow Wilson Fellowship (Hon.), 1958-59.

National Science Foundation Fellowship, 1958-61.

Grant to study routing for solid waste collection. Funding agency is the FAU-FIU Joint Center for Environmental and Urban Problems, 1974-75 (with Frank O . Hadlock).

Partial support for Eleventh Southeastern Conference on Combinatorics, Graph Theory and Computing. Funding agency is U.S. Department of Transportation, 1979-80.

Support to attend research institute in Burnaby (funded by Simon Fraser University and University of Victoria), 1979.

Contract for development of expert systems configuration for minicomputer systems. Funding agency is IBM Corporation, Armonk, New York, 1983-86.

Subsidy to attend CBMS Regional Conference in Eugene, Oregon (funding by NSF through University of Oregon), 1984.

Contract for development of expert system for vectorization enablement. Funding agency is IBM Corporation, Armonk, New York, 1986-87.

Partial support for Seventeenth, Eighteenth, Twentieth, Twenty-first, Twenty-third, Twenty- fourth, Twenty-fifth, Twenty-sixth, Twenty-eighth, and Twenty-ninth Southeastern Conferences on Combinatorics, Graph Theory and Computing. Funding agency is U.S. Office of Naval Research, 1985, 1986, 1987, 1989, 1990, 1992, 1993, 1994, 1995, 1997, 1998.

Partial support for Eighteenth, Twentieth, Twenty-first Twenty-third, Twenty-fourth, Twenty- fifth, Twenty-sixth, Twenty-eighth, Twenty-ninth, Thirtieth, Thirty-first, Thirty-third, Thirty-fourth, Thirty-fifth, Thirty-sixth, Thirty-seventh, Thirty-eighth, Forty-second, Forty-third, Forty-fourth, Forty-fifth Southeastern International Conferences on Combinatorics, Graph Theory and Computing. Funding agency is U.S. National Security Agency, 1987, 1989, 1990, 1992, 1993, 1994, 1995, 1997, 1998, 1999, 2000, 2002, 2003, 2004, 2005, 2006, 2007, 2010, 2011, 2012, 2013, 2014.

Subsidy to attend Summer Research Conference on Graphs and Algorithms (funding by NSF through American Mathematical Society), 1987.

Partial support for First International Symposium on Artificial Intelligence and Mathematics. Funding agency is U.S. National Science Foundation, 1990.

Partial support for the Second and Third International Symposium on Artificial Intelligence and Mathematics. Funding agency is the Air Force Office of Scientific Research, 1992, 1994.

Appointments:

1960-61 Visiting Lecturer, Georgetown University,
1961-62 Jr. Instructor, University of Virginia.
1962-65 Instructor, University of Illinois.

1965-66 Assistant Professor, University of Illinois.

1966-67 Mathematician, Institute for Defense Analyses/Communications Research Division
1967 Visiting Lecturer, Princeton University.
1967-68 Assistant Professor, Drexel Institute of Technology.
1968-70 Assistant Professor, Florida Atlantic University.
1970-77 Associate Professor, Florida Atlantic University.
1975 Visiting Associate Professor, University of Waterloo.
1977- Professor, Florida Atlantic University.
1982-83 Faculty Visitor, IBM Boca Raton.
1984-85 Chairman, FAU Institute for Computer Science and Engineering.
1987-88 Member, Core Faculty of FAU Computer Science Department.
2003-05 Member, Florida Atlantic University Board of Trustees

Honors and Professional Societies:

Magna cum laude; Gold Key Society; ranked first in class of 1958, Georgetown University College of Arts and Sciences; Sigma Xi; American Mathematical Society; Mathematical Association of America, Society for Industrial and Applied Mathematics, American Association for the Advancement of Science; New York Academy of Sciences; Association for Computing Machinery, IEEE, IEEE Computer Society; American Association for Artificial Intelligence, Florida A.I. Research Society, The Institute for Combinatorics and Its Applications (Founding Fellow). Citation for outstanding service by Florida Section of MAA, 1993.

Books and refereed papers: (most recent)

2004 -*Cryptographic primitives based on groups of hidden orders* (with S. Magliveras, T. van Trung and W. Wei), Tatra Mt. Math. Publ.

2004 -*Manhattan Graphs*, Congressus Numerantium (with Frank O. Hadlock and Stephen C. Locke)

Other Publications and Submitted Papers:

1985 - Project report to IBM on Configurer Project (with James Romanowiz) 1986 - *An Expert System for Minicomputer Configuration*, (research report).

1988 -M*odular Configuration Systems and Applications,* Proceedings of FLAIRS 1988 (with James Romanowiz).

1989 -*The Artificial Intelligence Curriculum in Florida Universities,* Florida Educational Computer Quarterly.

Keiko Ito

Curriculum Vitae

Education:

1996 August	MS in Mathematics, Florida Atlantic University, Boca Raton, Florida
1994-1997	Graduate Academic Program in Mathematics and Teaching Assistantship, Florida Atlantic University, Boca Raton, Florida
1994 April	BS in Mathematics, Florida Atlantic University, Boca Raton, Florida
1990 December	AA Degree, Broward Community College, Davie, Florida

Teaching:

Florida Atlantic University

2014 Fall	STA 2023 Introduction to Statistics (four classes)
2014 Summer	MAD 2104 Discrete Structure
2014 Spring	STA 2023 Introduction to Statistics (four classes)
2013 Fall	STA 2023 Introduction to Statistics (four classes)
2013 Spring	MAC 2312 Calculus-Analytic Geometry 3 (three classes)
2012 Fall	AC 1105 College Algebra (three classes)
	MAD 2104 Discrete Structure
Sept-Dec	MAD 2104 Discrete Structure (four classes)

Howard Community College

2012 Summer	MATH 220 Discrete Structure
2012 Spring	MATH 220 Discrete Structure
	MATH 141 College Algebra
2011 Fall	MATH 153 Precalculus II
	MATH 141 College Algebra
Substitute	Calculus II
	College Algebra (three classes)
	Developmental Algebra (two classes)
2011 Summer	MATH 220 Discrete Structure
2011 Spring	MATH 220 Discrete Structure
	MATH 143 Precalculus I
2010 Fall	MATH 143 Precalculus I (two classes)
2010 Summer	MATH 145 Business Calculus (two classes)
2010 Spring	MATH 145 Business Calculus (two classes)
2010 Winter	MATH 131 College Algebra
2009 Fall	MATH 131 College Algebra
Substitute	College Algebra (two classes)

Calculus III (two classes)

Washington Japanese Language School

2010 March A teacher in charge of 8th grade class
Teach one 8th grade Math class
Teach two 7th grad Math class
2009 March A teacher in charge of one of 8th grade classes
Teach two 8th grade Math classes
Teach one 7th grade Japanese class
2008 May 24 Substitute teacher: Washington Japanese Language School

Florida Atlantic University:

1997 Spring Teaching Assistant for MGF 1106 Math for Liberal Arts
Math for Liberal Arts Tutorial Session
1996 Fall MAC 1105 College Algebra
College Algebra Tutorial Session
1996 Summer MAC 2233 Method of Calculus
1996 Spring MAC 1105 College Algebra
College Algebra Tutorial Session
1995 Fall MAC 1105 College Algebra – two courses
College Algebra Tutorial Session
1995 Summer College Algebra Tutorial Session
1995 Spring MAC 1105 College Algebra
College Algebra Tutorial Session
1994 Fall MAC 1105 College Algebra

Publication:

Communications in Algebra, 28(1), 69-81 (2000), Keiko Holroyd, *Summands and Valuated Groups*

WILLIAM D. KALIES
CURRICULUM VITAE – OCTOBER 2014

Professor
Department of Mathematical Sciences
Florida Atlantic University
Boca Raton, FL 33431

Phone: (561) 297-1107
FAX: (561) 297-2436
E-mail: wkalies@fau.edu
URL: http://www.math.fau.edu/kalies

EDUCATION

August 1994 Ph.D. in Mathematics, Cornell University, Ithaca, NY.
May 1992 M.S. in Mathematics, Cornell University, Ithaca, NY.
June 1989 B.S. in Mathematics, The Ohio State University, Columbus, OH.

PROFESSIONAL EXPERIENCE

1998-present Professor, Department of Mathematical Sciences (asst., assoc., full), Florida Atlantic University, Boca Raton, FL.
1996-1998 Lecturer, Department of Mathematics, Cal. Poly. State Univ., San Luis Obispo, CA.
1994-1996 Postdoctoral Fellow, Center for Dynamical Systems and Nonlinear Studies, Georgia Institute of Technology, Atlanta, GA.
1992-1994 Graduate Research Assistant, Department of Mathematics, Cornell University.
1989-1992 National Science Foundation Graduate Fellow, Dept. of Mathematics, Cornell Univ.

RESEARCH SUPPORT AND FELLOWSHIPS

2009-2012 National Science Foundation Grant (DMS-0914995, $252,246), *Computing Dynamics of Multiparameter Systems*.
2005-2008 U.S. Department of Energy Grant (DE-FG02-05ER25713, $284,003), *Multiscale Analysis of Nonlinear Systems using Computational Homology*.
2005-2008 National Science Foundation Grant (DMS-0511208, $161,220), *Topological Methods for the Study of Nonlinear Infinite Dimensional Systems*.

REFEREED WORKS – JOURNAL PUBLICATIONS

1. Lattice structures for attractors I (with K. Mischaikow and R. VanderVorst), *Accepted and to appear in Journal of Computational Dynamics*, 2014.
2. Rigorous computation of the global dynamics of integrodifference equations with smooth nonlinearities (with S. Day). *SIAM Journal on Numerical Analysis* 51, pp. 2957–2983, 2013.
3. A reinjected cuspidal horseshoe (with M. Fontaine, and V. Naudot). *Discrete and Continuous Dynamical Systems - special issue*, pp. 227-236, 2013
4. Verified homology computations for nodal domains (with S. Day, and T. Wanner). *Multiscale Modeling and Simulation: A SIAM Interdisciplinary Journal* 7, pp. 1695-1726, 2009.
5. A database schema for the analysis of global dynamics of multiparameter systems (with Z. Arai, H. Kokubu, K. Mischaikow, H. Oka, and P. Pilarczyk). *SIAM Journal on Applied Dynamical Systems* 8, pp. 757-789, 2009.
6. Three-dimensional analysis of solid oxide fuel cell Ni-YSZ anode interconnectivity (with J. Wilson, M. Gameiro, K. Mischaikow, P. Voorhees, and S. Barnett). *Microscopy and Micro- analysis* 15, pp. 71-77, 2009.
7. Closed characteristics on singular energy levels of second-order Lagrangian systems (with M. Wess), *Journal of Differential Equations* 244, pp. 555–58, 2008.
8. Topological horseshoes of traveling waves for a fast-slow predator-prey system (with M. Gameiro, T. Gedeon, H. Kokubu, K. Mischaikow, and H. Oka), *Journal of Dynamics and Differential Equations* 19,

pp. 623–654, 2007.

INVITED LECTURES AND PAPERS PRESENTED AT CONFERENCES

2012 **Invited talk:** *Rigorous Computation of the Global Dynamics of Integrodifference Equations with Smooth Nonlinearity*, IV Developer's Workshop on the Conley-Morse Database, Kauai, HI.

2011 **Invited talk:** *Rigorous Computation of the Global Dynamics of Integrodifference Equations with Smooth Nonlinearity*, IMA Summer School on Topological Methods in Complex Systems, Philadelphia, PA.

2010 **Invited talk:** *Computing Global Dynamics of Multiparameter Systems*, Workshop on Bifurcation Analysis and Applications, Montreal, Canada.

2010 **Invited talk:** *Computing Global Dynamics of Multiparameter Systems*, Algebra and Topology: Methods, Computation, and Science, Münster, Germany.

2009 **Invited Lecturer:** 5 lectures on *Computational Conley Theory*, Summer School on Topology, Computation, and Dynamics, Munich, Germany.

2009 **Invited talk:** *Computational Conley Theory*, IMA New Directions Short Course on Applied Algebraic Topology, Minneapolis, MN.

2009 **Invited talk:** *Homology of Nodal Domains*, IMA New Directions Short Course on Applied Algebraic Topology, Minneapolis, MN.

2008 **Minisymposium talk:** *Building databases for global dynamics of multiparameter systems*, Foundations of Computational Mathematics '08, Hong Kong.

2007 **Invited talk:** *Computing global decompositions of dynamical systems*, Workshop on Topological and Computational Approaches to Dynamical Systems and Applications, Ryukoku University, Kyoto, Japan.

Ph.D. students advised:

Hyunju Ban – Ph.D. awarded 12/2006 – *Computing Global Decompositions of Dynamical Systems* Mark Wess – Ph.D. awarded 12/2008 – *Computing Topological Dynamics from Time Series* Ronald Adams – Ph.D. awarded 8/2014 – *Curve Shortening in Second-Order Lagrangian Systems*

Synergistic Activities:

National Science Foundation Applied Numerical Methods panelist. Reviewer for the Portuguese Foundation for Science and Technology.

Reviewer for VENI grant from the Netherlands Organisation for Scientific Research. Reviewer for VIDI grant from the Netherlands Organisation for Scientific Research. National Science Foundation Applied Dynamical Systems reviewer.

Courses Taught at FAU

Graduate: Computational Mathematics, Algebraic Topology, Linear Algebra, Multivariable Analysis, Numerical Analysis, Ordinary Differential Equations, Differential Topology, Topological Methods in Nonlinear Analysis, Introductory Analysis 1 & 2, Topics in Differential Equations, Directed Independent Study, and Ph.D. Research.

Undergraduate: Introduction to Computational Math, Engineering Mathematics 1, Engineering Mathematics 2, Numerical Analysis, Numerical Methods, Calculus 1, 2, & 3 (including honors section), Modern Analysis, Discrete Mathematics, Matrix Theory, Methods of Calculus, Math for Liberal Arts 1, and Directed Independent Study.

Biographical Sketch: Koray Karabina

(a) Professional Preparation

Bilkent University	Mathematics	B.Sc., 2003
Sabanci University	Mathematics	M.Sc., 2005
University of Waterloo (UW)	Comb. and Opt. (C&O)	M.Math, 2007
UW	C&O	Ph.D., 2010
UW	Cryptography	Post-doctoral, 05.2010-12.2010
UW	Cryptography	Post-doctoral, 08.2011-08.2012

(b) Appointments

2013-present	Asst. Prof., Dept. of Mathematical Sciences, Florida Atlantic University
2012-2013	Asst. Prof., Department of Mathematics, Bilkent University, Turkey
01.2011-07.2011	Cryptographic Researcher, Certicom Research-Research in Motion, Canada

(c) Selected Publications

1. S. Chatterjee, K. Karabina, and A. Menezes. Fault attacks on pairing-based protocols revisited. http://eprint.iacr.org/2014/492, 2014. Accepted: IEEE Transactions on Computers.

2. R. Azarderakhsh and K. Karabina. A New double point multiplication algorithm and its application to binary elliptic curves with endomorphisms. IEEE Transactions on Computers, 2013. Preprint, ISSN: 0018-9340.

3. K. Karabina. Squaring in cyclotomic subgroups. Mathematics of Computation, 82:555{579, 2013.

4. K. Karabina, E. Knapp, and A. Menezes. Generalizations of Verheul's theorem to asymmetric pairings. Advances in Mathematics of Communications, 7:103{111, 2013.

5. K. Karabina. Torus-based compression by factor 4 and 6. IEEE Transactions on Information Theory, 58:3293{3304, 2012.

(d) Grants

1. NSF Career, July 2014, Pending.
2. FAU College of Science Research Seed, March 2014, Granted ($5000).
3. FAU Faculty Research Mentoring, Jan 2014, Granted ($2000).

(e) Synergistic Activities

1. Mentorship: A K-12 student (Eric Silva) in cryptology at FAU, 05.2014-08.2014; an under-graduate student (Dale Brydon) in cryptology at UW, 2010.
2. Keynote Speaker: The World of Cryptography, Middle School Mathematics Day (AMC8), Florida Atlantic University, 2013
3. Technology transfer: Designed cryptographic algorithms and protocols for BlackBerry smart phones, and represented Certicom Research/RIM in international standards organizations, 2011.
4. Editorial: Mathematical Reviews, 2011-Present.
5. FAU Technology Development Committee Presentation: Sep 9, 2014: “Secure and Privacy-Preserving Biometrics”.
6. Program Committee (PC) and Organizing Committee (OC) member: Gold Coast Math Theachers' Circle 2014 (OC), ASIACRYPT 2014 (PC), AAD 2013 (OC), WAIFI 2012 (PC), INDOCRYPT 2011 (PC), IWSEC 2011 (PC), CACR 2008-2010 (OC).

(f) Collaborators & Other Affiliations:

Prof. Diego Aranha (University of Campinas), Prof. Reza Azarderakhsh (Rochester Institute of Technology), Prof. Sanjit Chatterjee (Indian Institute of Science), Prof. Catherine Gebotys (University of Waterloo), Dr. Prof. Darrel Hankerson (Auburn University), Dr. Edward Knapp (Google), Dr. Patrick Longa (Microsoft Research), Prof. Alfred Menezes (University of Wa-terloo), Prof. Carl Pomerance (Dartmouth College), Prof. Igor Shparlinski (University of New South Wales), Prof. Berkant Ustaoglu (Izmir Institute of Technology).

(g) Courses Taught:

1. Elliptic Curves (FAU-MAT 6933-Spring 2014).
2. Cryptography (FAU-MAD 6477-Fall 2013).
3. Linear Algebra (FAU-MAS 5145-Fall 2014).
4. Coding Theory (UW-CO 331-Winter 2012).
5. Discrete Mathematics (BU-MATH 210-Spring 2013; UW-ECE 103-Spring 2010).
6. Calculus (FAU-MAC 2311-Fall 2014; BU-MATH 102-Spring 2013; BU-MATH 101-Fall 2012; UW-MATH 128-Fall 2011).

(h) Outreach:

1. Supervised Eric Silva (High-school student) via weekly (1:30 hour) meetings, June-July, 2014.
2. Presented at the Gold Coast Math Teachers' Circle, July 28 August 1, 2014.

   1.1 July 29: “Solving Puzzles Provably”.

   2.2 July 31: “Crypto Games”.
3. Presented at the Gold Coast Math Teachers' Circle: Sep 25, 2014: “Breaking Ciphers”.

Stephen Kizlik

2970 SE 1st Place, Boynton Beach, FL 33435 (561)420-9949

svkizlik@fau.edu

Curriculum Vitae:

Employment:

Department of Mathematical Sciences, Florida Atlantic University, Boca Raton, FL Instructor, 2002 - present

Courses taught: Intermediate Algebra, College Algebra, Precalculus Algebra and Trigonometry, Math for Liberal Arts 1, Math for Liberal Arts 2, Introductory Statistics, Intermediate Statistics, Probability and Statistics for Engineers

Schooling:

Columbia University, New York, NY MA
Statistics, 2001

Florida Atlantic University, Boca Raton, FL BA
English, 1997

Atlantic Community High School, Delray Beach, FL IB
Diploma, 1992

National Merit Scholar

Skills:

Statistical and other programming languages; Vestigial abilities in French and German

ABBREVIATED FACULTY CV
Lee Klingler

Professional Preparation

Ph.D. in Mathematics, University of Wisconsin-Madison, 1984

Appointments

Professor, Department of Mathematical Sciences, Florida Atlantic University, 1996-present
Chair, Department of Mathematical Sciences, Florida Atlantic University, 2009-present

(Selected) Publications

1. Indecomposable modules of large rank over Cohen-Macaulay local rings, (with W. Hassler, R. Karr, and R. Wiegand), *Transactions of the American Mathematical Society,* **360**, No. 3 (2008), 1391-1406.
2. Big indecomposable modules and direct-sum relations, (with W. Hassler, R. Karr, and R. Wiegand), *Illinois Journal of Mathematics*, **51**, No. 1 (2007), 99-122.
3. Discrete logarithms for finite groups, (with S. Magliveras, F. Richman, and M. Sramka), *Computing*, **85** (2009), 3-19.
4. Unique decomposition into ideals for reduced commutative Noetherian rings, (with B. Ay), *Transactions of the American Mathematical Society,* **363**, No.7 (2011), 3703-3716.
5. Taking a College Algebra Course: An Approach which increased students' success rate, (with Madeline González Muñiz, Susan Moosai, and Daniel Raviv), *PRIMUS,* **22**, No. 3 (2012), 201-213.
6. Rings of integer-valued polynomials with integer-valued derivatives, (with Y. Villanueva), *Archiv der Mathematik*, **100**, No. 3 (2013), 245-254.
7. E-sequences and the Stone-Weierstrass Theorem, (with M. Marshall), *Journal of Number Theory*, **133**, No. 5 (2013), 1525-1536.
8. On using probabilistic Turing machines to model participants in cryptographic protocols, (with R. Steinwandt and D. Unruh), *Theoretical Computer Science*, **501** (2013), 49-51.
9. Maximally Prüfer rings, (with T. Lucas and M. Sharma), *Communications in Algebra*, to appear.

