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

<table>
<thead>
<tr>
<th>Program:</th>
<th>Mathematical Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Director/ Coordinator Name:</td>
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<td>561-297-4136</td>
</tr>
</tbody>
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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>
<thead>
<tr>
<th>Annual Headcount (Program CIP: 270101)</th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011-2012</td>
<td>145</td>
<td>2012-2013</td>
<td>5,617</td>
</tr>
<tr>
<td>2012-2013</td>
<td>158</td>
<td></td>
<td>28,523</td>
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</table>

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**

<table>
<thead>
<tr>
<th>Annualized State-Fundable FTE</th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-2011</td>
<td>833.2</td>
<td>1,040.8</td>
<td>15,335.0</td>
</tr>
<tr>
<td>2011-2012</td>
<td>985.7</td>
<td>3,948.6</td>
<td></td>
</tr>
<tr>
<td>2012-2013</td>
<td></td>
<td></td>
<td></td>
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</table>
Table 3

<table>
<thead>
<tr>
<th>Annualized Undergraduate State-Fundable FTE Produced In/Out of Department/College</th>
<th>Mathematics</th>
<th>College of Science</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-2011</td>
<td>2011-2012</td>
<td>2012-2013</td>
<td>2012-2013</td>
</tr>
<tr>
<td><strong>Course Level</strong></td>
<td><strong>FTE produced by students who are:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lower Division</strong></td>
<td>Majors within the department</td>
<td>16.7</td>
<td>19.7</td>
</tr>
<tr>
<td></td>
<td>Majors outside the department, but within the college</td>
<td>176.4</td>
<td>223.5</td>
</tr>
<tr>
<td></td>
<td>Majors outside the college</td>
<td>571.5</td>
<td>664.1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>764.7</td>
<td>907.3</td>
</tr>
<tr>
<td><strong>Upper Division</strong></td>
<td>Majors within the department</td>
<td>21.1</td>
<td>22.5</td>
</tr>
<tr>
<td></td>
<td>Majors outside the department, but within the college</td>
<td>2.8</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>Majors outside the college</td>
<td>44.6</td>
<td>51.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>68.5</td>
<td>78.3</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Undergraduate Classes</th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010-2011</td>
<td>2011-2012</td>
<td>2012-2013</td>
</tr>
<tr>
<td>Lecture/Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Sections</td>
<td>252</td>
<td>288</td>
<td>303</td>
</tr>
<tr>
<td># Enrolled</td>
<td>10,749</td>
<td>12,708</td>
<td>13,362</td>
</tr>
<tr>
<td>Avg Section Enrollment</td>
<td>42.7</td>
<td>44.1</td>
<td>44.1</td>
</tr>
<tr>
<td># Faculty Taught</td>
<td>174</td>
<td>192</td>
<td>197</td>
</tr>
<tr>
<td>% Faculty Taught</td>
<td>69.0</td>
<td>66.7</td>
<td>65.0</td>
</tr>
<tr>
<td>Lab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Sections</td>
<td>68</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td># Enrolled</td>
<td>1,545</td>
<td>156</td>
<td>7</td>
</tr>
<tr>
<td>Avg Section Enrollment</td>
<td>22.7</td>
<td>22.3</td>
<td>7.0</td>
</tr>
<tr>
<td># Faculty Taught</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>% Faculty Taught</td>
<td>5.9</td>
<td>14.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Sections</td>
<td>6</td>
<td>12</td>
<td>125</td>
</tr>
<tr>
<td># Enrolled</td>
<td>120</td>
<td>263</td>
<td>3,989</td>
</tr>
<tr>
<td>Avg Section Enrollment</td>
<td>20.0</td>
<td>21.9</td>
<td>31.9</td>
</tr>
<tr>
<td># Faculty Taught</td>
<td>6</td>
<td>12</td>
<td>78</td>
</tr>
<tr>
<td>% Faculty Taught</td>
<td>100.0</td>
<td>100.0</td>
<td>62.4</td>
</tr>
<tr>
<td>Other Course Types</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Sections</td>
<td>8</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td># Enrolled</td>
<td>9</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>Avg Section Enrollment</td>
<td>1.1</td>
<td>1.3</td>
<td>1.8</td>
</tr>
<tr>
<td># Faculty Taught</td>
<td>8</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>% Faculty Taught</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Course</th>
<th>Visits</th>
<th>Unique Students</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Fall 2013</td>
<td>Spring 2014</td>
</tr>
<tr>
<td></td>
<td>Fall 2013</td>
<td>Spring 2014</td>
</tr>
<tr>
<td>MAA4200 Total:</td>
<td>36</td>
<td>17</td>
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<tr>
<td>MAA4402 Total:</td>
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</tr>
<tr>
<td>MAC1105 Total:</td>
<td>601</td>
<td>578</td>
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<tr>
<td>MAC1114 Total:</td>
<td>235</td>
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<td>MAC1140 Total:</td>
<td>185</td>
<td>43</td>
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<td>MAC1147 Total:</td>
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<td>MAC2233 Total:</td>
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<td>MAC2311 Total:</td>
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Table 5
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<th>MAS3203</th>
<th>MAS4107</th>
<th>MAS4301 Total</th>
<th>MAS4304 Total</th>
<th>MAS5311 Total</th>
<th>MAT1033 Total</th>
<th>MAT4937 Total</th>
<th>MAT6907 Total</th>
<th>MGF1106 Total</th>
<th>MGF1107 Total</th>
<th>MHF3404 Total</th>
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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.

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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

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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.