(Selected) Grant Proposals

1. Co-PI (with Warren McGovern), NSF, "Workshop for new faculty, graduate, and undergraduate students on Commutative Rings", $30K, 2010. Not funded.
2. Co-PI (with Heinz-Otto Peitgen), NSF, "NSF Standards Mapped Graduate Education and Mentoring Phase II Research", $2M, 2010. Not funded.
3. Co-PI (with Roger Goldwyn), DOE, "Collaborative Problem Solving Impact: Students' Learning to Co-Think Algebra/Geometry (CPSI)", $1.5M, 2011. Not funded.
4. Co-PI (with Roger Goldwyn), DOE, "Collaborative Problem Solving Impact: Students' Learning to Co-Think Algebra/Geometry (CPSI)", $1.5M, 2012. Not funded.
5. Co-PI (with Nancy Romance), NSF, "Engineering-A-Future for Diverse Middle School Students to Master Core Engineering Practices", $3M, 2012. Not funded.
6. Co-PI (with Roger Goldwyn), DOE, "Collaborative Problem Solving Impact: Students' Learning to Co-Think Algebra/Geometry (CPSI)", $1.5M, 2013. Not funded.
7. Co-PI (with Roger Goldwyn), NSF, "Collaborative Problem Solving Impact: Students' Learning to Co-Think Algebra/Geometry (CPSI)", $1.5M, 2013. Not funded.

(Selected) Invited Talks

1. International Conference on Abelian Groups and Modules over Commutative Rings, Storrs, CT, June 11-15, 2007.
2. Weekend Algebra Conference, Lafayette, LA, September 28-30, 2007.
3. Conference on Abelian Groups and Constructive Mathematics, Boca Raton, FL, May 9-11, 2008 (co-organizer with M. Schmidmeier).
4. Commutative Algebra National Meeting (GSU-USC), Atlanta, GA, February 27-March 1, 2009.
5. Weekend Algebra Meeting, Mobile, AL, March 20-22, 2009.
6. Special Session on Commutative Ring Theory, 1053rd meeting of the American Mathematical Society, Boca Raton, FL, October 30-November 1, 2009 (co-organizer with A. Loper).
7. Weekend Algebra Meeting, Montgomery, AL, March 26-28, 2010.
8. 30th Ohio State-Denison Mathematics Conference, Columbus, OH, May 21-23, 2010.
9. Special Session on Commutative Algebra, 1074th meeting of the American Mathematical Society, Lincoln, NE, October 14-16, 2011.
10. Special Session on Algebraic Structures over Commutative Rings, 1083rd meeting of the American Mathematical Society, New Orleans, LA, October 13-14, 2012 (co-organizer with A. Li and R. Tucci).
11. Special Session on Commutative Algebra, 1087th meeting of the American Mathematical Society, Oxford, MS, March 1-3, 2013.
12. Mini-Conference on Commutative Rings, H. L. Wilkes Honors College, Jupiter, FL, March 9, 2013.

(Selected) Doctoral Students

1. Mario Marshall, *Polynomials that are Integer-valued on the Image of an Integer-valued Polynomial,* (2009).
2. Basak Ay, *Unique decomposition of direct sums of ideals*, (2010).
3. Yuri Villanueva, *Rings of Integer-valued Polynomials and Derivatives,* (2012).

(Selected) Courses Taught

Math for Liberal Arts 1, Coding Theory, College Algebra, Modern Algebra, Math for Liberal Arts 2, Introductory Commutative Algebra, Discrete Mathematics, Algebraic Number Theory, Honors Algebra 2, Calculus for Engineers 2, Calculus for Engineers 1, Methods of Calculus, Introductory Abstract Algebra 1.

Synergistic Activities

1. Member of statewide Discipline Committee, 2007-2009.
2. Restructured FAU's College Algebra course, 2008-2009.
3. Member of state General Education Committee, 2012-present.
4. Co-organizer of the Gold Coast Math Teachers' Circle, 2013-present.
5. Member of FAU's Association of Women in Science Taskforce, 2014-present.

Jose M. Laborde

Contact Information

117 N. Woodward Av
Department of Statistics
Florida State University
32306 USA

Voice: (850) 644-3218
Fax: (850) 644-5271
E-mail: laborde@stat.fsu.edu Tallahassee, FL
web: www.stat.fsu.edu/~laborde

Research Interests

Functional Data analysis, Statistical Shape Analysis, Bioinformatics, Biostatistics, Classification, Machine Learning.

Education

Florida State University, Tallahassee, Florida USA
Ph.D., Biostatistics, (expected: Fall 2013)
Dissertation Topic: "Elastic Shape Analysis of Nucleotide and Amino-Acid 3D Structures"
Advisors: Dr. Anuj Srivastava, Dr. Jinfeng Zhang M.Sc., Biostatistics, August 2011
Florida Atlantic University, Boca Raton, Florida USA
M.Sc., Mathematics, August, 2009
M.Sc., Applied Math and Statistics, August, 2008
Escuela Superior Politécnica del Litoral, Guayaquil, Ecuador
B.Sc., Statistics and Computer Science, June, 1999

Skills

- Statistical functional data analysis, experience programming Markov Chain Monte Carlo
  - Simulation, Statistical Machine Learning: regression, classification, clustering, neural networks,
  - generalized linear models, Bayesian networks, Hidden Markov models, Bayesian analysis.
  - Categorical data analysis, Time series and ANOVA.
- Statistical Packages/languages: R, SAS, S-Plus, SPSS, Minitab, Systat.
- Languages: MATLAB, some experience with C++, Python and Perl.
- Applications: Excel, LaTeX, Power Point, Word.

Professional Experience

Florida State University - Department of Statistics, Tallahassee, FL

Research/Teaching Assistant **August, 2009 - present** Conducted peer reviewed Research on state of the art techniques for RNA/Protein structural com- parison and classification (See "papers" section below). Taught and assisted courses: Statistics.

Florida Atlantic University - Department of Mathematics, Boca Raton, FL

Research/Teaching Assistant, Adjunct Instructor **August, 2005 - August, 2009** Conducted Research on Proteomic marker determination (Dr. Dragan Radulovic), and Fuel effi- ciency on vehicles with Nitrogen in tires (Dr. Hongwei Long). Taught and assisted courses: Calculus, Algebra, Statistics.

Armada del Ecuador, Guayaquil, Ecuador

Statistics researcher **January, 2005 - May, 2005**
Conducted ANOVA studies for technologically modified warships.

Independent, Guayaquil, Ecuador

Statistics Consultant **January, 2000 - December, 2004** Performed several statistical studies to improve efficiency on productivity and quality control for companies such as Coca-Cola, DOLE and Supan S.A. Performed socio-economical statistical studies on rural areas of Guayas province, Ecuador.

CONECEL (Cell-phone Carrier), Guayaquil, Ecuador

Statistics Researcher **May, 1999 - December, 1999** Performed several statistical studies within the technical audit area to determine locations and causes for signal quality failure.

Relevant class projects

- Face Recognition using Euclidean metric for classification with PCA, FDA and Simple Projections feature extraction. (Course: Computational Statistics I)
- Bayesian Analysis of Noisy Images. (Course: Computational Statistics II)
- Reversible Jump Markov Chain Monte Carlo Algorithm for Model Selection in Linear Regression. (Course: Computational Statistics II)
- Implemented machine learning methods to build models to predict antigen-antibody binding affinity. (Course: Statistical Genomics)

Honors and Awards

IEEE BIBM 2011 Student Travel Award for excellent regular paper
Member of Mu Sigma Rho Statistical Honor Society
BMC Genomics special issue Journal submission invitation (for IEEE BIBM 2011 paper)
4.1 FSU GPA

Publications and Conference Presentations

Jose Laborde, Daniel Robinson, Anuj Srivastava, Eric Klassen, and Jinfeng Zhang RNA global alignment in the joint sequencestructure space using elastic shape analysis Nucl. Acids Res. (2013) 41 (11): e114. doi:10.1093/nar/gkt187

Laborde, J., Srivastava A., Zhang J. 2011. Structure-based RNA Function Prediction using Elastic Shape Analysis, 2011 IEEE International Conference on Bioinformatics and Biomedicine. DOI 10.1109/BIBM.2011.119. (acceptance rate 19.40%)

Papers in revision

Jose Laborde, Anuj Srivastava, Jinfeng Zhang, Alignment of proteins in the joint sequence-structure space and its application to phylogenetic inference, submitted to ISMB 2013.

Wei Wu, Anuj Srivastava, Jose Laborde, Jinfeng Zhang, Multiple global protein structure alignment using multidimensional curve registration, submitted to IEEE-BIBM 2013.

Papers in preparation

Laborde, J., Srivastava A., Zhang J. Protein/RNA networks based on Elastic Shape Geodesic Dis- tances.

Laborde, J., Srivastava A., Zhang J. On the Statistical Distribution of Pairwise Elastic Shape Dis- tances of Biomolecules.

Jose Laborde, Gewen He, Anuj Srivastava, Jinfeng Zhang. ESA-RNA: A web-server for RNA structure-sequence pairwise comparison through geodesic distances.

Laborde, J., Zhang J., Srivastava A. Fast distance based classification of protein domains by Multiple Centroid Class Partitioning

Languages

- Fluent oral and written Spanish.

Affiliations

- IEEE, ASA.
- IASI, Sociedad Ecuatoriana de Esta

ABBREVIATED FACULTY CV

Yuandan Lin

A. **Professional Preparation:**
- B.S. in Mathematics, 1982, Nankai University, China
- Ph.D. in Mathematics, 1992, Rutgers University

B. **Appointments:** Florida Atlantic University
- Assistant Professor, 1992-1997
- Associate Professor, 1997-2008
- Professor, 2008-present.

C. **(Selected) Publications** (last 7 years)
1. ``Input-to-state stability of switched systems with time delays", to appear *in Advances in Delays and Dynamics*, (with Z.P. Jiang and Y. Wang).
2. ``Stability of nonlinear switched systems with delays", *Proc. of the 32nd Chinese Control Conference*, pp. 1544—1548, 2013 (with Z.P. Jiang and Y. Wang).
3. ``New results on input-to-state stability for nonlinear time-delay systems with applications", *Proc. of the 8th World Congress on Intelligent Control and Automation*, pp. 719-724, 2011 (with S. Tiwari, Z.P. Jiang, and Y. Wang).
4. ``Stabilization of time-varying nonlinear systems: a control Lyapunov function approach", *Journal of Systems Science and Complexity*, vol.22, pp.683—696, 2009 (with Z.P. Jiang and Y. Wang).
5. "Nonlinear Small-Gain Theorems for Discrete-Time Large-Scale Systems", *Proc. of the 27th Chinese Control Conference*, pp. 704—708, 2008 (with Z.P. Jiang and Y. Wang).
6. "Remarks on ISS and Integral-ISS Stabilization with Positive Controls", *Proc. of the 17th IFAC World Congress*, Seoul, South Korea, pp. 2455—2459, 2008 (with Z.P. Jiang and Y. Wang).

D. **Grants (Proposals and Funded)** (last 7 years)

E. **Synergistic Activities**
- Technical Editor, *Forum Geometricorum.*

F. Collaborators and Other Affiliations

D.Z. Cheng, L. Guo, Z.P. Jiang, E.D. Sontag, S. Tiwari, and Y. Wang

F. **(Selected) Courses Taught** (last 7 years)
- Undergraduate: Calculus 1, 2, and 3, Differential Equations, Discrete Mathematics, Engineering Mathematics 1 and 2, Introduction to Computational Mathematics,

Introductory Complex Analysis, Matrix Theory, Methods of Calculus

- Graduate: Introductory Analysis 1 and 2, DIS in Analysis, Supervised University Instruction in Mathematics

G. **Community Engagement or Out-reach**

- Frequent participant of the K-12 events Math Day, mini Math Day, Math Circle, and Regional Science Olympiad

ABBREVIATED FACULTY CV

Stephen C. Locke

A. Professional Preparation:

Ph.D. Combinatorics and Optimization, University of Waterloo, 1982

B. Appointments

Professor and Associate Chairman, Mathematical Sciences Department, Florida Atlantic University, 1993-present

C. (Selected) Publications

38. C. Gottipati and S.C. Locke. Cohesion and non-separating tress in connected graphs, submitted to Journal of Combinatorial Mathematics and Combinatorial Computing, June 2014.

37. C. Gottipati and S.C. Locke. Reduced path systems and super-edge-graceful trees. Congressus Numerantium 216 (2013), 39-52. Abstract.

36. S.C. Locke and Wandi Wei. Infinite families of super edge-graceful trees. Congressus Numerantium 195(2009), 125-145. [MR2584291]

35. R.E.L. Aldred, R.P Anstee, and S.C. Locke. Perfect matchings after vertex deletions. Discrete Mathematics 307(2007), 3048-3054. [MR#2008k:05159]

34. M. Abreu and S.C. Locke. k-path-connectivity and mk-generation: an Upper Bound on m. Graph Theory in Paris: Trends in Mathematics. Birkhäuser Verlag Basel/Switzerland (2007), 11-19. [MR#2007j:05125]

Expository: J. Alvarez and S.C. Locke. Sumemos Esta Serie. (Expository, in Castilian) Submitted to a Venezuelan journal, 2014.

D. Grants (Proposals and Funded) N.A.

E. Synergistic Activities

Faculty Senate, Pre-Health Care Professions Committee, FAUS School Advisory Board, CGTC organizing committee.

F. <u>Collaborators and Other Affiliations</u>: Co-authors: Marién Abreu, Michael O. Albertson, Robert E.L. Aldred, Brian Alspach, Richard P. Anstee, Mark V. Barovich, J. Adrian Bondy, Yoshimi Egawa, Kathryn L. Fraughnaugh, R. Glas, Chenchu B. Gottipati, Frank O. Hadlock, Irith Ben-Arroyo Hartman, Stephen T. Hedetniemi, Frederick Hoffman, Robert E. Jamison, Yoshihiro Kaneko, Domenico Labbate, Feng Lou, Aaron D. Meyerowitz, Dave Witte Morris, Cong Teng, Wandi Wei, Cun-Quan Zhang

G. <u>(Selected) Courses Taught</u>

Discrete Mathematics, Methods of Calculus, Graph Theory, Calculus 2, Calculus 3, Modern Algebra, Modern Analysis, Linear Algebra 2, Algorithmic Graph Theory, Graphs and Matroids, Trigonometry, PreCalculus, Designs and Geometries, Projective Geometry, Mathematical Problem Solving, Number Theory.

Three M.S. students graduated, two Ph.D. students graduated (Barovich, Abreu). One Ph.D. student to graduate December 2014 (Gottipati).

H. <u>Community Engagement or Out-reach and Other Dalliances</u>: 6^{th} degree black belt in Judo (October 2008), and 5^{th} degree black belt in Ju Jitsu (May 1995). Founded Tomodachi Judo Club c. 1991, and still teach there. Initiated Judo course at FAU and taught two semesters.

Hongwei Long

A. Professional Preparation

BS in Applied Math (1987), Huangzhong University of Science and Technology, China.
MS in Mathematics (1990), Wuhan Institute of Mathematical Sciences, China.
Ph. D. in Mathematics (1998), University of Warwick, United Kingdom.

B. Appointments

8/2010- present Associate Professor, Department of Mathematical Sciences, Florida Atlantic University, Boca Raton, U.S.A

8/2004- 7/2010 Assistant Professor, Department of Mathematical Sciences, Florida Atlantic University, Boca Raton, U.S.A.

6/1999-7/2004 Postdoctoral Research Fellow, Department of Mathematical and Statistical Sciences, University of Alberta, Edmonton, Canada

1/1998-5/1999 Postdoctoral Research Fellow, Centro de Matematica e Aplicacoes Fundamentais, Universidade de Lisboa, Portugal

7/1990-10/1994 Research Associate, Wuhan Institute of Mathematical Sciences, Chinese Academy of Sciences, Wuhan, China

C. (Selected) Publications (last 7 years)

1. Z. Brzezniak and H. Long, A note on γ-radonifying and summing operators. To appear in *Banach Center Publications*, 2014.
2. W. Buckley, H. Long and S. Perera, A jump model for fads in asset prices under asymmetric information. *European Journal of Operational Research* 236 (2014), 200-208.
3. H. Long and L. Qian, Nadaraya-Watson estimator for stochastic processes driven by stable Levy motions. *Electronic Journal of Statistics* 7 (2013), 1387-1418.
4. H. Long, Y. Shimizu and W. Sun, Least squares estimators for discretely observed stochastic processes driven by small Levy noises. *Journal of Multivariate Analysis* 116 (2013), 422-439.
5. A. Bensoussan, H. Long, S. Perera and S. Sethi, Impulse control with random reaction periods: A central bank intervention problem. *Operations Research Letters* 40 (2012), 425-430.
6. Z. Brzezniak, H. Long and I. Simao, Invariant measures for stochastic evolution equations in M-type 2 Banach spaces. *Journal of Evolution Equations* 10 (2010), 785-810.
7. H. Long, Parameter estimation for a class of stochastic differential equations driven by small stable noises from discrete observations. *Acta Mathematica Scientia* 30B (2010), 645-663.
8. H. Long, Least squares estimator for discretely observed Ornstein-Uhlenbeck processes with small Levy noises. *Statistics and Probability Letters*, 79 (2009), 2076-2085.
9. Y. Hu and H. Long, Least squares estimator for Ornstein-Uhlenbeck processes driven by alpha-stable motions. *Stochastic Processes and their Applications*119 (2009), 2465-2480.
10. Y. Hu and H. Long, On the singularity of least squares estimator for mean-reverting alpha-stable motions. *Acta Mathematica Scientia* 29B (2009), 599-608.
11. M. A. Kouritzin and H. Long, On extending classical filtering equations. *Statistics and Probability Letters*, 78 (2008), 3195-3202.

D. Grants (Proposals and Funded) (last 7 years)

2008, PI for *PurigeN98 project on fuel efficiency study*, funded by PurigeN98, duration: May 2008 to April 2009, $45,651 in total.

E. Synergistic Activities

Conferences

1. Least squares estimators for discretely observed stochastic processes driven by small Levy noises. IMS-China International Conference on Statistics and Probability, Chengdu, China, June 30-July 4, 2013.
2. Least squares estimators for discretely observed stochastic processes driven by small Levy noises. AMS Meeting, Special Session on Stochastic Analysis, University of Kansas, March 30-April 1, 2012.
3. Invariant measures for stochastic evolution equations in M-type 2 Banach spaces, Program on Stochastic Partial Differential Equations (SPDEs), Isaac Newton Institute for Mathematical Sciences, University of Cambridge, United Kingdom, May 6-19, 2010.
4. Organizing (jointly with Dr. Lianfen Qian) a special session on "Recent Adavnces in Probability and Statistics" for the 2009 AMS sectional meeting, Florida Atlantic University, Boca Raton, Florida, October 30-November 1, 2009.
5. Least squares estimator for Ornstein-Uhlenbeck processes driven by stable Levy motions, The 32nd SIAM Southeastern-Atlantic Section Conference, University of Central Florida, Orlando, March 14-15, 2008.

F. Collaborators and Other Affiliations

Collaborators: Alain Bensoussan (University of Texas at Dallas), Zdzislaw Brzezniak (University of York), Winston Buckley (Bentley University), Yaozhong Hu (University of Kansas), Sandun Perera (University of Texas at Dallas), Lianfen Qian (Florida Atlantic University), Suresh Sethi (University of Texas at Dallas), Yasutaka Shimizu (Osaka University), Wei Sun (Concordia University)
Ph.D. Dissertation Students: Winston Buckley (2009), Bentley University; Sandun Perera (2009), University of Texas at Dallas.

G. (Selected) Courses Taught (last 7 years)

MAC 2311-Calculus Analytic Geometry 1, MAC 2282-Calculus for Engineers 2, MAC 2313-Calculus Analytic Geometry 3, STA 3173-Introduction to Biostatistics, STA 4234-Applied Statistics 1, STA 4032-Probability and Statistics for Engineers, STA 4442-Probability and Statistics 1, STA 4443-Probability and Statistics 2, STA 6326-Mathematical Statistics, STA 6444-Mathematical Probability, STA 6446-Regression Analysis, STA 6446-Stochastic Calculus, STA 6857-Applied Time Series Analysis

H. Community Engagement or Out-reach

Volunteer as judge at the dispute center for several Mu Alpha Theta Math Competitions at FAU and local high schools; Volunteer for Florida Science Olympiad (FAU).

ROBERT SETH LUBARSKY

PROFESSIONAL EXPERIENCE

Florida Atlantic University, Boca Raton, FL (August 2004 - present)

Instructor

NYIT, IMACS, NSU, FAU, and BCC, Ft. Lauderdale, FL (October 2001 - May 2004)

Adjunct Professor of Mathematics

T-Mobile, Bonn, Germany (June 1998 - September 2000)

Security Engineer (Dept. of System Security resp. Technical Security)

Carl Duisberg Centers, Cologne, Germany (November 1996 - April 1998)

Instructor

Community College of Philadelphia, PA (August 1995 - May 1996)

Assistant Professor of Mathematics

Franklin & Marshall College, Lancaster, PA (July 1988 - June 1995)

Assistant Professor of Mathematics and Computer Science

Cornell University, Ithaca, NY (September 1984 - June 1988)

H.C. Wang Assistant Professor of Mathematics

Odyssey Research Associates, Ithaca, NY (January 1986 - August 1987)

Systems Analyst

EDUCATION

Massachusetts Institute of Technology (MIT) (September 1980 - June 1984)

Ph.D. in mathematical logic

Cornell University, Ithaca, NY (September 1975 - June 1979)

B.A. in the College Scholar Program (an independently structured program)

SELECTED PUBLICATIONS

Separating the Fan Theorem and Its Weakenings (joint with Hannes Diener), Journal of Symbolic Logic, 79 (2014), pp. 792-813, doi: 10.1017/jsl.2014.9

Principles Weaker than BD-**N** (joint with Hannes Diener), Journal of Symbolic Logic, 78 (2013), pp. 873-885

Walker's Cancellation Theorem (joint with Fred Richman), Communications in Algebra, 42 (2014), pp. 1644-1649, doi: 10.1080/00927872.2012.747598

On the Failure of BD-**N** and BD, and an Application to the Anti-Specker Property, Journal of Symbolic Logic, 78 (2013), pp. 39-56

Geometric Spaces with No Points, Journal of Logic and Analysis, 2, No. 6 (2010), pp. 1-10, http://logicandanalysis.org/, doi: 10.4115/jla2010.2.6

ITTMs with Feedback, in Ways of Proof Theory (Ralf Schindler, ed.), Ontos, 2010, pp. 341-354

Signed-bit Representations of Real Numbers (joint with Fred Richman), Journal of Logic and Analysis, 1, No. 10 (2009), pp. 1-18, http://logicandanalysis.org/, doi: 10.4115/jla.2009.1.10

Topological Forcing Semantics with Settling, in Proceedings of LFCS '09, LNCS #5407 (Sergei N. Artemov and Anil Nerode, eds.), Springer, 2009; also Annals of Pure and Applied Logic, 163 (2012), pp. 820-830, doi: 10.1016/j.apal.2011.09.014

GRANTS

Funded

MAMLS-National Science Foundation, in support of the Jan. '12 MAMLS, $10,000

National Science Foundation, Workshop on Constructive Mathematics (Oct '09 workshop), one year, $11,400

Travel and attendance costs partially or totally covered to attend:
Heyting Day, Amsterdam, Netherlands, Sept. 6, 2013
TACL, Nashville, TN, Jul. 28 – Aug. 1, 2013
Constructive Mathematics: Foundations and Practice, Nis, Serbia, Jun. 24 – 28, 2013
ESSLLI, Opole, Poland, Aug. 6-17, 2012
Computability and Complexity in Analysis, Cambridge, UK, Jun. 24-27, 2012
Computability in Europe, Cambridge, UK, Jun. 18-23, 2012
The Incomputable, Milton Keynes, UK, Jun. 11-16, 2012
Research stay, Isaac Newton Institute, Cambridge, UK, May 10 – Jun. 11, 2012
MAMLS, CUNY, NYC, Mar. 9-10, 2012
Gödelian Incompleteness, Oberwolfach, Germany, Oct. 17-21, 2011
Reverse Mathematics, Chicago, IL, Sept. 16-18, 2011
Infinity Conference, Bellaterra, Spain, Jul. 18-22, 2011
Third European Set Theory Conference, Edinburgh, United Kingdom, Jul. 3-8, 2011
PCC 2011 (Proof, Computation, Complexity), Ghent, Belgium, Jun. 6-7, 2011
Logic and Mathematics 2010, Champaign-Urbana, IL, Sept. 4-5, 2010
Constructive Mathematics, Fraueninsel im Chiemsee, Germany, June 7-11, 2010
MAMLS (Laver conference), Boulder, CO, Feb. 5-7, 2010
Reverse Mathematics, University of Chicago, Chicago IL, Nov. 5-8, 2009
Effective Mathematics of the Uncountable, CUNY, New York City, Aug. 17-21, 2009
Proof Theory and Constructive Mathematics, Leeds, England, Jul. 6 – 15, 2009
ESI Workshop on Set Theory, Vienna, Austria, Jun. 21-27, 2009
Conference in Honor of Harvey Friedman, Columbus, OH, May 14-17, 2009
Declined
National Science Foundation, submitted fall ’11 for AY 2012-2015, $257,170
Templeton Foundation, submitted fall ’10 for AY 2011-2013, $149,774
National Science Foundation, submitted fall ’09 for AY 2011-2014, $197,303

COLLABORATORS
Hannes Diener, Matthew Hendtlass, Norman Perlmutter, Michael Rathjen, Fred Richman

SELECTED COURSES TAUGHT
Calculus I, II, and III
Discrete Math, Matrix Theory
Logic (grad and undergrad), Set Theory (grad)
Probability and Statistics for Engineers, Probability & Statistics I, Introductory Statistics
Problem Solving
Math and Politics (freshman honors seminar)
Linear Programming and Game Theory

Erik Lundberg (abbreviated CV)

A. Professional Preparation:

University of South Florida - 2011. Ph.D, Mathematics.
University of Florida - 2005. B.S., Mathematics. (Summa Cum Laude.)

B. Appointments:

Florida Atlantic University: 2014 – present. Assistant Professor of Mathematics.
Purdue University: 2011 – 2014. Golomb Assistant Professor of Mathematics.
University of South Florida: 2005 – 2011. Teaching/Research Assistant.

C. Recent Publications:

1. *Statistics on Hilbert's sixteenth problem*, (with A. Lerario), to appear in IMRN. **2.** *Remarks on Wilmshurst's theorem,* (with A. Lerario and S-Y. Lee), to appear in Indiana U. Math. J. **3.** *Experiments on the zeros of harmonic polynomials using certified counting*, (with J. Hauenstein, A. Lerario, and D. Mehta), to appear in Experimental Mathematics. **4.** *A solution to Sheil-Small's harmonic mapping problem for polygons*, (with D. Bshouty and A. Weitsman), to appear in Proc. AMS. **5.** *Electrostatic skeletons*, (with K. Ramachandran), to appear in Annales Academiae Scientiarum Fennicae. **6.** *Spiral galaxy lensing: a model with twist*, (with S. R. Bell, B. Ernst, S. Fancher, Ch. R. Keeton, and A. Komanduru), to appear in Math. Phys., Anal., and Geom. **7.** *Self-commutators of Toeplitz operators and isoperimetric inequalities*, (with S. R. Bell and T. Ferguson), Proc. Royal Irish Acad., 114 (2014), 1-18. **8.** *A tale of ellipsoids in potential theory*, (with D. Khavinson), Notices of the AMS, 61 (2014), 148-156. **9.** *Non-algebraic quadrature domains*, (with A. Eremenko), Potential Analysis, 38 (2013), 787-804. **10.** *An overdetermined problem in potential theory*, (with D. Khavinson and R. Teodorescu), Pacific J. Math., 265 (2013), 85-111. **11.** *Lemniscate growth*, (with V. Totik), Analysis and Mathematical Physics, 3 (2013), 45-62. **12.** *Generalized pattern frequency in large permutations*, (with J. Cooper and B. Nagle), Electronic J. of Combinatorics, Vol. 20, Issue 1 (2013), P28.

D. Grants (Proposals and Funded):

Hybrid Motor Rocket Grant (2014 - funded by NASA): $940

NSF proposals (not funded): Analysis Program (2012) as main PI: **"**Application of Harmonic Function Theory", Geometric Analysis Program as a main PI (2013): "Real algebraic geometry from the random viewpoint", Computational Mathematics Program (2013) as Co-PI 2013: "Novel Computational Algebraic Geometry Methods and Their Applications to Statistical Topology and Mathematical Biology", Analysis Program (2014) as main PI: "Frontiers in harmonic mappings and their applications", Geometric Analysis Program as a main PI (2014 – in preparation): "Hilbert's sixteenth problem from the random viewpoint"

E. Synergistic Activities:

1. Organized an REU at Purdue in gravitational lensing, Summer 2012, and served as a mentor. The students presented at the joint AMS meeting in San Diego (January 2013), and I presented their work at mathfest 2013 and at the Astrophysics Dept. at Notre Dame. **2.** Mentored Rodrigo Ferraz de Andrade (graduate student of Mark D. Ward, Purdue) for his advanced topics exam. I served on his advanced topics committee and I am on his Ph. D. defense committee. We worked together and submitted a joint paper. **3.** Mentored Matthew Fleeman (graduate student of my former advisor Dmitry Khavinson). His thesis work

in operator theory follows an investigation of Putnam's inequality initiated in my paper with S. R. Bell and T. Ferguson. I met with him at conferences and over Skype to discuss his work. **4.** Supervised a summer project in potential theory for graduate student Koushik Ramachandran (now postdoc at the Indian Statistical Institute). Our joint paper was recently accepted. **5.** Initiated and organized several learning seminars at Purdue 2011-2014. **6.** Invited/hosted graduate student Charles Z. Martin from UCSB and discussed applications of his thesis work to a dynamic version of the Calderon problem. Spring 2011. **7**. Helped organize a gravitational lensing workshop at U. of South Florida, Summer 2010. **8.** Helped organize the 25th South East Analysis Meeting. Spring 2009.

F. Collaborators and Other Affiliations

Saugata Basu (Purdue), Steven R. Bell (Purdue), Joshua Cooper (U. South Carolina), Peter Duren (U. Michigan), Alexandre Eremenko (Purdue), Bjorn Gustafsson (KTH), Dmitry Khavinson (Thesis advisor, U. South Florida), Seung-Yeop Lee (U. South Florida), Antonio Lerario (Lyon 1), John McCarthy (Washington University, St. Louis), Brendan Nagle (U. South Florida), Mihai Putinar (UC Santa Barbara), Koushik Ramachandran (Indian Statistical Institute), Hermann Render (UC Dublin), Arthur David Snider (U. South Florida), Vilmos Totik (U. South Florida) Alexander Vasiliev (U. Bergen), Mark Daniel Ward (Purdue), Allen Weitsman (Purdue)

G. Courses Taught:

Trigonometry/Precalculus, Calculus I, Calculus III, Linear Algebra, Ordinary Differential Equations, Second semester in Differential Equations (with intro to PDE)

Theory of Ordinary Differential Equations (graduate level)

H. Community Engagement or Out-reach

Mentored Max Rabinovich, a talented high school student, in Complex Analysis. He won a semi-finalist award in the 2008 Siemens Competition and a finalist prize in the 2009 Intel Talent Search Competition. Initiated and organized a student-only seminar at U. of South Florida. Fall 2007 – 2009.

Delivered featured address at the donor's forum for the Take Stock in Children Scholarship Foundation, a college scholarship and mentoring program awarded to students from low-income families. Spring 2007.

Spyros S. Magliveras
Department of Mathematical Sciences
Florida Atlantic University
Boca Raton, FL 33431

Major Areas of Research

Cryptology, group theory, algebraic combinatorics, group actions, complexity of algebraic algorithms, post quantum cryptography, coding theory, data compression.

Education

- Ph.D. in Mathematics (August 1970): Birmingham University, England, U.K.
- M.Sc. in Mathematics (July 1963): University of Florida, Gainesville, Florida.
- BEE in Electrical Engineering (June 1961): University of Florida, Gainesville, Florida.

Employment and Work Experience

- Teaching Fellow, Research Fellow, Mathematics Department, University of Michigan, 1964-68.
- Senior Research Fellow, University of Birmingham, Department of Mathematics, 1968-1970.
- Assistant, Associate and Full Professor, S.U.N.Y. Oswego, Department of Mathematics, 1970--1978.
- Visiting Associate Professor, S.U.N.Y. Binghamton, Department of Mathematics, 1976.
- Associate Professor, University of Nebraska - Lincoln, Departments of Mathematics & Computer Science and Engineering, 1978-1983.
- Full Professor, University of Nebraska-Lincoln, Computer Science and Engineering Department, 1984-2000.
- Honorary Research Fellow, and SERC Research Fellow, University of Birmingham (England), Department of Mathematics, (leave) 1984-1985.
- Henson Distinguished Professor of Commun. & Infor. Science, University of Nebraska - Lincoln, Department of Computer Science & Engineering, 1991-2000.
- NSERC Visiting Professor, C&O Department, University of Waterloo, 1993.
- DFG Visiting Professor, Institute for Experimental Mathematics, University of Essen, Germany, (leave) 1992, 1993, 1994, 1998, 2000 and 2001.
- Visiting Prof. at the University of Waterloo, 1993, 1999-2000.
- Visiting Prof. at the University of Rome, La Sapienza, 2000.
- Visiting Prof. University of Bayreuth, 2000.
- Visiting Prof. University of Western Australia.
- Henson Professor Emeritus, University of Nebraska - Lincoln.
- Professor of Mathematical Sciences, FAU, 2001 - date; Chair, Department of Mathematical Sciences, FAU, 2004-2009; Director, Center for Cryptology and Information Security (CCIS), an NSA designated National Center of Academic Excellence in Information Assurance Research, 2003-ö2013; Assoc. Director CCIS, 2013-date.

Other information

Dr. Magliveras' expertise is in cryptology, permutation groups, algebraic combinatorics, algorithms and their complexity, particularly those related to computational group theory. His Erdös number is 2. Magliveras is the co-editor of 5 books, co-author of 3 books, and co-author of US Patents # 6,038,317 and # 8,189,664 B2. He has a total

of 108 refereed journal papers, 123 conference papers, many as a plenary speaker, and 45 invited talks and/or colloquia. Dr. Magliveras has been awarded research grants totaling over $4,200,000 by Government and Industry. Magliveras was the co-founder and co-director of the Center for Communication and Information Science at the University of Nebraska - Lincoln. He was the founder and Director of the Center for Cryptology and Information Security (CCIS) at FAU 2003-2013, and currently CCIS Assoc. Director. Eighteen students received their Ph.D. degree under his supervision and he is currently supervising the Ph.D. research of 5 more students. He has supervised over 30 Master's thesis students. He is co-founder, Managing and Chief Editor of the Journal of Mathematical Cryptology (a W. de Gruyter journal). He is the recipient of numerous research, teaching and service awards including the AMOCO award of Distinguished Teaching in 1984, and the Paul and Betty Henson Distinguished Professorship in Communication and Information Sciences from 1991 to 2000. In March 2003 he received the **Euler gold medal** of the ICA for his lifetime contributions to research in Combinatorics. In 2010 he received the Warren Lloyd Holtzman Teacher of the Year award in the Charles E. Schmidt College of Science at Florida Atlantic University.

Some Recent Publications

[86] Spyros S. Magliveras, Tran van Trung and Wandi Wei, *Primitive sets in a lattice*, Austral. J. Comb. **40** (2008), pp. 173-186.

[89] Wolfgang Lempken, Spyros S. Magliveras, Tran van Trung and Wandi Wei, *A public key cryptosystem based on non-abelian finite groups*, J. Cryptology, **22**, (2009) pp. 62-74.

[90] Spyros S. Magliveras, *Large sets of t-designs from groups*, Mathematica Slovaca, vol. **59**, no 1, (2009) pp 1-Ç20.

[93] Cafer Çaliş kan and Spyros S. Magliveras, *Subplanes of projective planes of order 121*, J. Geom. **97** (2010), pp 17-27.

[94] Ivana Ilić and Spyros S. Magliveras, *Weak discrete logarithms in non-abelian groups*, J. of Combinatorial Math. and Comb. Computing (JCMCC) **74** (2010), pp. 3-11.

[96] Nidhi Singhi, Nikhil Singhi and Spyros S. Magliveras, *Minimal logarithmic signatures for finite groups of Lie type, Designs*, Codes and Cryptography (DCC), **55** (2010), pp. 243-260.

[98] Markus Grassl, Ivana Ilić, Spyros S. Magliveras, and Rainer Steinwandt, *Cryptanalysis of the Tillich-Zémor hash function*, J. Cryptology, (JOC) **24** (2011), pp. 148-156.

[101] Spyros S. Magliveras, Tran van Trung, and Wandi Wei, *On Jacobsthal Binary Sequences*, Information Security, Coding Theory and Related Combinatorics, D. Crnkovič and V. Tonchev (Eds.), ASI-NATO volume, IOS Press (2011) pp. 27-37.

[105] Emre Kolotoğ lu, Spyros S. Magliveras and Nicola Pace, *Related decompositions and new constructions of the Higman-Sims and Hall-Janko graphs*, Australasian J. Combinatorics, vol. **54** (2012), pp 217-230.

[106] Emre Kolotoğ lu and Spyros S. Magliveras, *On large sets of projective planes of orders 3 and 4*, Discrete Math. **313** (20) (2013), pp. 2247-2252.

Collaborators

I have collaborated with the following people during the last 48 months: A. Bonisoli, M. Burmester, C. Çaliş kan, P. Carrillo, M. Epstein, M. Grassl, O. Grosek, J.W.P. Hirschfeld, I. Ili_c, H. Kalva, L. Klingler, E. Kolotoğ lu, W. Lempken, K.T. Magar, K. Matheis, N. Pace, F. Richman, Nidhi Singhi, Nikhil Singhi, M. Sramka, D. Socek, P. Svaba, R. Steinwandt, D. R. Stinson, Tran van Trung, G. Tsudik, Wandi Wei, L.C. Yu.

Aaron Meyerowitz

Dept. Of Mathematical Sciences Florida
Atlantic University
Boca Raton FL 33431

Education

B.S. Mathematics	Hebrew University in Jerusalem	1978
M.S. Mathematics	Colorado State University	1980
Ph.D. Mathematics	Colorado State University	1984

Professional experience

1983-1986	Instructor	Ohio State University
1986-1990	Assistant Professor	Florida Atlantic University
1990-2000	Associate Professor	Florida Atlantic University
2001-present	Professor	Florida Atlantic University

Refereed publications.

1. *Partial Geometric Lattices with Generalized Quadrangles as Planes,* Algebras, Groups and Geometries 2 (1985) 436-454.

2. *Dominated Permutations of Subsequences of Random Variables,* (with M. Schwartz), Transactions of the AMS 294 (1986) 287-294.
3. *New Results for Quasi-Symmetric Designs an application of MACSYMA,* (with M. Shrikhande and S. Sane),Journal of Combinatorial Theory A 43 (1986) 277-290.

4. *Best Monotone Approximation in* $L_1[0, l]$, (with R. Huotari and M. Sheard), Journal of Approximation Theory 47 (1986) 85-91.
5. *Partial Geometric Lattices I-Regularity Conditions,* (with R. Miskimmons), Journal of Statistical Planning and Inference 17 (1987) 21-50.
6. *The Natural Best* L_1*-Approximation by Nondecreasing Functions,* (with R. Huotari, D. Legg and D. Townsend), Journal of Approximation Theory 52 (1988) 132-140.

7. *Partial Geometric Lattices II-The Association Schemes,* (with R. Liebler), Journal of Statistical Planning and Inference 18 (1988) 161-176.
8. *Tilings in Z with triples,* Journal of Combinatorial Theory A 48 (1988) 229-235.
9. *Reconstruction of Sequences,* (with B. Manvel, A. Schwenk, K. Smith and P. Stockmeyer) Discrete Mathematics, 94 (1991) 209-219.
10. *Quasi-symmetric Designs with y* = .\, Journal of Combinatorial Theory A 59 (1992) 134-141.
11. *A Note on Cycle Double Covers in Cayley Graphs,* (with S.C. Locke and F. Hoffman), Mathematica Pannonica, 2 (1991) 63-66.
12. *Cycle Balanced Partitions in Distance-Regular Graphs,* Journal of Combinatorics, Information & System Sciences, 17 (1992) 39-42.

13. *Calculating Maximum-Entropy Probability Densities for Belie/ Functions,* (with F. Richman and E. Walker), International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems, 2 (1994) 377-389.
14. *Maximal Intersecting Families,* European Journal of Combinatorics, 16 (1995) 491-501.

15. *The Graph of Maximal Intersecting Families* (with D. Loeb) Congressus Nurnerantiurn, 128 (1997) 65-81.
16. *Tiling* Z *by Translates of One Finite Set* (with E. Coven) Journal of Algebra. 212 (1999) 161-174.
17. *Tiling the line with triples* Discrete Math. Theor. Comput. Sci. Proc., AA, Paris, (2001), 257 Dl74
18.Cyc/e-Balance Conditions for Distance Regular Graphs Discrete Mathematics 264 (2003), 1490165.

Selected Manuscripts in Process.

19.Cyc/e-Balance Conditionsfor Doob Graphs and other Products of Graphs. 21 pages
20.The 392 Conjecture (with J. Selfridge) 57 pages

Invited Adresses

Idaho State University, June 1988 Wright State University, June 1989 University of Wisconson, October 1989 Wright State University, August 1990

AMS Summer meeting Special session on Combinatorics, August 1990 AMS Special Session on Combinatorics, October 1992

University of South Florida, March 1993 Hebrew University, May 1993

University of Miami, October 1993

AMS Special Session on Algebraic Combinatorics, October 1994 AMS Special Session on Algebraic Combinatorics, September 1998 Association of Jewish Librarians, June 1999

Algebraic Combinatorics, Pohang Korea July 2000 Lehmer Conference, U.C. Berkeley August 2000 Wesleyan University, October 2000

Discrete models: combinatorics, computation, and geometry (Paris, 2001) Wright State University 2003

Algebraic Combinatorics, Pohang Korea July 2004 (invited)

Recent Reviewing

Journal of Combinatorial Theory Electronic Journal of Combinatorics Designs Codes and Cryptography Quaestiones Mathematicae

Editorial Board

Forum Geometricorurn

J.D. Mireles James

A. Professional Preparation: B.S.(2003) Mathematics, B.S. (2003) Electrical Engineering, Lamar University; Ph. D (2009) University of Texas at Austin.

B. Appointments: **Rutgers University**, Postdoctoral Assistant, 2009-10; Hill Assistant Professor, 2010-14, **Florida Atlantic University,** Assistant Professor, 2014-Present.

C. *Publications* 1. "Co-existence of hexagons and rolls" with J.B. van den Berg, A. Deschenes, and J.P. Lessard (Submitted). 2. "Polynomial Approximation of One Parameter Families of (Un)Stable Manifolds with Rigorous Computer Assisted Error Bounds" J.D. Mireles James (To Appear in Indagationes Mathematicae). 3. "Computer Assisted Error Bounds for Linear Approximation of (Un)Stable Manifolds and Rigorous Validation of Higher Dimensional Transverse Connecting Orbits" J.D. Mireles James. Communications in Nonlinear Science and Numerical Simulation (online version, August 2014). 4. "Computer Assisted Proof of Transverse Saddle-to-Saddle Connecting Orbits for First Order Vector Fields" with J.P. Lessard and C. Reinhardt. Journal of Dynamics and Differential Equations. June 2014, Volume 26, Issue 2, pp 267-313. 5. "Parameterization of Invariant Manifolds for Periodic Orbits (I): Efficient Numerics Via the Floquet Normal Form" with R. Castelli, and J.P. Lessard (Accepted for Publication in SIADS. To Appear). 6. "Rigorous Numerics for Analytic Solutions of Differential Equations: the Radii Polynomial Approach" with Allan Hungria and J.P. Lessard (Submitted). 7. "Rigorous A-Posteriori Computation of (Un)Stable Manifolds and Connecting
Orbits for Analytic Maps" with Konstantin Mischaikow. SIAM Journal on Applied Dynamical Systems. Volume 12, Number 2, pp. 957-1006. 8. "Parameterization of Invariant Manifolds by Reducibility for Volume Preserving and Symplectic Maps" with R. de la Llave. Discrete and Continuous Dynamical Systems. Volume 32, Number 12, December 2012. pp. 4321-4360. 9. "Quadratic Volume-Preserving Maps: (Un)stable Manifolds, Hyperbolic Dynamics, and Vortex-Bubble Bifurcations." J.D. Mireles James. Journal of Nonlinear Science. Journal of Nonlinear Science, Volume 23, Number 4, 2013, pp. 585-615. 13. "Adaptive Set-Oriented Computation of Topological Horseshoe Factors in Area and Volume Preserving Maps." J.D. Mireles James SIAM Journal on Applied Dynamical Systems, Volume 9, Issue 4. 2010 pp. 1164-1200.

D. Grants (Proposals and Funded) 1. National Science Foundation Grant DSM 1318172: ($103,429.00) "Computational Intersection Theory for Infinite Dimensional Dynamical Systems". July 2013—Jun 2016. 2. AMS-Simmons Travel Grant (Awarded in Summer 2013).

E. Synergistic Activities *Analysis and Applications Seminar: Department of Mathematical Sciences, Florida Atlantic University. Co-Organized with Erik Lundberg (Fall 2104 -- Present).
*Applied and Computational Math Seminar: Rutgers University. Organized by J.D.M.J. Spring 2014.
Co-organized with Konstantin Mischaikow Fall 2013. *Minisymposium on Rigorous Computations in Dynamical Systems: organized with Jan Bouwe van den Berg for the Annual Meeting of the Canadian Applied and Industrial Mathematics Society, Quebec City, June 17-18, 2013. **Select Conference Talks**: "Fixed Point Approach to Rigorous Computation of Connecting Orbits in Infinite Dimensions" BIRS 5 Day Workshop on Rigorously Verified Computing for Infinite Dimensional Nonlinear Dynamics, Ban_ International Research Station, Alberta, Canada, September 23, 2014. -- "Parameterization Method for Invariant Manifolds and Some Validated Computations of Their Intersections" Boulder Dynamics 2014,
Conference in Honor of James Meiss' 60th Birthday, July 22, Boulder, Colorado, 2014. –"Some Recent Developments in the Parameterization of Stable/Unstable Manifolds" 10th AIMS Conference on Dynamical Systems and Applications, Special Session on Rigorous and Numerical Methods for
Invariant Manifolds, July 10, Madrid, Spain, 2014.--"Approximation of Julia sets with computer assisted validation for complex analytic dynamical systems" AMS Special Session on Complex Dynamics I, Joint Mathematics Meeting, Baltimore Maryland, January 17, 2014. –"Rigorous Computation of Connecting Orbits in Higher Dimensions" SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 19, 2013.—

"Computer Assisted Analysis of Invariant Manifolds and Connecting Dynamics" First International Conference on Dynamics of Differential Equations, Georgia Institute of Technology, Atlanta, Georgia, March 16, 2013.--\Computer Assisted Proof of Transverse Heteroclinic Connections for Vector Fields," Dynamics, Topology and Computations, Bedlewo, Poland, June 27, 2012.—"Parameterization of Invariant Manifolds with Rigorous Computer Assisted Error Bounds," Tenth Workshop on Interactions Between Dynamical Systems and Partial Differential Equations (JISD 2012),
Barcelona, Spain, May 30, 2012.—"Numerical Computation of One Parameter Branches of (Un)Stable Manifolds with Rigorous Error Bounds," ICMC Summer Meeting on Differential Equations, Special Session on Computational Dynamics, Universidade de Sao Palo, Sao Carlos, Brazil, February 8, 2012. **Referee:** SIAM Journal on Applied Dynamical Systems, Nonlinear Differential Equations and Applications, Communications in Nonlinear Science and Numerical Simulation, and Springer Books.

F. Collaborators and Other Affiliations: Past and Present Student Research Projects *Rigorous Computation for In_nite Dimensional Stable Manifolds for PDEs* with Jonathan Jaquette, Rutgers Univeristy.--*Computer assisted proof of connecting orbits for vector Fields* with Christian Reinhardt, TUM University, Munich.--*Rigorous approximation of Julia sets for complex analytic dynamical systems* with Haripriya Chakraborty, Rutgers University. (Speaker at 2014 JMM).--*Computer assisted proof of analytic decay rates for periodic problems in applied math with Allan Hungria*, Rutgers University. (Speaker at 2014 JMM). *Computer assisted proof of Hexagonal Roll structures for PDE's* with Andrea Deschienes, Laval University, Quebec City.--*Invariant Manifolds, the Hartman-Grobman Theorem, and Applications* with Yuri Boaventura, USP Sao Carlos.

G. (Selected) Courses Taught: At Rutgers University: M515 - Graduate Course in Ordinary Differential Equations: Spring 2013. Course and notes developed with M. Gameiro, J.P. Lessard, K. Mischaikow, and J.D. Mireles James. M495 -Undergraduate Special Topics Course on Nonlinear Analysis and Computer Assisted Proof: Spring 2014. Undergraduate course developed by J.D. Mireles James. M373.--Numerical Analysis I: Fall 2013.--M244 Differential Equations for Engineering and Physics: Fall 2013.--M312 Introduction to Mathematical Analysis II; Spring 2013.--M250 Introductory Linear Algebra; Fall 2012.--M 244 Differential Equations for Engineering and Physics; Fall 2012.--M 311 Introduction to Mathematical Analysis; Spring 2012.--M423 Elementary Partial Differential Equations; Fall 2011.--M300 Introduction to Mathematical Reasoning; Spring 2011.--M151 Calculus I for the Mathematical and Physical Sciences; Fall 2010 and Fall 2011. At Florida Atlantic University: MAD 3400: Numerical Methods: Fall 2014.

H. Community Engagement or Out-reach: Educational/Outreach Talks –"Understanding the Mistakes We Make When We Do Numerical Analysis" Rutgers University Student Chapter of the Mathematical Association of America, October 29, 2013.—"Computer Assisted Analysis of Periodic Solutions of Ordinary and Partial Differential Equations" University of Delaware student chapter of SIAM. September 17, 2013.—"A Little Nonlinear Analysis (with and without computer assistance)" Rutgers University Student Chapter of the Mathematical Association of America, May 1, 2013—"Computation of Stable and Unstable Manifolds of Dynamical Systems by Parameterization" George Mason University Department of Mathematics URCM and REU Applied Mathematics Seminar, FairfaxVirginia, July 27, 2010.—"Dynamical Systems: Wild Behavior in Simple Models of the World"

University of Texas Mathematics Department Saturday Morning Math Group, April 17, 2010.

Susan Moosai

9264 Neptune Basin Ct.
Boca Raton, FL 33434
smoosai@fau.edu

EDUCATION

Florida Atlantic University, Boca Raton, FL – August 2010
Ph.D. in Educational Leadership (Statistical Applications for Higher Education Institutions)

Florida Atlantic University, Boca Raton, FL – December 2002 MS. In
Mathematics (Statistical Applications)

University of Vermont, Burlington, VT (1986-1988**)** CPA
Accounting Curriculum

University of Guelph, Canada (January 1984- June 1985)
BSc in Physical Sciences (Chemistry, Mathematics and Physics)

College of Arts & Technology, Newcastle Upon Tyne, England (September 1979 -August 1981)
General Certificates in Advanced Physics, Chemistry, Mathematics and Spanish

Connecticut School of Broadcasting
Radio and Television Broadcasting; Journalistic skills for newspaper reporting.

PROFESSIONAL EXPERIENCE

Florida Atlantic University, Boca Raton, FL (August 2007 - present) Instructor / Co-coordinator Introductory Statistics: Department of Mathematics
Associate Graduate Faculty: College of Education: Department of Educational Leadership

Florida Atlantic University, Boca Raton, FL (April 2003 – August 2007)
Budget Manager (Departments of Biology and Complex Systems & Brain Sciences)

FAU and Palm Beach Community College, Boca Raton, FL (August 2001 - May 2007) Adjunct Professor of Mathematics

RESEARCH INTERESTS

Curriculum, Instruction and Student performance at higher education institutions.

PUBLICATIONS

Community College Journal of Research and Practice: Volume 35, Issue 10, 2011. Using Student and Institutional Characteristics to Predict Graduation Rates at Community Colleges: New Developments in Performance Measures and Institutional Effectiveness.

Primus: Co-author of "Taking a College Algebra Course. An Approach which Increased Students' Success Rate."

PROFESSIONAL ACTIVITY

Ph.D. Dissertation committees: **Committee Member:** College of Educational Leadership

Lead Presenter/ Facilitator at 2 week Statistics: Presented and conducted 2 week Statistics workshop in Orlando, Florida, to Florida middle school and high school teachers. **Florida State University– 2014**

Presentations at professional meetings or conferences: Presented findings of my doctoral work at **College of Education Student Achievement Council (SAC)** at the 10th Annual SAC Research Conference – **2011**

Peer Reviewer: Active Reviewer for publications in **Community College Journal of Research and Practice**

Conferences attended:

- **Wiley Publishers**: **College Algebra and Pre-Calculus conference 2009**
- **Pearson**: **Course Redesign - Sept 2010**
- **Pearson**: **The Redesign Alliance:** NCAT Redesign Workshop: Increasing Student Success in Developmental and College-Level Math: February 6-8, 2011 at the Rosen Centre Hotel, Orlando, Florida.

Courses Curriculum Developed:

- Current Coordinator of Methods of Calculus, MAC 2233. Redesigning course from a traditional to a hybrid online course.
- Coordinator of Introductory Statistics, STA 2023 and also worked toward making this course a hybrid online course
- Piloted and implemented the online Introductory Statistics course.
- Co- developed the existing hybrid model (2+2) of College Algebra, MAC 1105 currently implemented.

ABBREVIATED FACULTY CV

Vincent NAUDOT

A. Professional Preparation

- B.S Mathematics, 1990, Universite de Dijon, France
- M.S. Mathematics, 1991, Universite de Dijon
- Ph-D Mathematics, 1996, Universite de Dijon
- "*Habilitation a diriger les Recherches*", 2005, Universite de Dijon

B. Appointments

- 09/92-09/96 Alocataire de Recherche, Univesite de Dijon
- 09/96-09/98 JSPS Postdoctoral researcher, Kyoto University, Japan
- 09/96-04/00 TMR Postdoctoral researcher, LUC, Hasselt Belgium
- 04/00-0401 NAOj invited researcher, Tokyo, Japan
- 04/01-05/05 Postdoctoral researcher RUG, The Netherlands
- 05/05-08/07 EPSRC researcher, Warwick, UK
- 08/07-08/11 Assistant Professor FAU, Boca Raton
- 08/11-Present Associate Professor

C (Selected) Publications (last 7 years)

- "Normal linear stability of quasi periodic tori" by H.W. Broer, J. Hoo, V. Naudot Journ. Diff. Eqns., 232, (2), (2007), 355-418.

- "On the index of finite determinacy of vector fields with resonances", by V. Naudot, J. Yang. Acta Math. Sinica. Eng. Series, 24, No 8, (2008), 1401-1408.

- "Analytic invariants associated with a parabolic fixed point in C2", by V.Gelfreich, V.Naudot. Ergod. Th. & Dynam. Syst., 28, issue 06, (2008) 1815-1848.

- "Linearization of families of germs" by V. Naudot and J. Yang. Dynamical Systems: an international journal. Vol. 23, 4, (2008), 467-489

- "Higher Order Birkhoff Averages" by T. Jordan, V. Naudot, T. Young. Dynamical Systems, 1, (2009), 1-15.

- "On the width of chaos for quadratic maps" by V. Gelfreich, V. Naudot. Experimental Mathematics, 18, issue 4, (2009), 409-427.

- "Dynamical Stabilization of expression States in Genes", by L.S. Liebovitch, J.L. Michaels, V. Naudot, Bulletin of Mathematical Biology, 73, Issue 9, (2011), 2132-2151.

- "A reinjected cuspidal Horseshoe", by M. Fontaine, W.D. Kalies, V. Naudot, Discrete and Continuous Dynamical System, (Supp. 2013), 227-228.

- "Quasi-linearization of parameter depending germs of vector fields" by V.

Naudot. J. Yang, Dynamical Systems, 28, no 2, (2013), 173-186.

D. Grants (Proposals and Funded) (last 7 years)

E. Synergistic Activities

F. Collaborators and Other Affiliations

- W.D Kalies (FAU, Dept of Math.)
- E. Noonburg (FAU, Dept of Biology)
- S. Ippolito (FAU, Dept of Math, Grad Student)
- M. Fontaine (FAU, Dept of Math, Grad Student)
- J Mireles-James (FAU, Dept of Math.)
- J. Yang (Beijing University, China)
- P. De Maesschalck (LUC Hasselt, Belgium)
- P. Bonckaert (LUC, Haseelt Belgium)
- Kwok-wai Chung (HongKongCity University)
- L. Liebovitch (CUNY, Queens College)

G. (Selected) Courses Taught (last 7 years)

- MAC2311, Calc I,
- MAC2312, Calc II,
- MAC2253 Calc I for Eng,
- MAC2254 Calc II for Eng
- MAP6211, Intro Dynamical System I, (Grad)
- MAP6212, Intro Dynamical System II (Grad)
- MAA4200, Modern Analysis
- MAP3305, Engineering Math I
- MAP4306, Engineering Math II
- MAA5105, Multi-Variable Analysis, (Grad)
- MAA5228, Introductory Analysis I, (Grad)
- MAA5229, Introductory Analysis II, (Grad)
- MAC2233, Method of Calculus

H. Community Engagement or Out-reach

From Fall 2007 up to 2014, I animate the Dynamical System Seminar that take place regularly in our Department.

Philip Andrew Pina, Jr.

EDUCATION

Doctoral Studies (Potential Densities of Markov Processes on Groups), University of Florida, Gainesville, Florida
MSc. (Mathematics) (1992) University of Florida, Gainesville Florida BSc. (Statistics) (1987) University of Florida, Gainesville Florida

PROFESSIONAL EXPERIENCE

FLORIDA ATLANTIC UNIVERSITY ***December 1998 – present***
Boca Raton, Florida

Instructor of Mathematics:
Actuarial Science Advisor *August 2008-present*

- Advise students on course selection and prerequisite coursework for Society of Actuaries/Casualty Actuary Society (SOA/CAS) exam success and the Department of Mathematical Science's Certificate of Actuarial Science requirements
- Review and renew Florida Atlantic University SOA/CAS Verification of Educational Experience (VEE) approved courses
- Submit evaluated university courses VEE approval.
- Keep abreast of changing syllabus requirements of the SOA/CAS preliminary exams: Exam 1/P (Probability), Exam 2/FM (Financial Mathematics), Exam 3F/MFE (Models For Financial Economics), Exam MLC (Life Contingencies), Exam 3L (Life Contingencies and Statistics), Exam 4/C (Construction of Actuarial Models)
- Develop and maintain contacts in the actuarial community including internship contacts
- Improve course structure and teaching pedagogy for the two actuarial capstone courses Actuarial Science I & II.

Coordinator of College Algebra *December 1998-August 2008*

- Coordinated and managed MAC 1105 College Algebra (800-1200 students)
- Hired 20-25 undergraduate student assistants for recitation sessions
- Conducted 3 day orientation each fall semester to evaluate potential student assistants and 10-15 incoming graduate student to determine suitability for the classroom
- Assigned hired student assistants and incoming graduate students to recitation sessions
- Created 5 exams (three versions each), 5 makeup exams & cumulative final exam (three versions each)
- Created 15 PLTL (Peer Led Team Learning) lesson plans for use in recitation sessions
- Trained graduate students and student assistants in the use of PLTL method of instruction
- Observed graduate students and student assistants teaching in the classroom and maintained a ranking and hierarchy structure to ensure that weaker tutors had access to more training and mentoring. University grades were monitored each semester for student assistants with an expectation of superior performance
- Maintained a cordial relationship with other instructors
- Taught unassigned recitation sections when qualified personnel could not be hired

Special Projects and Accomplishments

- *Prepared and awarded $2000 renewable Casualty Actuaries of the Southeast (CASE) grant*
- *Formed Actuarial Science Advisory Board*
- *Increased enrollment in MAP 4173 (averaging 10 students each fall semester)*
- *Formed Actuarial Science Club*
- *Student PLTL City College of New York Conference Presentation: students Shaleza Bahksh and Jamie Frade poster presentation and joint article published in PLTL newsletter*
- *Awarded $500 PLTL seed grant*
- *Course Revision: College Algebra, PreCalculus, Trigonometry, PreCalculus Algebra and Trigonometry*
- *Corporate beta tested and introduced MyMath Lab (current incarnation MyLabs Plus) at FAU*
- *Prompted initial Prentice Hall donation to the Department of Mathematical Sciences*

Professional Development

- SOA/CAS Exam P Passed, studying for Exam FM
- CASE (Casualty Actuaries of the Southeast) Conference
- PreCalculus Summit Summer 2002, Summer 2004, Summer 2006, Summer 2008
- PLTL Mathematics Conference Summer 2003

Originator and Counselor: Minority Student Retention Program, University of Florida

- Initiated, designed, and implemented the University Of Florida's *Cycle of Success* Program—retention rate of scholarship recipients increased by 30%.
- Managed the program budget.
- Delegated duties to staff of peer counselors.
- Provided academic and career counsel.
- Tutored Mathematics.
- University program continues.

ACTIVITIES AND ORGANIZATIONS

- American Mathematical Society
- Mathematical Association of America
- National Education Association
- Florida Teaching Profession

ABBREVIATED FACULTY CV

Daniela Nikolova-Popova

A. Professional Preparation

Education:

- **Secondary:** 1966 – 1969: English Language School, Sofia, Bulgaria: 1969 – 1971: Lycee Francais de La Marsa, Tunis, Tunisia. **B.Sc**. (Mathematiques-Physiques), Paris,1971,with Mention (Honor).
- **Tertiary:** 1971 – 1976: Faculty of Mathematics, Sofia University: **M.Sc.** (Mathematics), Sofia, 1976.
- **Ph.D.** (Mathematics and Computer Science), Sofia, 1984.

Post-Doctor studies:

- 1979 – 1980: Moscow University (6 months);
- 1984 - 1986 DAAD-scholarship, Germany (16 months);
- 1992: British Council Fellowship - UK (6 months);
- 1994 - 1995 Volkswagen-Stiftung, Germany (2 months).

B. Appointments

- **1976-2014:** Institute of Mathematics and Informatics, Bulgarian Academy of Sciences (BAS), Associate Professor (since 2005 – on leave);
- **Since 2005:** Florida Atlantic University (FAU), Department of Mathematical Sciences, Instructor

C. (Selected) Publications

- Visualizing t-Designs and t-wise balanced designs (with R. Laue), New Trends in Mathematics and Informatics. Jubilee International Conference 60 years Institute of Mathematics and Informatics, Bulgarian Academy of Sciences. Sofia, 2007(25-25).
- Designs of Designs (with R. Laue), Journal of Combinatorial Design , Volume 20, 1, p. 1–22, 2011.
- On the covering number of small symmetric groups and some sporadic simple groups (with Luise-Charlotte Kappe and Eric Swartz), to be submitted to the Journal "Groups, Complexity, and Cryptology".
- http://arxiv.org/abs/1409.2292
- Covering small alternating groups with proper subgroups (with Spyros Magliveras and Michael Epstein), to be submitted.

D. Grants (Proposals and Funded)

- NSF Proposal (with E. An), May 2011: **"**An Academic Service-Learning Paradigm to Transform Undergraduate Engineering"- not funded.
- Elsevier Proposal (with J Peluso, and E. Rezler), September 1, 2011: "Establish and support Women in STEM (WiSTEM) organization at Florida Atlantic University (FAU) – not funded.
- NSF Proposal (with Prof. Magliveras), 2012 for organizing an International conference at FAU: "Group Theory Combinatorics and Computing" – not funded.
- Individual **Assessment Grant** awarded by the Office of Institutional Effectiveness and Analysis (IEA), 2010.

- Individual **Academic Service-Learning (AS_L) STEM grant** for the course MAC 2282: Calculus 2 for Engineers, Spring 2011.
- Individual grant for a proposed course, "Mathematics and its History," as part of the **University Honors Program (UHP),** satisfying the WAC (writing across the curriculum) requirements, Spring 2012.
- **Distinction through Discovery Undergraduate Curriculum Grants for the 2013-2014 academic year**: **Funded proposal (**for 3 Upper level courses**)** submitted by Drs. Frederick Hoffman, Terje Hoim, Daniela Popova and Warren McGovern from the Charles E. Schmidt College of science and the Wilkes Honors College.
- **Distinction through Discovery Undergraduate Curriculum Grants for the 2015-2016 academic year: Submitted pre-proposal** (October 1, 2014, Lower level Calculus courses): "Bringing Project Based Learning (PBL) to Teaching Calculus at FAU", submitted by Daniela Popova, Katarzyna Winkowska-Nowak, Koray Karabina.
- **Distinction through Discovery Student Grants (**October 15, 2014): "Bridge the Gap between mathematics and Arts – Frieze and Wallpaper Groups and their algorithmic Classifications": **Submitted proposal** by Julia Seay, Samuel Schlegel, and Stevens Dormezil – my students from the Independent study.

E. Synergistic Activities

- Developed an **Online** Calculus I for Engineers course that received a **National recognition through the QM (Quality Matters)** qualification process – November 2013.
- Organized **an International conference on Group Theory, Combinatorics and Computing (GTCC) at FAU**. http://math.fau.edu/GTCC2012/
- **The 2013 Women's Leadership Forum: Women in Science, Technology, Engineering and Mathematics** – organized and panelist.

F. Collaborators and Other Affiliations:

Associate member of the Institute of Mathematics and Informatics, Bulgarian Academy of Sciences.

G. (Selected) Courses Taught :

- Intermediate Algebra, College Algebra, Pre-Calculus Algebra.
- Mathematics for Liberal Art, Methods of Calculus
- Calculus-Analytic Geometry I, II, and III; Calculus for Engineers: I, II; Calculus for Engineers I - online
- Matrix Theory, Survey of Geometry, History of Mathematics
- Modern Algebra, Modern Analysis, Mathematical Problem Solving
- Independent studies: Lie Groups and Algebras; Permutation Groups and Algorithms
- Learning Strategy and Human Development, the Learning Community Experience
- SAT, GMAT

H. Community Engagement or Out-reach

- Pompano Beach Lions Club – director
- UFF -Senator
- United Nations Women Committee – since May 2014.

ABBREVIATED FACULTY CV

Daiva Pucinskaite

A. Professional Preparation:

Doctoral studies at University of Bielefeld / Germany, 2005-2009,

"Eine Verbindung zwischen quasi-erblichen Algebren und lokalen, selbstinjektiven Algebren", advisor: Prof. Dr. Dr. phil.h.c. Claus Michael Ringel

Diploma in mathematics as University of Bielefeld / Germany, 1996-2004,

"Der Untermodulverband des gr¨oßten projektiven unzerlegbaren Moduls in einem regul¨aren Block der Kategorie O der Lie-Algebra sl_3(C) ",

advisor: Prof. Dr. Dr. phil.h.c. Claus Michael Ringel

Study of mathematics at the University of Vilnius / Lithuania, 1991-1995.

B. Appointments

Florida Atlantic University: Visiting Assistant Professor since 2014

University of Kiel/Germany: Post-doctoral researcher 2009-2014

University of Bielefeld/Germany: Scientific assistant (2005-2009)

University of Bielefeld /Germany**:** Teaching assistant (2000-2004)

C. (Selected) Publications (last 7 years)

1-quasi-hereditary algebras, J. Lond. Math. Soc. (2) 87 (2013), no. 2, 478-496.

Quasi-hereditary algebras via generator-cogenerators of local self-injective algebras and transfer of Ringel duality, Math.Z (2014)

D. Grants (Proposals and Funded) (last 7 years)

Travel support through the National Science Foundation to attend the International Auslander Conference in Woods Hole, MA, in 2013 and 2014,

E. Synergistic Activities

F. Collaborators and Other Affiliations

Karin Erdmann (University of Oxford)

Markus Schmidmeier (FAU)

Steffen Koenig (University of Stuttgart)

G. (Selected) Courses Taught (last 7 years)

Calculus 2 (2014 Fall) FAU

Introduction to the representation theory of algebras (2013 Fall) University of Kiel

Introduction to the representation theory of BGG-category O (2012 Spring) University of Kiel

H. Community Engagement or Out-reach

Girls'Day (2012 and 2013) University of Kiel

Meeting of Scientists (2010-2014) University of Kiel

Lianfen Qian

A. Professional Preparation

1996/08 Ph.D. in Statistics, Michigan State University, East Lansing, MI.
1989/05 M.S. in Statistics, Hangzhou University, Zhejiang, China.
1984/05 B.S. in Mathematics, Dept. of Math., Zhejiang University (Xixi Campus)

B. Appointments

2002-present Professor/Associate Professor, Dept of Mathematical Sciences and Environmental Science Program, FAU.
1996-2002 Assistant Professor, Department of Mathematical Sciences and Environmental Science Program, FAU.
1993-1996 Research, Teaching Assistant and Statistical Consultant, Department of Statistics and Probability, Michigan State University (MSU)
1991-1993 Teaching Assistant, Department of Mathematics, MSU.
1984-1991 Lecturer, Department of Mathematics, Zhejiang University (Xixi Campus).

C. (Selected) Publications (last 7 years)

2014 Qian, L.F., Wei Zhang and Zhongwei Li, Essential gene identification for a microarray data of Yersinia Pestis, accepted by *IEEE BIBE 2014*.

2014 Qian, L.F. and Wei Zhang, Multiple change-point detection in piecewise exponential hazard regression model with long-term survivors and right censoring, *Contemporary Developments in Statistical Theory, A Festschrift for Hira Lal Koul*,*Springer Proceedings in Mathematics & Statistics*, Volume 68(2014), 289-304.

2014 Wei Zhang, Qian, L. F. and Yunxia Li, Semiparametric sequential testing for multiple change points in piecewise constant hazard functions with long-term survivors. *Communications in Statistics – Simulation and Computation*, 43 (2014), 1685-1699.

2014 Li, Y.X. and Qian, L.F., Likelihood ratio test for a piecewise continuous Weibull model with an unknown change point, *Journal of Mathematical Analysis and Applications*, 412(1), 498-504.

2013 Chang, F.Z. and Qian, L.F., Maximum likelihood estimator of AUC for a Bi-exponentiated Weibull model, *ISRN Probability and Statistics*, http://dx.doi.org/10.1155/2013/965972.

2013 Li,Y.X.; Qian,L.F. and Zhang,W., Estimation in a change-point hazard regression model with long-term survivors, *Statistics & Probability Letters*, 83 (2013), 1683-1691.

2013 Long, H.W. and Qian, L.F., Nadaraya-Watson estimator for stochastic processes driven by stable Levy motions, *Electronic Journal of Statistics*,7 (2013), 1387-1418.

2012 Qian, L.F. (Joint with Sara Schesser Bartra, et al.) The outer membrane protein A (OmpA) of Yersinia pestis promotes intracellular survival and virulence in mice. *Microbial Pathogenesis* 52 (2012), no 1. 41-46.

2012 Qian, L.F. Fisher information matrix for three-parameter exponentiated-Weibull distribution under type II censoring. *Statistical Methodology*. 9 (2012) 320-329.

2010 Qian, L.F., Yao, Q.C. and Khoshgoftaar, T.M. Dynamic two-phase truncated Rayleigh model for release date prediction of software. *Journal of Software Engineering and Applications*. 3 (2010), no. 6, 603-609.

2010 Wang, S.J., Qian, L.F. and Carroll, R.J. Generalized empirical likelihood methods for analyzing longitudinal data. *Biometrika.* 97 (2010), no. 1, 79-93.

2010 Liu, Z. and Qian, L.F. Change-point estimation in a segmented linear regression model via empirical likelihood. *Statistical Simulation and Computation*, Vol. 39, (2010), 85-100.

2008 Heilmayer, O., Digialleonardo, J., Qian, L.F. and Roesijadi, G. Stress tolerance of a subtropical Crassostrea virginica population to the combined effects of temperature and salinity. *Estuarine, Coastal and Shelf Scienc*e (2008), doi:10.1016/j.ecss.2008.03.022. In press. 79 (2008), 179-185.

2008 Diaz, N., Lizardi, H., Qian, L.F. and Liu, Z. The relationship between different types of childhood abuse and a history of major depressive disorder in a sample of Latino College students. *Journal of Aggression, Maltreatment and Trauma*. 17 (2008) no. 2, 175-196.

2008 Lai, T. L., Qian, L.F. and Shao, Q.M. *Asymptotic theory in probability and statistics with applications*, Advanced Lectures in Mathematics (ALM), 2. International Press, Somerville, MA; Higher Education Press, Beijing, 2008. vi+533 pp. ISBN: 978-1-57146-169-8

2007 Qian, L.F. Piecewise Regression Models: Estimation Theory and Applications. *Probability and Statistics with Applications* (editors: Lai, T.L, Qian, L.F. and Shao, Q.M.), 309-341. Adv. Lect. Math. (ALM), 2, Int. Press, Somerville, MA.

D. Grants (Proposals and Funded) (last 7 years)

2014 Simons Foundation Collaboration Grants for Mathematicians, $35,000, rejected.
2013 FAU Technology Fee Project Proposal, jointly with Lee, Roger and Emily, $73,230.
2009 USA DOD contract grant for bacteria gene functionality classification project, $5,000.
2008 Helped on NCCI research fund for ¼ RA.

E. Synergistic Activities

- Multiple change-points detection in hazard rates, invited colloquium talk at FIU, 11/21/2013.
- Challenges of Statistics Methods for Interdisciplinary Research and Big Data, invited colloquium talk at Wenzhou University, 12/26/2013.
- Empirical Likelihood Inference in Partial Linear Models for Longitudinal Data, invited colloquium talk at NOVA, 10/22/2014.
- Proposal to build the undergraduate major in Statistics and working on international partner programs for both undergraduate and graduate students.

F. Collaborators and Other Affiliations

- Statisticians: Drs. Hira Koul, Donatas Surgailis, Raymond Carroll, Suojing Wang, Zhongwu Cai, Qiman Shao, Tze-Leung Lai, Soyoung Ryu, Heirich Niederhausen, Wei Zhang, Yunxia Li, Hongwei Long, Jose Correa, Zhihua Liu, Fazhe Chang
- Engineers: Taghi Khoshgoftaar, Qingchuan Yao, Mohammad Ilyas, Sam Hsu
- Biologists and others: Guri Roesijadi, Zhongwei Li, Dan Austin, Naelys Diaz.

G. (Selected) Courses Taught (last 7 years)

- Undergraduate Statistics Courses Taught:
  STA 2023 Introductory Statistics — STA 3173 Introduction to Biostatistics
  STA 4102 Computational Statistics 1 — STA 4234/4202L Applied Statistics 1
  STA 4442 Probability and Statistics 1 — STA 4443 Probability and Statistics 2
  STA 4032 Probability and Statistics for Engineers
- Graduate Statistics Courses Taught:
  STA 5195/4906 Biostatistics — STA 6326 Mathematical Statistics
  STA 6446 Regression Analysis — STA 6446 Computational Statistics
  STA 6857/4930 Applied Time Series — STA 6206 Stat. Methods for Environ. Sciences
  STA 6208/4930 Applied Statistical Methods
  STA 6907 Internship — STA 6907 Longitudinal Data Analysis (DIS)
  STA 6907 Analysis of Categorical Data (DIS)
  STA 6907 Survival Analysis and Clinical Trials (DIS)
- Others: MAT 7978 Adv. Math Resch. MAT 7980 Dissertation, MAT 6971 Master's Thesis

H. Community Engagement or Out-reach

- Reviewer for the American Mathematics Reviews, Technometrics and many statistical journals.
- Statistical consultant for students and researchers from FAU and the community.
- Undergraduate advisor for Statistics minor and certificate programs
- Board Member of CASEC: Chinese Association of Science Economics & Culture of South Florida, 2011-Present
- Principal of CCSSF-PBC：The Contemporary Chinese School of South Florida -- Palm Beach Campus, 2011-Present

AI BENG (SERENE) RADULOVIC

10042 Lexington Estates Blvd
Boca Raton, FL 33428
E-mail:aradulov@fau.edu
Tel: (561) 306 2981

Professional Preparation

The University of Connecticut, Storrs, CT.
Master of Mathematics in Applied Math, December 1994.
Concentration: Actuarial Science.

State University of New York at Albany, Albany, NY.
Bachelor of Science in Business Administration, May 1989

Appointments:

Introductory to Statistics Coordinator 08/14-present, *Florida Atlantic University FL*
Set up the course syllabus, online homework, quizzes and exams.
Supervise instructors teaching the course.

College Algebra Coordinator 08/13-5/14, *Florida Atlantic University FL*
Set up the course syllabus, online homework, quizzes and exams.
Supervise instructors teaching the course.
Supervised about 15 tutors in the lab.

College Algebra E-learning Instructor 01/12- 12/13, *Florida Atlantic University FL*
Set up an e- learning environment utilizing MyMathLab, Blackboard and Blackboard Collaborate. (previously known as Elluminate Live)
Conducted weekly synchronous online meetings via Blackboard Collaborate.

College Algebra Co-Coordinator 08/11-5/13, *Florida Atlantic University FL*
Co set up the redesign of the traditional College Algebra course to a fully equipped computer based course.
Co run computer lab of 96 stations and co supervise 15 lab assistants.
Co set up the course syllabus, online homework, quizzes and exams.

Intermediate Algebra Coordinator 09/07 – 05/11, *Florida Atlantic University FL.*
Set up course syllabus and common exams for approximately 200 students.
Supervise 4 – 5 graduate assistants teaching the course.

Math Lecturer 01/04 – 5/14, *Florida Atlantic University, FL.*
11/99 – 03/01, *Devry Institute, NJ.*
01/99 – 05/99, *Eastern Connecticut State University, CT.*
09/92 – 12/92, *The University of Connecticut, CT.*

Statistic Lecturer 01/08 – 12/2010, *Florida Atlantic University, FL.*
01/00 – 05/00, *Rutgers State University, NJ.*

Courses Taught: Intermediate Algebra, College Algebra, Pre-Calculus, Methods of Calculus and Math for Liberal Arts 1 & 2; Introductory Statistics and Applied Probability & Statistics for Engineers

CURRICULUM VITAE DRAGAN RADULOVIC

Department of Mathematics , Florida Atlantic University, Boca Raton FL, (561) 306 2169

Education: **Post-Doc** 1999-2001, Princeton University-Applied Mathematics, Concentration**:** *Mathematical models for Internet traffic,* Supervisor**:** *Dr. Ingrid Daubechies*
Ph.D. 1991-1996 in Mathematics, University of Connecticut, Storrs, Connecticut Concentration: *Probability Theory and Mathematical Statistics* Thesis: "*The Bootstrap for Empirical Processes Under Dependence*" Advisor: *Dr. Evarist Giné*
Bachelor of Science in Mathematics, Zagreb University, Zagreb, Croatia

Employment:

2003-present	Full/Assistant Professor Florida Atlantic University
2001-2003	Gibbs Instructor at Yale University Statistics Department
2001 Spring	Visiting Researcher Institute Henri Poincare, Paris France
1999-2002	Principal Mathematician at Internet Startup Company Quantiva inc.
1999-2001	Research Associate at Princeton University and Research Consultant for AT&T Labs
1997-1999	Research Associate at United Technology Research Center- East Hartford CT
1996-1997	Assistant Professor at Eastern Connecticut State University

U.S. Patents:

2008	**"**System and method for analyzing a data stream C"*U.S. Patent Number 7 415 390*, (joint work with R. Hiller at Net Scaut)
2006	**"**System and method for analyzing a data stream B"*U.S. Patent Number 7 133 808* , (joint work with R. Hiller at Net Scaut)
2006	**"**System and method for analyzing a data stream A" *U.S. Patent Number* 7 031,884, (joint work with R. Hiller at Net Scaut)
2002	MonitoringSystem Behavior Using Empirical Distributions and Cumulative Distribution Norms *U.S. Patent Number 6,477,485*(Joint work with B. LaBarre-UTRC)

Publications:
Probability Theory and Mathematical Statistics:

2012	Direct Bootstrapping Technique and its Application to a Novel Goodness of Fit Test to Appear in Journal of Multivariate Analysis
2012	Necessary and Sufficient Conditions for Moving Blocks Bootstrap Central Limit Theorem of the Mean, D Radulovic ,Journal of Nonparametric Statistics (2012) , 1-15
2009	Uniform central Limit theorems for pre-Gaussian classes of functions, D. Radulovic, M. Wegkamp, High Dimensional Probability *Vol. 5* (2009) 84–102
2008	Another look at Disjoint Blocks Bootstrap, D. Radulovic *Test*. 2008 18: 195-212
2008	Pure Random Search with Exponential Rate of Convergency, D. Radulovic *Optimization* 2008, Vol1 pg 1-15
2008	A Discretized Version of the Self-Similar Model for Internet Traffic1, K Drakakis, D. Radulovic *Applied Mathematical Sciences*, Vol. 2, 2008, no. 55, 2743 - 2756
2007	On the spikiness of Internet traffic. K. Drakakis, D. Radulovic *Appl. Math. Sci. 1(2007) No* 9-12 pp 571-602
2005	An Improvement on the Energy Function, K. Drakakis, D. Radulovic *Signal Processing* Volume 85, Issue 1, January 2005, Pages 121-127
2004	Weak Convergence of Empirical Copula Process. Fermanian , Radulovic, Wegkamp, *Bernoulli* 2004, 10 No. 5 847-860.

2004 Renevable Type Bootstrap for Markov chains, D. Radulovic , *Test* (2004) Vol 13 No. 1 1-46 2003 On Accelerated Random Search, M. Appel , B. Labarre, D. Radulovic *SIAM*

Journal on Optimization, Volume 14, Number 3, (2003). Pgs. 708-731

2003 A Note on Smoothed Bootstrap, D. Radulovic *Progress in Probability* (2003), 55, pg 333-346 2003 Necessary and Sufficient Conditions for Weak Convergence of Smoothed Empirical Processes

D. Radulovic, M. Wegkamp, *Stat. Probab. Letters (2003)* Vol. 61 Pg. 321-336

2002 Some results *on* the multiresolution structure of Internet traffic traces, K. Drakakis, D. Radulovic

Proceedings of SPIE. 2002. Volume 4868-pages not given-online Journal.

2000 Weak Convergence of Smoothed Empirical Processes Beyond Donsker Classes, D. Radulovic, M. Wegkamp *High Dimensional Probability II*, Birkhauser, 89 - 106. (2000) 1996 Jackknife-Bootstrap Variance Estimator, , D. Radulovic *Test*. Vol.7, No. 2, pg 295-306 1998Can We Bootstrap Even If CLT Fails? , D. Radulovic

The Journal of Theoretical Probability, 1998. Vol 11, No. 3

1998 The Bootstrap of Empirical Processes for α-Mixing Sequences, , D. Radulovic

Progress in Probability, (1998)Vol 43, Birkhauser Verlag/Switzerland

1996 The Bootstrap for the Empirical Process Based on Stationary Observations, , D. Radulovic

Stochastic Processes and their Applications 1996. 65. pp. 259-279

1996 Bootstrap of the Mean for Strong Mixing Sequences Under Minimal Conditions, , D. Radulovic

Statistics and Probability Letters 1996. 28. pp 65-72.

Molecular Biology/Biostatistics

2011 Genetic Variation Shapes Protein Networks Mainly through Non-transcriptional Mechanisms E. Foss, D. Radulovic et al, *PLOS Biology*, Vol 9 , Issue 9 , e1001144, September 2011

2008 Comparison of a Label-free Quantitative Proteomic Method Based on Peptide Ion Current Area to the Isotope Coded Affinity Tag Method in *Cancer Informatics* 2008 : 243-255 , Soyoug Ryu and David R. Goodlett, Radulovic, D et al

2007 Genetic basis of proteome variation in yeast, Dragan Radulovic, Eric J Foss, et al, *Nature-Genetics* 39, 1369 - 1375 (2007)

2007 MglA Regulates Francisella tularensis subsp novicida (Francisella novicida) Response to Starvation and Oxidative Stress, Tina Guina, Dragan Radulovic, et al

Journal of Bacteriology, 2007, p. 6580-6586, Vol. 189, No. 18

2004 Informatics Platform for Global Proteomic Profiling and Biomarker Discovery, Radulovic, D., Jelveh, S., Ryu, S., Hamilton, G., Foss, E., Mao, Y., Emili, A.: *Molecular and Cellular Proteomics*. 2004 3, 984-997

2003 PRISM: A Generic Large-Scale Proteomics Investigation Strategy for Mammals, Dragan Radulovic, et al *Mol Cell Proteomics* **2**, 96-106 (2003).

FRED RICHMAN

Education

1958 AB Princeton University (magna cum laude) 1959 SM University of Chicago
1963 PhD University of Chicago (directed by Irving Kaplansky)

Experience

1960-1962 NSF Cooperative Fellow, University of Chicago 1962 Instructor, University of Illinois, Chicago (2 months) 1963-1966 Assistant Professor, New Mexico State University 1966-1971 Associate Professor, New Mexico State University 1971-1989 Professor, New Mexico State University
1989-1990 Programmer, TCI Software Research (also summer 1992) 1990- Professor, Florida Atlantic University

1969-1970 Visiting Associate Professor, Florida Atlantic University (sabbatical leave)
1976-1977 Visiting Fellow, Princeton University Physics Department (sabbatical leave)
1977 Research staff, Institute for Defense Analyses (Jan-July) Also summers of 1979, 1981, 1991 and 1995
1981 Visiting Lecturer, University of Essen (Summer) 1982 Visiting Lecturer, Monash University (May-June) 1983-1984 Research staff, Institute for Defense Analyses (sabbatical leave)
1988-1989 Consultant, TCI Software Research
2002 Erskine Fellow, University of Canterbury (June-July)

Awards

1958 Covington Mathematics Prize, Princeton University 1980 Westhafer Award for Excellence in Research, NMSU 1989 Eminent Scholar, State of New Mexico

Grants

1966-1985 NSF grants for investigations in abelian groups. 1988-1990 NSF grant for investigations in abelian groups.
1995-1997 NSF Instrumentation and Laboratory Improvement equipment grant to develop an electronic workbook for calculus students.

PhD Students

1967 Louis Duncan, Channel capacity and coding
1971 David Tabor, Homomorphism classes of abelian groups
1972 E. Lee Lady, Products of abelian groups and modules
1975 Laurel Rogers, Constructions in abelian p-groups
1980 Judy Moore, Warfield groups and related topics
1989 Christine Merrin, Simply presented valuated modules
1990 Stephen Merrin, The constructive theory of Lie algebras
2009 Marcela Chiorescu, Minimal zero-dimensional extensions
2009 Mary E. Hopkins, Weakly integrally closed monoids and forbidden patterns

Masters Students

1996 Keiko Holroyd, Finite valuated groups
2000 Dawne Richards, Categorical syllogisms

BOOKS

Mathematics for the liberal arts student, Brooks-Cole, Belmont, California 1967. (with C. Walker and R. Wisner). Second edition 1973.

College trigonometry, Scott, Foresman, and Co., Chicago 1970. (with C. Walker and E. A. Walker)

Number theory, an introduction to algebra, Brooks-Cole, Monterey, Cali- fornia, 1971.

Varieties of constructive mathematics, London Math. Soc. Lecture Notes Series 97, Cambridge 1987. (with D. S. Bridges) MR 88k:03127

A course in constructive algebra, Springer-Verlag 1988. (with R. Mines and W. Ruitenburg) MR 89d:03066

Numbers and symmetry: an introduction to algebra, CRC Press, Boca Raton 1997. (with B. L. Johnston)

Mathematics for the liberal arts student, Prentice-Hall, 2000. Preliminary edition, Simon & Schuster Custom Publishing 1998 (with Carol L. Walker, Robert J. Wisner, and James W. Brewer)

Calculus, understanding its concepts and methods, Mackichan Software, 2006. (with Darel Hardy, Carol Walker, and Robert J. Wisner)

Applied algebra: codes, ciphers, and discrete algorithms, Second Edition, CRC Press, 2009. (with Darel Hardy and Carol Walker)

ARTICLES IN JOURNALS AND CONFERENCE PROCEEDINGS (since 2001)

2001 Adjoints and the image of the ball, Proc. Amer. Math. Soc., 129, 1189-1193. MR 2001g:47002

Constructive mathematics without choice, Reuniting the antipodes- constructive and nonstandard views of the continuum, Schuster et al. eds., Kluwer, Synthese Library 306, 199-205. MR 1895394

Pointwise differentiability, Reuniting the antipodes-constructive and nonstandard views of the continuum, Schuster et al. eds., Kluwer, Syn- these Library 306, 207-210. MR 2003b:03099

2002 Omniscience principles and functions of bounded variation, Mathemat- ical Logic Quarterly, 42, 111-116. MR 2002i:03080

Computing limiting stationary distributions of small noisy networks, Journal of Applied Probability, 39, March, 1-18 (with Katarzyna Winkowsa- Nowak) MR 2003b:60117

Trace-class operators, Houston Journal of Mathematics, 28, 565-583 (with Douglas S. Bridges and Peter Schuster). MR 2003g:47131

Spreads and choice in constructive mathematics, Indagationes Mathe- maticae, 13, 259-267. MR 2016342

Pre-abelian clan categories, Rocky Mountain J. Math., 32, 1605-1616. MR 1987628

2003 The ascending tree condition: constructive algebra without count- able choice, Communications in Algebra, 31, No. 4, 1993-2002. MR 1972902

2004 Equivalence of syllogisms, Notre Dame J Formal Logic, 45, 215-233. MR 2130479

The polydisk Nullstellensatz, Proc. Amer. Math. Soc., 132, 2133-2140 (with Douglas Bridges, Ray Mines, and Peter Schuster) MR 2053987

2005 A division algorithm, Journal of Algebra and its Applications, Vol. 4, No. 4, August, 441-450. MR 2166255

Constructive aspects of Markov chains, Journal of Universal Computer Science, 11, 2046-2055 (electronic). MR 2210704

2006 Enabling conditions for interpolated rings, Proceedings of the Dagstuhl Seminar on Mathematics, Algorithms, and Proofs, drops.dagstuhl.de/ opus/volltexte/2006/279/

Did Euclid need the Euclidean algorithm to prove unique factorization, American Mathematical Monthly, 113, 196-205 (with David Pengelley) MR 2204484

Pi-balanced torsion-free modules over a discrete valuation domain, Jour- nal of Algebra, 295, 269-288 (with David M. Arnold and K. M. Ran- gaswamy) MR 2188861

Van der Waerden's construction of a splitting field, Communications in Algebra, 34, 2351-2356. MR 2240372

2007 Almost located ness in uniform spaces, Czechoslovak Mathematical Jour- nal, 57, 1-12 (with Douglas Bridges, Hajime Ishihara, Ray Mines, Peter Schuster, and Luminita Vita) MR 2309944

Subrings of zero-dimensional rings, Multiplicative ideal theory in com- mutative algebra, Springer 2006, 73-88 (with Jim Brewer) MR 2265802

Near convexity, metric convexity, and convexity, Rocky Mountain Jour- nal of Mathematics, 37, 1305-1314. MR 2360301

2008 Real numbers and other completions, Math. Logic Quarterly 54, 98- 108. MR 2387400

2009 Transient limits, Applicable Analysis and Discrete Mathematics, 3, 52-63, (with Katrzyna Winkowska-Nowak) MR 2499307

Intuitionistic notions of boundedness in N, Math. Logic Quarterly, 55, 31-36. MR 2489290

Discrete logarithms for finite groups, Computing, 85, 3-19, (with Lee C. Klingler, Spryos Magliveras, and Michal Sramka) MR 2511763

Signed-bit representations of real numbers, J. Logic and Analysis, 1, 1-18, (with Robert S. Lubarsky) MR 2539791

2010 Zero sets of univariate polynomials, Trans. Amer. Math. Soc., 362, 6619-6632, (with Robert S. Lubarsky) MR 2678988

2012 Algebraic functions, calculus style, Communications in Algebra, 40, 2671-2683

Minimal zero-dimensional extensions of rings of dimension greater than one, Communications in Algebra, 40, 3792-3800, (with Marcela Chiorescu)

Curriculum Vitae

Yoram Sagher

Address

Department of Mathematical Sciences
Florida Atlantic University
777 Glades Rd. Boca Raton Florida, 33431
Tel. (561) 297-1246
Cell phone: (312) 909-9329
e-mail: yoram.sagher@gmail.com

Education

Ph.D. Mathematics, The University of Chicago, 1963–1967
B.Sc. Mathematics, Technion, Israel Institute of Technology, 1957 – 1961

Military service

Israel, 1961–1963

Employment:

Professor	Florida Atlantic University	2003-present
Chair	Florida Atlantic University	2003 – 2004
Professor	University of Illinois, Chicago	1982 – 2003
Professor	University of Florida	1984 – 1985
Associate Professor/Professor	Syracuse University	1981 – 1982
Associate Professor	University of Illinois, Chicago	1976 – 1982
Senior Scientist	Weizmann Institute of Science, Israel	1972 – 1976
Scientist	Weizmann Institute of Science, Israel	1970 – 1972
Assistant Professor	University of Illinois, Chicago	1967 – 1970
Instructor	University of Illinois, Chicago	1966 – 1967

Visiting Positions

Visiting Professor	University of Minnesota	Spring, 1991
Visiting Professor	Syracuse University	Fall, 1990
Visiting Associate Professor	Washington University, St. Louis	1975 – 1976
Visiting Associate Professor	University of Minnesota	Fall, 1974
Visiting Assistant Professor Organization of American States	University of Minnesota	1970 – 1971

Visiting Professor University of Buenos Aires 1969 – 1970

Graduate Students Supervision

M. Cwikel Ph.D. 1974 Weizmann Institute, Israel Topics in the Lions-Peetre Interpolation Theory

W. Cao Ph.D. 1990 University of Illinois, Chicago Stability of Fredholm Properties and Interpolation of Operators

M.V. Siadat Ph.D. 1990 University of Illinois, Chicago Norm Inequalities for Integral Operators on Cones

K. Zhou Ph.D. 1990 University of Illinois, Chicago Norm Inequalities for Lacunary Series

E. Kochneff Ph.D. 1991 University of Illinois, Chicago On Widder's Theory of the Heat Equation

R. Tan Ph.D. 1992 University of Illinois, Chicago On Hilbert Transforms, Cardinal Interpolation, and Bernstein's Inequality

M.V. Siadat Doctor of Arts 1997 University of Illinois, Chicago Building Study and Work Skills in a College Mathematics Classroom

N. Xiang Ph.D. 1997 University of Illinois, Chicago Norm Estimates of Banach Space Valued Random Series and their Applications in Harmonic Analysis

P. Musial Ph.D. 2002 University of Illinois, Chicago The L^r Henstock-Kurzweil Integral

B. Booton Ph.D. 2005 University of Illinois, Chicago Norm Inequalities for Certain Classes of Functions and Their Fourier Transforms

Y.S. Yim Ph.D. 2005 University of Illinois, Chicago On Quasi-Homogeneous Space: Maximal Operators and A_p

Conferences

Co-organizer (with Klaus Hoechsmann (PIMS Vancouver), Tony Gardiner (University of Birmingham), Bernard Madison (University of Arkansas), and Günter Törner (University of Duisburg)) of an international conference in mathematics education Numeracy and Beyond *II*, Banff , Canada, December 2004.

Co-organizer (with K. Hoechsmann, A. Gardiner, B. Madison, and G. Törner) of an inter- national conference in mathematics education Numeracy and Beyond *I,* Pacific Institute for the Mathematical Sciences at the University of British Columbia, Vancouver, Canada, July 2003.

Member, American Mathematical Society subcommittee of the Committee on Education, to comment on the Conference Board of Mathematical Sciences document on the mathematical preparation of teachers. Chair: Roger Howe. 2000.

Editorial Work

Associate Editor	Journal of Geometric Analysis	
Associate Editor	Journal of Function Spaces and Applications	
Co-editor	Proceedings of the Lund Conference on Function Spaces and applications	Springer
Co-editor	Proceedings of the Haifa Conference	American Math. Society/

on Function Spaces and Interpolation Israel Math. Union

Service

Developed a new syllabus for the Introduction to Analysis sequence Developed a new syllabus for the Real Analysis sequence.
Wrote notes used in the class-400 typed pages
Developed a new course: Symposia on Teaching High School Mathematics for in-service teachers.
Developed a new sequence: Analysis for High School Teachers
Developed a new syllabus for: Methods of Teaching High School Mathematics for pre-service teachers.
Wrote a collection of about 550 exercises used in the course.
Developed an new course: Discrete Mathematics for in-service high school teachers.
Wrote notes used in class-70 typed pages
Developed an new sequence: Harmonic Analysis. Wrote notes used in class-250 typed pages Developed a sequence of 4 courses: Methods of Teaching Elementary and
Middle School Mathematics for in-service teachers.
Prepared a set of recommendations for instruction of school mathematics for the Rio de Janeiro secretariat of Education (A project of the World Bank.)

Select Publications

1. (with P. Shvartsman), "The Approximation Functional and Interpolation with Perturbed Continuity", J. of Approximation Theory 110 (2001), pp. 236 − 260.
2. (with M.V. Siadat and P. Musial), "Mathematics: Keystone to Student Learning", Academic Exchange Quarterly, Summer 2000 pp. 15−22.
3. (with P. Shvartsman), "An Interpolation Theorem with Perturbed Continuity", J. of Functional Analysis 188(2002), pp. 75−100.
4. (with P. Shvartsman), "Rearrangement-Function Inequalities and Interpolation Theory", J. of Approximation Theory 119 (2002), pp. 214 − 251.
5. (with P. Musial), "The L^r Henstock-Kurzweil Integral", Studia Math. 160(2004), pp. 53 − 81.
6. (with N. Krugljak and P. Shvartsman), "Weak-Type Operators and the Strong Fundamental Lemma of Real Interpolation Theory", Studia Math. 170(2005), pp. 173−2001.
7. (with B. Booton) "Norm Inequalities for Certain Classes of Functions and Their Fourier Transforms", Journal of Mathematical Analysis an Applications 335 (2007), pp. 1416−1433.
8. (with B. Booton) "Asymptotic Behavior of Hardy Operators", Journal of Mathematical Inequalities, 5 (2011) pp. 483 − 400.
9. (with V. Rutherfoord) "Negiligible Variation and the Change of Variable Theorem", Indiana University Math. Journal, 61(2012) pp 31-44.
10. (with M. Cwikel and P. Shvartsman) "*A geometrical/combinatorical question with implications for the John–Nirenberg inequality for BMO functions*" Proceedings of the Jozef Marcinkiewicz Centenary Conference, Banach Center Publications, 95(2011), pp. 45-53.
11. Lecture Notes on Measure Theory and Real Analysis. in preparation, 900 pages.

Very Short CV

Markus Schmidmeier

A. Professional Preparation:

- Ph.D. (magna cum laude), Munich University (LMU), 1996
- Diploma (with distinction), Munich University (LMU), 1991
- M.Sc. (with distinction), Warwick University, England, 1988

B. Positions held:

- Professor, Florida Atlantic University, since 2013; Associate Professor, 2007– 2013; Assistant Professor, 2001–2007
- Guest Professor, Norwegian University of Science and Technology (NTNU), Trondheim, Norway, Fall 2005.
- Visiting Professor at Florida Atlantic University, 1999–2001.
- Postdoc at the University of Antwerp (UIA), Belgium, 1998–1999,
- Scientific Assistant, Charles University, Prague, 1996–1998.

C. Publications and Preprints since 2008:

27. with A. Moore, *A Swiss Cheese Theorem for Linear Operators with Two Invariant Subspaces,* manuscript, 15pp. (2014)

26. with J. Kosakowska, *The Boundary of the Irreducible Components for In- variant Subspace Varieties,* manuscript, 35 pp., (2014)

25. with J. Kosakowska, *Varieties of Invariant Subspaces Given by Littlewood- Richardson Tableaux;* 33 pp. (2014), Oberwolfach Preprint 2014-01

24. with J. Kosakowska, *Arc Diagram Varieties;* in "Expository Lectures on Representation Theory", Contemp. Math. 607 205–224, (2014)

23. with H. Tyler, *The Auslander-Reiten Components in the Rhombic Picture;* dedicated to Mark Kleiner on the occasion of his 65th birthday, Comm. Algebra 42 (2014), no. 3, 1312–1336

22. with J. Kosakowska, *Operations on Arc Diagrams and Degenerations for Invariant Subspaces of Linear Operators;* dedicated to Professor Daniel Simson, preprint, 37 pp, (2012), to appear in Trans. Amer. Math. Soc.

21. *Hall polynomials via automorphisms of short exact sequences,* dedicated to Professor Wolfgang Zimmermann, Algebras and Representation Theory 15 (2012), 449–481

20. *The entries in the LR-tableau,* Mathematische Zeitschrift 268 (2012), 211– 222

19. with G. Marks, *Extensions of simple modules and the converse of Schur's Lemma,* in: Advances in Ring Theory, Trends in Mathematics, 229–237, Birkhäuser Verlag, 2010

18. with H.-D. Gronau, *"Orthogonal covers by multiplication graphs",* Discrete Appl. Math. 157 (2009), 2048–2056

17. *"Systems of submodules and an isomorphism problem for Auslander-Reiten quivers,",* Bull. Belg. Math. Soc. Simon Stevin 15 (2008), 523–546

16. with C. Petroro, *Abelian groups with a p^2-bounded subgroup, revisited,* J. Alg. Applic. 10 (2011), 377–389

15. with C. M. Ringel, *"Invariant subspaces of nilpotent linear operators. I",* Journal für die reine und angewandte Mathematik 614 (2008), 1–52

14. with C. M. Ringel, *"The Auslander-Reiten Translation in Submodule Cat- egories",* dedicated to Idun Reiten, Transactions of the AMS 360 (2008), 691–716

D. External Funding:

- Simons Foundation, *Travel and Collaboration Grant,* (2012-17).
- *Collaborative Research Center 701 at Bielefeld University,* October–December 2008 (3 months), December 2010–January 2011 (1 month).
- NSF, *Dissertation Enhancement Grant,* October–December 2008, (3 months travel support for my doctoral student).

E. Recent Conferences and Seminars organized:

- *AMS Special Session on Linear Operators in Representation Theory and in Applications,* at Texas Tech University in Lubbock, TX, April 11-13, 2014, with Gordana Todorov (Northeastern).
- *Symposion on Enumerative Combinatorics,* at Florida Atlantic University, April 4, 2014, on the occasion of the retirement of Dr. Heinrich Nieder- hausen.
- *AMS Special Session on Representations of finite dimensional algebras,* No- vember 2009, with Frauke Bleher (University of Iowa) and Birge Huisgen- Zimmermann (UCSB).
- *Conference on Abelian Groups and on Constructive Mathematics,* in honor of the 70th birthdays of Ray Mines (NMSU) and Fred Richman (FAU), May 2008
- *Mathematical Sciences Colloquium* at FAU since 1999

F. Recent Visitors (dates for last visit only):

- Anne Henke (Oxford, England), July 11–17, 2014.
- Justyna Kosakowska (Toruń, Poland), April 6–27, 2014
- Daiva Pucinskaite (Kiel, Germany), April 2014.
- Hans-Dietrich Gronau (Universität Rostock), 2×, March 2–26, 2013.
- Helene Tyler (Manhattan College), October 11–15, 2013.
- Hagen Meltzer (Szczecin, Poland), June 25 – July 2, 2014
- Mark Kleiner (Syracuse U, NY), November 7 – December 7, 2011
- Gordana Todorov (Northeastern University), May 8–11, 2011
- Bernhard Keller (Paris 7), January 20, 2010

H. Outreach to High Schools:

- Three *high school mathematics competitions* on January 7, 2006, on January 13, 2007, and on January 18, 2014, attracted 843, 1096 and 1260 registered high school students, respectively. Joint project with Laura Lembeck, the American Heritage High School in Plantation, and the high school honors association MAΘ.

  The next contest is scheduled for March 3, 2015.

- Organizing the *dispute center* at regional high school mathematics competitions. Since 2002, one or two events per year.

ABBREVIATED FACULTY CV

Tomas P. Schonbek

A. Professional Preparation

1965. Licenciado en Ciencias Matemáticas, Universidad de Buenos Aires.

1970. Ph. D., Mathematics, Massachusetts Institute of Technology.

B. Appointments

1970-76. Assistant Professor, Florida Atlantic University.

1976-84. Associate Professor, Florida Atlantic University.

1977-81. Chairman, Department of Mathematics,
Florida Atlantic University.

1982-83. Research Associate, Brown University.

1984-Professor. Florida Atlantic University.

1990-91. Visiting Professor, Universidad Autónoma de Madrid.

Sept 96-Jan 97. Research Scholarship from DGICT (Spain), to
work at the Universidad Complutense de Madrid.

C. (Selected) Publications (last 7 years)

On a Helmholtz decomposition for an exterior domain, Siam J. Math. An, 46 (2014), 3497-3517.

Existence and decay of solutions of the 2D QG equation in the presence of an obstacle (with L. Kosloff), DCDS, Series S, 7 (2014), 1025-1043.

On the Laplacian, and fractional Laplacian, in an exterior domain, (with L. Kosloff), Advances in Differential Equations 17 (2012), 173-200.

On the tennis ball problem (with W. Wei and J. Freeman), Integers, 11 (2011), 833-842.

Entropy numbers, Extrapolation, Besov spaces, Orlicz

spaces, (with T. Kühn), Contemporary Mathematics, 445 (2007), 195-206.

D. Grants (Proposals and Funded) (last 7 years)

E. Synergistic Activities

F. Collaborators and Other Affiliations

Thomas Kühn, Universität Leipzig, Germany.

Fernando Cobos, Universidad Complutense de Madrid.

María Schonbek, University of California, Santa Cruz.

G. (Selected) Courses Taught (last 7 years)

Summer 2014: Topics in Complex Analysis.

Spring 2014: Graduate course in Complex Analysis.

Spring 2013, Spring 2008: Graduate course in Partial Differential Equations.

Spring 2012: Multivariable Analysis.

Spring 2011: Graduate course in Differential Geometry.

Summer 2007: Graduate course in Functional Analysis.

H. Community Engagement or Out-reach

Chair, Math Day Organizing Committee.

Director, FAU Math Circle for Middle School Students.

ABBREVIATED FACULTY CV

Rainer Steinwandt

A. Professional Preparation

- Undergr. Inst:[1] Univ. Karlsruhe, computer science,1998: Dipl.-Inform.
- Grad. Inst.:[3] Univ. Karlsruhe, computer science, 2000: Dr. rer. nat.

B. Appointments

- since 09/08: Professor at Dept. of Mathematical Sciences, FAU, USA
- 08/05-08/08: Assoc. Prof. at Dept. of Mathematical Sciences, FAU, USA
- 05/00-08/05: Research Associate at Universität Karlsruhe, Germany

C. Selected Publications (last 7 years)

- M. Roetteler and R. Steinwandt: *"A note on quantum related-key attacks",* Information Processing Letters, vol. 115, no. 1, pp. 40-44, 2015.
- W. Gao, K. Neupane and R. Steinwandt: *"Tuning a two-round group key agreement",* International Journal of Information Security, 2014.
- R. Steinwandt and A. Suárez Corona: *"Scalable Attribute-based Group Key Establishment: from Passive to Active and Deniable",* Applicable Algebra in Engineering, Communication and Computing, vol. 25, pp. 1-20, 2014.
- M. Rötteler and R. Steinwandt: *"A quantum circuit to find discrete logarithms on ordinary binary elliptic curves in depth O(log^2 n)",* Quantum Information & Computation, vol. 14, pp. 888-900, 2014.
- L. Klingler, R. Steinwandt and D. Unruh: *"On using probabilistic Turing machines to model participants in cryptographic protocols",* Theoretical Computer Science, vol. 501, pp. 49-51, 2013.
- B. Amento, M. Rötteler and R. Steinwandt: *"Efficient quantum circuits for binary elliptic curve arithmetic: reducing T-gate complexity"*, Quantum Information & Computation, vol. 13, pp. 631-644, 2013.

D. Grants (Funded) (last 7 years)

- Co-director, NATO multi-year Science for Peace (SfP) project MD.SFPP 984520 – Secure Implementation of Post-Quantum Cryptography (since July 2013, total budget ca. US$ 394,745)
- Team member, Planning grant NATO Science for Peace and Security Programme, Secure Implementation of Post-Quantum Cryptography (ca. US$ 9,418)
- PI, NSF EAGER project 1049296, Small-scale Quantum Circuits with Applications in Cryptanalysis (01/2011–12/2012, US$ 110,534)
- Co-PI, Pragmatics/Department of Defense project, Pervasive Computing, Security in GIG-like Architectures (10/2008–09/2009, US$ 132,000)

[3] In the German academic system, the separation into undergrad. and grad. studies did not really apply.

E. Synergistic Activities

- Co-founding & co-managing editor: *Journal of Mathematical Cryptology*
- Editorial board member: *Designs, Codes and Cryptography*; *Journal of Universal Computer Science*; *Journal of Algebra, Combinatorics, Discrete Structures & Applications*
- Co-Guest editor for special issues of *Designs, Codes and Cryptography*; *Discrete Applied Mathematics*; *IEEE Transactions on Computers*; *Integration, the VLSI Journal*
- Program chair *Cryptology, Designs and Finite Groups 2009*, Co-organizer Dagstuhl Seminars 08491, 11381, 13371, 15371
- Program committee member ICISSP 2015, PKC 2015, ICISC 2014, PQCrypto 2014, ICISC 2013, ICISC 2012, ISC 2012, PKC 2012, SHARCS 2012, ISC 2011, ICISC 2010, ISC 2010, CHES 2009, EUROCRYPT 2009, ICISC 2009, ISC 2009, ICISC 2008, PKC 2008, SCC 2008
- Project reviewer for *British Engineering and Physical Sciences Research Council*, *FWO Research Foundation Flanders*, *German-Israeli Foundation for Scientific Research and Development*, *Israel Science Foundation*, *Natural Sciences and Engineering Research Council of Canada*, *Netherlands Organisation for Scientific Research*, *United States-Israel Binational Science Foundation*

F. Collaborators and Other Affiliations

- External member Mathematical Cryptology Group at Univ. Rey Juan Carlos
- Collaborators: M. Abdalla, B. Amento, J.-M. Bohli, V. Božović, P. Budhathoki, S. Fehr, K. Gaj, W. Gao, W. Geiselmann,, M. Gonzalez Muñiz, M. I. González Vasco, M. Grassl, I. Ilić, L. Klingler, S. Magliveras, C. Martínez López, K. Matheis, M. Mosca, R. C. Mullin, D. Naccache, K. Neupane, M. Rötteler, D. Socek, A. Suárez Corona, v. T. Tran, D. Unruh, V. I. Villányi, M. Yung

G. (Selected) Courses Taught (last 7 years)

- Undergraduate: Calculus–Analytic Geometry I (MAC 2311), Calculus–Analytic Geometry III (MAC 2313), Introduction to Computational Mathematics (MAD 2502), Engineering Mathematics I (MAP 3305), Introduction to Coding Theory (MAD 4605)
- Graduate: Introduction to Cryptology and Information Security (MAD 5474, collocated with CIS 4362), Cryptanalysis (MAD 6478), Elliptic Curves (MAS 6396), Computational Mathematics (MAT 5932): Spring 09, Linear Algebra (MAS 5145), Coding Theory (MAD 6607), Number Theory and Cryptography (MAS 6217)

H. Community Engagement or Out-reach

- Director of FAU's Center for Cryptology and Information Security
- Expert committee member: Election of Lead Research Fellow in Cryptography, University of Tartu, Estonia
- Member of SUS Advisory Council Florida Center for Cybersecurity

NECIBE TUNCER, Ph.D.

Assistant Professor
Department of Mathematical Sciences
Florida Atlantic University
777 Glades Road, Boca Raton, FL, 33431
Email: ntuncer@fau.edu

A. PROFESSIONAL PREPARATION

Doctorate of Philosophy in Mathematics May 2007
Auburn University, Auburn, AL, USA
Master of Science in Mathematics August 2001
Dokuz Eylul University, Izmir, Turkey
Bachelor of Science in Mathematics May 1999
Dokuz Eylul University, Izmir, Turkey

B. APPOINTMENTS

Assistant Professor Aug. 2014 - present
Florida Atlantic University, Department of Mathematical Sciences
Assistant Professor Aug. 2011 – Aug. 2014
The University of Tulsa, Department of Mathematics,
John Thompson Research Assistant Professor Aug. 2008 – Aug 2011
University of Florida, Department of Mathematics
Lecturer Aug. 2007- Aug. 2008
Georgia State University, Department of Mathematics and Statistics

C. PUBLICATIONS

- Necibe Tuncer and Anotida Madzwamuse, "Finite element method for pattern formation on evolving surfaces," submitted.
- Necibe Tuncer, Juan Torres, Maia Martcheva, Robert Holt and Michael Barfield, "Modeling dynamics of low pathogenic and high pathogenic avian influenza H5N1 virus in wild and domestic birds," submitted.
- Necibe Tuncer, Anotida Madzvamuse and Amnon J. Meir, "Radially projected finite elements for reaction-diffusion systems on stationary spheroidal surfaces," submitted.
- Necibe Tuncer, Juan Torres, Maia Martcheva, "Dynamics of low pathogenic and high pathogenic avian influenza virus in birds," Biomath Communications, Vol 1 (1), 5-11, (2014).
- Necibe Tuncer and Trang Le "The effect of air travel on the spread of avian influenza pandemic to USA,'' International Journal of Critical Infrastructure Protection, Vol 7, (1), 27-47, (2014).
- Necibe Tuncer and Maia Martcheva, "Modeling seasonality in avian influenza," Journal of Biological Systems, Vol. 21 (4), (2013), 1340004.
- Alexandra Smirnova and Necibe Tuncer, "Estimating time dependent transmission rate of avian influenza via stable numerical algorithm," Journal of Inverse and Ill-Posed Problems, Vol 22, N1, 31-62 (2014).
- Necibe Tuncer, Juan Torres, Maia Martcheva, "Dynamics of low and high pathogenic avian influenza in wild bird population," in "Dynamical Systems: Theory, Applications and Future Directions", (J. Thuenche, ed.), Nova Publishers, New York, (2013), p. 235-259.
- Necibe Tuncer, "Projected surface finite elements for elliptic partial differential equations," Applications and Applied Mathematics: An International Journal, Vol 8, Issue 1, (2013), 16-33.

- Necibe Tuncer and Maia Martcheva, "Analytical and numerical approaches to coexistence of strains in a two-strain SIS model with diffusion," Journal of Biological Dynamics, Vol. 6, Issue 2, (2012), 406-439.
- Alexandra Smirnova and Necibe Tuncer, "Inverse problem of groundwater hydrology by preconditioned iteratively regularized Gauss-Newton method," Nonlinear Analysis, Vol. 74, (2011), 5987-5998.
- Amnon J. Meir and Necibe Tuncer, "Radially projected finite elements," SIAM Journal of Scientific Computing, Vol. 31, No. 3, (2009), 2368-2385.
- A. B. Bakushinsky, Alexandra B. Smirnova, and Necibe Tuncer, "Relative computational efficiency of iteratively regularized methods," Journal of Inverse and Ill-posed Problems, 16, N7,(2008), 681-694.
- Necibe Tuncer, "A novel finite element discretization of domains with spheroidal geometry," Ph.D. Dissertation, Auburn University Library, (2007).
- Alexandra Smirnova and Necibe Tuncer, Book chapter, "Iteratively Regularized Methods for Inverse Problem in Optical Tomography" Introduction to Iterative Methods for Ill-Posed Problems}, Gruyter, Germany,(2010).

D. GRANTS AND FUNDED RESEARCH

- NSF Grant, Maia Martcheva (PI), Necibe Tuncer (CO-PI), Avian Flu: Modeling and implications for control, September 2012-September 2015, $299,973.00 awarded.
- Necibe Tuncer (PI), Modeling Seasonality in Avian Influenza, Faculty Development Summer Fellowship Award, Jan 2012-Dec 2012, $7,611 awarded.
- Necibe Tuncer (PI), Modeling Low Pathogenic and High Pathogenic Avian influenza in Bird Population, Faculty Development Summer Fellowship Award, Jan 2013-Dec 2013, $7,800 awarded.

E. SYNERGISTIC ACTIVITIES

- AMS Fall Central Sectional Meeting, organized the special session entitled "Advances in Mathematical Methods for Disease Modeling," Washington University, St. Louis, MO, October 2013.
- SIAM Annual Meeting, organized the mini-symposium entitled "Analysis and Numerical Approximations of Partial Differential Equations Defined on Surfaces," San Diego, CA, July 2013.
- SIAM Conference on Life Sciences, organized the mini-symposium entitled "Contemporary Approaches in Mathematical Epidemiology, Ecology and Population Dynamics," San Diego, CA, August 2012.

RESEARCH WITH UNDERGRADUATES

- Trang Le, "The effect of air travel on the spread of avian influenza pandemic to USA." Student's research resulted in a publication.
- Tricity Andrews, "Mathematical Modeling of the Cholera Outbreak in Ecuador Using a Modified SIR Model." She is awarded NSF Graduate Fellowship

F. COLLABORATORS AND OTHER AFFILIATIONS

Visiting Scholar June 2014
Technical University of Delft, Delft, Netherlands
Visiting Scholar June 2014
KTH, Stockholm, Sweden
COLLABORATORS: Maia Martcheva, Anotida Madzvamuse, A.J.Meir, Alexandra Smirnova

G. COURSES TAUGHT

Graduate courses (4) 1. Mathematical Biology 2. Numerical Methods for Initial and Boundary Value Problems 3. Introduction to Numerical Analysis 4. Introduction to Partial Differential Equations
Undergraduate courses (2) 1. Differential Equations 2. Calculus III (Spring 2012)

ABBREVIATED FACULTY CV

NAME: JORGE E. VIOLA-PRIOLI

A. Professional Preparation

PhD IN MATHEMATICS, RUTGERS UNIVERSITY, 1973

LICENCIADO EN MATEMATICAS, UNVERSIDAD DE BUENOS AIRES, 1966

B. Appointments

(TENURED TRACK), ASSISTANT PROFESSOR, UNIVERSIDAD DE ORIENTE, VENEZUELA, 1973-1975

(TENURED TRACK) ASSISTANT PROFESSOR, UNIVERSIDAD SIMON BOLIVAR, VENEZUELA, 1975-1977

TENURED ASSOCIATE PROFESSOR, UNIVERSIDAD SIMON BOLIVAR, VENEZUELA, 1977-1985

TENURED FULL PROFESSOR, UNIVERSIDAD SIMON BOLIVAR, VENEZUELA, 1985- to date

C. (Selected) Publications (last 7 years)

ECUACIONES DIFERENCIALES ORDINARIAS (TEXTBOOK), with ANA M. VIOLA-PRIOLI, 2ND EDITION, PUBLISHER: EQUINOCCIO, 2014

D. Grants (Proposals and Funded) (last 7 years)

E. Synergistic Activities (AT FLORIDA ATLANTIC UNIVERSITY)

MEMBER OF THE GRADUATE FACULTY, DEPARTMENT OF MATHEMATICS

MEMBER OF THE GRADUATE COMMITTEE, DEPARTMENT OF MATHEMATICS

MASTER TEACHER, DEPARTMENT OF MATHEMATICS

COORDINATOR OF EIGHTEEN SECTIONS OF METHODS OF CALCULUS

MENTOR OF ALL GRADUATE STUDENTS, DEPARTMENT OF MATHEMATICS

CHAIR OF THE UNDERGRADUATE COMMITTEE, DEPARTMENT OF MATHEMATICS

MEMBER OF THE GRIEVANCE COMMITTEE, CHARLES SCHMIDT SCHOOL OF SCIENCES,

F. Collaborators and Other Affiliations

RESEARCH AND PUBLICATIONS WITH A. M. VIOLA-PRIOLI, R. WISBAUER (GERMANY), J. GOLAN (ISRAEL), P. SMITH (UNITED KINGDOM)

G. (Selected) Courses Taught (last 7 years)

LINEAR ALGEBRA 2, DISCRETE MATHEMATICS, CALCULUS 3, METHODS OF CALCULUS, COLLEGE ALGEBRA, CALCULUS FOR ENGINEERS

H. Community Engagement or Out-reach

ABBREVIATED FACULTY CV (maximum 2 pages)

Richard F. Voss

A. Professional Preparation

UNIVERSITY OF CALIFORNIA Berkeley, CA
1970--1975, NSF Fellowship, Teaching Assistant, Research Assistant
Ph.D. in Physics December 1975

CAMBRIDGE UNIVERSITY Cambridge, UK
Jan 1972 -- July 1972, visiting scholar (with Berkeley thesis advisor, J. Clarke)

MASSACHUSETTS INSTITUTE OF TECHNOLOGY Cambridge, MA
1966—1970, full scholarship, B.S. in Physics June 1970, GPA 3.9/4.0

B. Appointments

FLORIDA ATLANTIC UNIVERSITY 8/1995- Boca Raton, FL
Professor of Physics, Professor of Mathematical Sciences

DELPHI SYSTEMSIMULATION 1/1997-7/97 Munich, Germany
Research on fractal applications to environmental monitoring and simulation.

YALE UNIVERSITY 1/1994-1/97 New Haven, CT
Professor of Applied Physics, Adjunct, lecturing on fractal geometry in Math. Dept.

IBM RESEARCH DIVISION 1975-2000 Yorktown Heights, NY
Research Staff Member (1975-1993), Visiting Scientist (1993-2000).
Fundamental research in condensed matter physics, scientific visualization, theory and applications of fractals.

U. CAL. / INST. THEOR. PHYSICS 1/1984-8/1984 Santa Barbara, CA
Sabbatical: program on macroscopic quantum phenomena at the Institute for Theoretical Physicsand visiting Prof. in Physics Dept.

HARVARD UNIVERSITY 9/1984-5/1985 Cambridge, MA
Sabbatical (visiting scholar in Depts. of Applied Physics and Computer Science): research on applications of fractal geometry

C. (Selected) Publications (last 7 years)

D. Grants (Proposals and Funded) (last 7 years)

Funded:

NSF MSP DUE 8/2004-7/2012 $4,454,964 with supplements, **Standards Mapped Graduate Education and Mentoring**, co-PI.

FAU Technology Fee 2013-2014, $20,361, Integrating Mobile Apps and Robotics into STEM Education, collaborative faculty

Proposals:

NSF DUE MSP Phase II 6/2011-5/2014 $2,099,447, **Standards Mapped Graduate Education and Mentoring Phase II Research**, co-PI.

NSF DUE MSP Prototype 5/2013-4/2017 $1,497,075, **Teacher Enhancement for Elementary Mathematics**, senior personnel

NSF DRL Discovery Research K-12 7/2014-6/2016 $447,456, **Robot Trajectories through Common Core Math Standards**, senior personnel

E. Synergistic Activities

Editorial Board, World Scientific Journal **Fractals**

Content Facilitator, FSU FCR/STEM Algebra 1 Institute, July 2014

F. Collaborators and Other Affiliations

G. (Selected) Courses Taught (last 7 years)

MAE 6127 Patterns and Probability for Teachers of Middle Grades
MAT 6715 Mathematics and Technology
MAE 6328 Algebraic and Theoretical Number Patterns for Teachers of Middle Grades
MTG 6415 Fractal Geometry
MAE 5125 Technology Basics in Middle Grade Classrooms
MAE 6323 Iterations and Technology for Teachers of Middle Grades
MAE 6327 Patterns and Scaling for Teachers of Middle Grades
MAE 6329 Geometrical Connections for Teachers of Middle Grades
MAE 6324 Patterns and Iterations for Teachers of Middle Grades
MAE 6124 Technology Implementation in Middle Grade Classrooms

H. Community Engagement or Out-reach

ABBREVIATED FACULTY CV

Yuan Wang

A. Professional Preparation: B.S. in Math, 1982, Shandong University, China; Ph.D. in Math, 1990, Rutgers University.

B. Appointments: Florida Atlantic University — Assistant Professor, 1990—1995; Associate Professor, 1995—2000; Professor, 2000—present.

C. (Selected) Publications (last 7 years)

7. ``Input-to-state stability of switched systems with time delays", to appear *in Advances in Delays and Dynamics*, (with Y. Lin and Z.P. Jiang).
8. ``Robust stability of singularly perturbed systems with delays", *Proc. of the 52nd Conference on Decision and Control,* pp.3975--3980, 2013 (with Y. Yang).
9. ``Stability of nonlinear switched systems with delays", *Proc. of the 32nd Chinese Control Conference*, pp. 1544—1548, 2013 (with Z.P. Jiang and Y. Lin).
10. ``Nonlinear small-gain theorems for large-scale time delay systems", *Dynamics of Continuous, Discrete and Impulsive Systems, Series A: Mathematical Analysis*, Vol.19, pp.27--63, 2012 (with S. Tiwari and Z.P. Jiang).
11. ``Remarks on integral-ISS for systems with delays", *Proc. of the 10th World Congress on Intelligent Control and Automation*, pp.2227—2232, 2012 (with S. Tiwari and Z.P. Jiang).
12. ``Smooth universal inputs for smooth systems: a formal power series approach", *Proc. of the 20th International Symposium on Mathematical Theory of Networks and Systems*, CD-Rom (0070), 8 pages, 2012 (with W.S. Gray).
13. ``On stability analysis of nonlinear singularly perturbed systems with delays", *Acta Mathematica Sinica, English Series*, Vol.32, pp.1239—1256, 2012 (with H. Qin).
14. ``New results on input-to-state stability for nonlinear time-delay systems with applications", *Proc. of the 8th World Congress on Intelligent Control and Automation*, pp. 719-724, 2011 (with S. Tiwari, Y. Lin, and Z.P. Jiang).
15. ``On stability of time-varying systems with time delays", Proc. of the 50th IEEE Conference on Decision and Control and European Control Conference, pp.314—319, 2011 (with S. Tiwari).
16. ``Razumikhin-type small-gain theorems for large-scale systems with delays"*, Proc. of the 49th IEEE Conference on Decision and Control*, pp. 7407—7412, 2010 (with S. Tiwari).
17. ``Stabilization of time-varying nonlinear systems: a control Lyapunov function approach", *Journal of Systems Science and Complexity*, vol.22, pp.683—696, 2009 (with Z.P. Jiang and Y. Lin).
18. ``Input classes for identification of bilinear systems"*, IEEE Transactions on Automatic Control,* vol. 54, pp.195--207, 2009 (with E.D. Sontag and A. Megretski).
19. ``Non-causal Fliess operators and their shuffle algebra", *International Journal of Control*, vol.81, pp.342—355, 2008 (with S. Gray).
20. "Nonlinear Small-Gain Theorems for Discrete-Time Large-Scale Systems", *Proc. of the 27th Chinese Control Conference*, pp. 704—708, 2008 (with Z.P. Jiang and Y. Lin).

21. "Remarks on ISS and Integral-ISS Stabilization with Positive Controls", *Proc. of the 17th IFAC World Congress*, Seoul, South Korea, pp. 2455—2459, 2008 (with Z.P. Jiang and Y. Lin).

D. Grants (Proposals and Funded) (last 7 years)

- NSF Grant DMS-0906918, ``Collaborative Research: New Tools for Nonlinear Systems Analysis and Synthesis". Oct 2009--Sept. 2012, extended to Sept. 2013, $115,000.

E. Synergistic Activities

- Associate Editor, *Journal of Control Theory and Applications*, 2003--2009.
- Associate Editor, *European Series of Applied and Industrial Mathematics: Control, Optimization and the Calculus of Variations*, since January 2013.
- Moderator of the branches math.OC and cs.SY for the electronic archive and distribution server ArXiv at http://arxiv.org since February 1999.
- Co-organizer of the international conference *Perspectives and Future Directions in Systems and Control Theory*, May 2011.
- Publicity Chair, *the 27th Chinese Control and Decision Conference*, May 2014.
- Invited 45 minutes lecture, *the 5th International Congress of Chinese Mathematicians*, Dec. 2010.
- IEEE Fellow, class of 2013.

F. Collaborators and Other Affiliations

Z.P. Jiang, Y. Lin, S. Gray, E.D. Sontag, S. Tiwari, Y. Yang.

G. (Selected) Courses Taught (last 7 years)

- Undergraduate: Math for Liberal Arts 1 and 2, Differential Equations, Engineering Math 1 and 2, Linear Algebra 2, Calculus 3, Modern Analysis, Introduction to Complex Analysis
- Graduate: Real Analysis, Complex Analysis, Multivariable Analysis, Independent Study on Mathematical Control Theory, Stability Analysis, etc., Supervising PhD students (1 student completed, 2 current students)

H Community Engagement or Out-reach

- Frequent participant of the K-12 events Math Day, mini Math Day, Math Circle, and Regional Science Olympiad.

ABBREVIATED FACULTY CV

Katarzyna Winkowska-Nowak

Professional Preparation

Masters of Science MS in Mathematics, UNIVERSITY OF WARSAW, POLAND, WARSAW, 1986
Doctor of Philosophy PhD in Mathematics, FLORIDA ATLANTIC UNIVERSITY, BOCA RATON, (advisor prof. Helmut H. Schaefer) FL. 1996

Appointments

Instructor, Department of Mathematical Sciences, Florida Atlantic University, 1996-present
Adjunct Professor, University of Social Sciences and Humanities, Warsaw, Poland 2000-2006
Senior Instructor, University of Social Sciences and Humanities 2006- present

(Selected) Publications

Books:

- Nowak, A. Winkowska-Nowak, K., Bree, D. (Eds.) Complex Human Dynamics, From Mind to Societies, Springer Verlag Berlin-Heideberg, 2013
- Winkowska-Nowak K., Pobiega E., Skiba R. (eds.) GeoGebra. Innowacja edukacyjna - kontynuacja (GeoGebra:spreading innovation in education, part II) , Sedno, Warsaw, 2013.
- Winkowska-Nowak K., Skiba R. GeoGebra: wprowadzanie innowacji edukacyjnej,(GeoGebra:spreading innovation in education) WUMK, Torun, 2011.
- Nowak A., Borkowski W., Winkowska-Nowak K. (eds.): Układy złożone w naukach społecznych

(Complex Systems in the Social Sciences, selected topics) . Scholar Warsaw2010

- Nowak A., Winkowska-Nowak K., Rycielska L. (Eds.): Szkoła w dobie Internetu (Education in the Age of Internet), Polish Scientific Publisher, PWN , Warsaw, 2009
- Winkowska-Nowak K., Nowak A., Rychwalska A. (Eds.):Modelowanie matematyczne i symulacje komputerowe w naukach społecznych (Mathematical Modeling and Computer Simulations in Social Sciences). Academica, Warsaw, 2007

(Selected) Grant Proposals

8. PI, NSF, Discovery Research Grant K-12:" Robot Trajectories through Common Core Math Standards" , $ 450 000, 2013. Not Funded.
9. (With Daniela Popova) Pre-Proposal to the Distinction through Discovery Curriculum Grants Program about implementing Project Based Learning in our Calculus courses, 2014 (in review).
10. Co-PI, Polish Ministry of Education grant "Aligning GeoGebra for high school curriculum" $2700 000 2013-2015 Founded
11. Co-PI, Polish Ministry of Education grant "Aligning GeoGebra for middle school curriculum" $2700

000 2013-2015 Founded

(Selected) Courses Taught

Undergraduate: Math for Liberal Arts 1, Math for Liberal Arts 2, Methods of Calculus, Collage Algebra, Calculus 1, 2, 3, Graduate: Mathematics for Social Scientists, Fractals for the Classroom, Use of Technology in Teaching Mathematics, Integrating mathematics and computing, Dynamical Systems, Chaos, and Computing

Synergistic Activities

6. Founder and Chair of the Polish Chapter of the International Institute of GeoGebra since 2008 until now
7. Main organizer of yearly GeoGebra Conferences for teachers and scholars since 2010
8. Main organizer and chair of International GeoGebra IGI Conference 2012 Warsaw, Poland
9. Founder and President of Teachers' Association ROSE (Regional Centers of E-learing)
10. Member of Advisory Board in several grants for enhancement of teaching of mathematics.
11. Conduct lectures and workshops for teachers at University of Bremen, Germany (1995-2010)

Awards:

Award of Rector of SWPS (University of Social Sciences and Humanities) for Innovative Teaching Initiatives in Polish education, Warsaw, Poland, 2008

•Competent Speaker, Toastmasters International, 2009.

•Competent Leader, Toastmasters International, 2010.

Elected as a Ashoka Foundation Fellow in 2011 (Social Entrepreneur in the area of Education)

ABBREVIATED FACULTY CV

Yanzhou Xu

F. Professional Preparation

MS in Applied Math and Statistics, FAU, 2003

Pursing PhD in Higher Educational Leadership

G. Appointments

Instructor, Department of Mathematical Sciences, Florida Atlantic University, 2004 - current

C. (Selected) Publications (last 7 years)

D. Grants (Proposals and Funded) (last 7 years)

E. Synergistic Activities

F. Collaborators and Other Affiliations

G. (Selected) Courses Taught (last 7 years)

College Algebra, Intermediate Algebra, Introductory Statistics, Math for Liberal Arts I, Methods of Calculus

H. Community Engagement or Out-reach

Paul Yiu

A. Professional Preparation: B.A.(1975), M. Phil (1978), University of Hong Kong; Ph. D (1985) University of British Columbia.

B. Appointments: **University of British Columbia**, Postdoctoral fellow, 1985-86; **Ohio State University**: Research instructor,1986-1990; **University of Hong Kong**: Lecturer,1988-1989; **Florida Atlantic University**: Assistant professor, 1990-1993; Associate Professor, 1993-2000; Professor, 2000-present.

C. (Selected) Publications

1. (with F. M. van Lamoen), Construction of Malfatti squares, *Forum Geom*., 8 (2008) 49--59.
2. Conic solution of Euler's triangle determination problem, *Journal for Geometry and Graphics*, 12 (2008) 75--80.
3. Dynamic triangle geometry: families of lines with equal intercepts, *International Journal of Computers forMathematical Learning*, 13 (2008) 159--170.
4. Conic construction of a triangle from the feet of its angle bisectors, *Journal for Geometry and Graphics*, 12 (2008) 133--144.
5. (with S. M. Lee, H. Sun, W. Wei and Y. Wen) The super edge-gracefulness of two infinite families of trees, *Congressus Numerantium*, 190 (2008) 109--128.
6. (with S. Gao and K.R.S. Sastry) Heron sequences,*Combinatorial Number Theory*, de Gruyter, 2009, pp.199—204.
7. Heptagonal triangles and their companions, *Forum Geom*., 9 (2009) 125--148.
8. (with A. P. Hatzipolakis) Reflections in triangle geometry, *Forum Geom*., 9 (2009) 301--348.
9. The circles of Lester, Evans, Parry, and their generalizations, *Forum Geom.*, 10 (2010) 175--209.
10. Rational Steiner porism, *Forum Geom.,* 11 (2011) 237--249.
11. (with N. Dergiades) Golden section with a collapsible compass only, *Forum Geom*., 11 (2011) 255--259.
12. Polygonal triples and the double ruling of a hyperboloid, *International Journal of Mathematical Education in Science and Technology*, 43 (2012) 831--839.
13. Sherman's fourth side of a triangle, *Forum eom.*, 12 (2012) 219--225.
14. Geometry of sum-difference numbers, *College Math. Journa*l, 43 (2012) 408-409.
15. Conic construction of a triangle from its incenter, nine-point center, and a vertex, *Journal for Geometry and Graphics*, 16 (2012) 137--149.
16. On the conic through the intercepts of the three lines hrough the centroid and the intercepts of a given line, *Forum Geom*., 13 (2013) 87--102.
17 (with Sandor Kiss) The touchpoints triangles and the Feuerbach hyperbolas, *Forum Geom*., 14 (2014) 63--86.
18. Three constructions of Archimedean circles in the arbelos, *Forum Geom*., 14 (2014) 255--260.

D. Grants (Proposals and Funded) (last 7 years)

E. Synergistic Activities Editor in chief, **Forum Geometricorum**, an electronic journal on Classical Euclidean Geometry since 2000. **Conferences**: **(1)** Heron

triangles which cannot be decomposed into two integer right triangles, February 15--16, 2008, MAA-Florida Sectional Meeting, Florida Southern College, Lakeland. **(2)**

Florida.Organizer of Invited Paper Session on Classical Euclidean Geometry, MathFest, Madison, Wisconsin, July 31--August 2, 2008. **(3)** Heptagonal triangles and their

companions, February 13--14, 2009, MAA-Florida Sectional Meeting, Florida Gulf Coast University, Fort Myers, Florida.

F. Collaborators and Other Affiliations

G. (Selected) Courses Taught:

Mathematics for Liberal Arts 1 (2011 Spring, Fall)
Mathematics for Liberal Arts 2 (2012 Fall)
Methods of Calculus (Summer 2008)
Calculus 1 (2013 Spring)
Calculus 3 (2012 Spring)
Discrete Mathematics (2008 Fall)
Engineering Mathematics 1 (2013 Spring, 2014 Spring)
History of Mathematics (2009 Spring, 2011 Summer, 2014 Spring)
Survey of Geometry (2008 Spring, 2009 Spring, 2012 Fall, 2013 Fall, 2014 Summer, Fall)
Number Theory 2 (2008 Spring)
Mathematical Problem Solving (2010 Spring, 2012 Spring)
Modern Algebra (2011 Spring)
MST Advanced Euclidean Geometry (2010 Summer, 2013 Summer)
MST Advanced Algebra and Geometry (2010 Fall, 2013 Fall)
MST Number Theory of Cryptography (2008 Fall, 2014 Fall)
MST Calculus from a Historical Perspective (2009 Fall)
MST Problem Solving and Recreational Mathematics (2009 Summer, 2012 Summer)
Linear Programming and Game Theory (2010 Fall)
Linear Algebra (2011 Fall)
Algebraic Topology (2010 Spring)

H. Community Engagement or Out-reach

Curriculum Vitae

Yong Zang

Contact information

Department of mathematical science

Florida Atlantic University

777 Glades Road

Boca Raton, Boca Raton, 33431

Tel: 561-297-4093

E-mail: zangy@fau.edu

Education

The University of Hong Kong

Ph.D. in Statistics, Sep. 2007-Jul. 2011, Hong Kong

The University of Science and Technology of China

M.S., Sep. 2004-Jul. 2007, China

Anhui University

B.S., Sep. 2000-Jul. 2004, China

Working Experience

Assistant Professor, Department of Mathematical Science, Florida Atlantic University; Aug. 14-Now

Postdoctoral Fellow, Department of Biostatistics, MD Anderson Cancer Center; Sep. 11-Jul. 14

Refereed Journal Publications

1. **Zang Y**, Zhang H, Yang YN and Zheng G. "Robust genomic control and robust delta-centralization for case-control association studies*" Human Heredity, 63: 187-195, 2007.*
2. **Zang Y**, Fung WK, and Zheng G. "Tail strength to combine two p-value: Their correlation cannot be ignored" *American Journal of Human Genetics, 84: 291-295, 2009.*
3. **Zang Y,** Fung WK, and Zheng G. "Asymptotic powers for matched trend tests and robust matched trend test in case-control genetic association studies" *Computational Statistics and Data Analysis, 54: 65-77, 2010.*
4. **Zang Y,** Fung WK, and Zheng G. "Simple algorithms to calculate asymptotic null distributions for robust tests in case-control genetic association studies in *R*" *Journal of Statistical software, 33(8), 2010.*
5. **Zang Y** and Fung WK. "Robust tests for matched case-control genetic association studies" *BMC Genetics 11(91), 2010.*
6. **Zang Y** and Fung WK. "Robust Mantel-Haenszel test under genetic model uncertainty allowing for covariates in case-control association studies*" Genetic Epidemiology 35: 695-705, 2011.*
7. **Zang Y** and Yuan Y. "A shrinkage method for testing the Hardy-Weinberg equilibrium in case-control studies" *Genetic Epidemiology 37: 743-750, 2013.*
8. **Zang Y,** Lee JJ and Yuan Y. "Adaptive designs for identifying optimal biological dose for molecularly targeted agents" *Clinical Trial 11: 319-327, 2014.*
9. **Zang Y,** Liu S and Yuan Y. "Optimal marker-adaptive designs for targeted therapy based on imperfectly measured biomarkers*" Journal of the Royal Statistical Society: Series C accepted.*
10. **Zang Y** and Lee JJ. "Adaptive clinical trial designs in oncology" *Chinese Clinical Oncology accepted.*
11. Guo B, **Zang Y** and Yuan Y. "A Bayesian phase I/II clinical trial design in the presence of informative dropouts" ***Statistics and its interface accepted.***

Course Taught

STA 3173: Introduction to Biostatistics. 2014 Fall.

Xiao-Dong Zhang

A. **Professional Preparation:** B.A.(1985), Zhongshan Univeristy (China); M. Phil (1987), The Chinese University of Hong Kong; Ph. D (1991), California Institute of Technology.

B. **Appointments**: **Florida Atlantic University**: Assistant professor, 1991-1996; Associate Professor, 1996-present.

C. **(Selected) Publications:** 1. An Introduction to Analytic Number Theory, lecture notes written at Florida Atlantic University and used in summer 2004 and summer 2006.

2. On a Generalization of Bertrand's Postulate, being revised and to be submitted.

3. On Some Spectral Properties of Positive contractions (joint with Cheban Acharya), in preparation.

D. **Grants (Proposals and Funded)** (last 7 years)

E. **Synergistic Activities:** (1) Technical Editor of **Forum Geometricorum**, an electronic journal on Classical Euclidean Geometry since 2000. (2) Coordinate the teaching of MAC2233 (Methods of Calculus) from Fall 2008 through Spring 2010. (3) One Ph.D student (Cheban Acharya) graduated in summer 2012 under my supervision and another graduate student is under my supervision. (4) Have served and are serving several Ph. D and master committees.

F. **Collaborators and Other Affiliations**

G. **(Selected) Courses Taught:** MAP3305 (Engineering Math 1, Fall 2014), MAA5229 (Introductory Analysis 2, Spring 2014), MAA4402 (Introductory Complex Analysis, Spring 2014), MAA5228 (Introductory Analysis 1, Fall 2013), MAS2103 (Matrix Theory, Fall 2013), MAP2302 (Differential Equations 1, Summer 2013), MAT4937 (Mathematical Problem Solving, Spring 2013), MGF1107 (Math For Liberal Arts 2, Fall 2012), MAP6336 (Ordinary Differential Equations, Fall 2012), MAS3203 (introductory

Number Theory, Summer 2012), MAC2311 (Calculus 1, Spring 2012), MHF3404 (History of Mathematics, Spring 2012), MGF1106 (Math For Liberal Arts 1, Fall 2011), MTG6316 (General Topology 1, Fall 2011), MAC2233 (Methods of Calculus, Spring 2010), MTG3212 (Survey of Geometry, Spring 2010), MAA4200 (modern Analysis, Spring 2009), MAA6416 (Elementary Functional Analysis, Summer2007), MAP 4306 (Engineering Math 2, Fall 2007), MAA6506 (Introduction to Banach Algebras, Summer 2008), MAC1114 (Trigonometry, Summer 2008).

H. **Community Engagement or Out-reach:** (1) organizing FAU on-line math competition for local high school students from 1999-2013. (2) contributing competition problems for Math Day 2010-2014.