Table 8

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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

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</table>

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

<table>
<thead>
<tr>
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<td>100.0</td>
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<td>83.3</td>
<td>50.0</td>
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<tr>
<td>Graduate @ other SUS Institution</td>
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<td>16.7</td>
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</tr>
<tr>
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</tbody>
</table>

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

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<thead>
<tr>
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<td>9</td>
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<tr>
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<td>-</td>
<td>38.1</td>
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</tr>
<tr>
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<td>14.3</td>
<td>41.7</td>
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<td>14.3</td>
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<td>-</td>
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<td>38.1</td>
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<tr>
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<td>5</td>
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<tr>
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<td>38.5</td>
<td>7.1</td>
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<td>50.0</td>
<td>4.8</td>
<td>-</td>
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</table>
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>
<thead>
<tr>
<th>Year Degree Granted</th>
<th>All</th>
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<tbody>
<tr>
<td>2001-2002</td>
<td>19.0</td>
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<tr>
<td>2002-2003</td>
<td>16.0</td>
</tr>
<tr>
<td>2003-2004</td>
<td>20.0</td>
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<tr>
<td>2004-2005</td>
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<tr>
<td>2005-2006</td>
<td>24.0</td>
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<tr>
<td>2006-2007</td>
<td>20.0</td>
</tr>
<tr>
<td>2007-2008</td>
<td>29.0</td>
</tr>
<tr>
<td>2008-2009</td>
<td>24.0</td>
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<tr>
<td>2009-2010</td>
<td>25.0</td>
</tr>
<tr>
<td>2010-2011</td>
<td>28.0</td>
</tr>
<tr>
<td>2011-2012</td>
<td>27.0</td>
</tr>
<tr>
<td>2012-2013</td>
<td>27.0</td>
</tr>
<tr>
<td>2013-2014</td>
<td>33.0</td>
</tr>
<tr>
<td>Total</td>
<td>320.0</td>
</tr>
</tbody>
</table>

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.**
- **Outcome 1:** 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:
  o MAC 2311 Calculus-Analytic Geometry 1
  o MAC 2312 Calculus-Analytic Geometry 2
  o MAC 2313 Calculus-Analytic Geometry 3
  o MAS 2103 Matrix Theory (MAS 4107 Linear Algebra 2 is strongly recommended)
  o MAD 2104 Discrete Mathematics
  o MAA 4200 Modern Analysis
  o MAS 4301 Modern Algebra
  o 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**

<table>
<thead>
<tr>
<th>Annual Headcount (Program CIP: 270101)</th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2011-2012</td>
<td>2012-2013</td>
<td>2012-2013</td>
</tr>
<tr>
<td>Masters/Specialist</td>
<td>32</td>
<td>21</td>
<td>228</td>
</tr>
<tr>
<td>Doctoral</td>
<td>47</td>
<td>54</td>
<td>279</td>
</tr>
</tbody>
</table>

**Table 14**

<table>
<thead>
<tr>
<th>Annual Headcount (Program CIP: 270301)</th>
<th>Applied Mathematics &amp; Statistics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2011-2012 2012-2013</td>
<td>2012-2013</td>
<td>2012-2013</td>
</tr>
<tr>
<td>Masters/Specialist</td>
<td>11 6</td>
<td>228</td>
<td>4,675</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Annualized Graduate</th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>State-Fundable FTE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2010-2011</td>
<td>2011-2012</td>
<td>2012-2013</td>
</tr>
<tr>
<td>Graduate Total</td>
<td>50.1</td>
<td>41.8</td>
<td>36.4</td>
</tr>
<tr>
<td>Grad I</td>
<td>18.2</td>
<td>17.6</td>
<td>12.4</td>
</tr>
<tr>
<td>Grad II</td>
<td>31.9</td>
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</tr>
<tr>
<td>Classroom</td>
<td>38.6</td>
<td>36.5</td>
<td>32.6</td>
</tr>
<tr>
<td>Thesis-Dissertation</td>
<td>11.6</td>
<td>5.3</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Table 16

<table>
<thead>
<tr>
<th>Annualized Graduate</th>
<th>Mathematics</th>
<th>College of Science</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>State-Fundable FTE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2010-2011</td>
<td>2011-2012</td>
<td>2012-2013</td>
</tr>
<tr>
<td>FTE produced by students who are:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Majors within the department</td>
<td>40.7</td>
<td>35.5</td>
<td>31.6</td>
</tr>
<tr>
<td>Majors outside the department, but within the college</td>
<td>0.4</td>
<td>1.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Majors outside the college</td>
<td>9.1</td>
<td>5.2</td>
<td>4.2</td>
</tr>
<tr>
<td>Total</td>
<td>50.1</td>
<td>41.8</td>
<td>36.4</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Graduate Classes</th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010-2011</td>
<td>2011-2012</td>
<td>2012-2013</td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture/Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Sections</td>
<td>252</td>
<td>288</td>
<td>303</td>
</tr>
<tr>
<td># Enrolled</td>
<td>419</td>
<td>388</td>
<td>289</td>
</tr>
<tr>
<td>Avg Section Enrollment</td>
<td>12.0</td>
<td>11.8</td>
<td>11.6</td>
</tr>
<tr>
<td># Faculty Taught</td>
<td>35</td>
<td>33</td>
<td>25</td>
</tr>
<tr>
<td>% Faculty Taught</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Lab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Sections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Enrolled</td>
<td>20</td>
<td>465</td>
<td></td>
</tr>
<tr>
<td>Avg Section Enrollment</td>
<td></td>
<td></td>
<td>20.0</td>
</tr>
<tr>
<td># Faculty Taught</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Faculty Taught</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Course Types</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Sections</td>
<td>68</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td># Enrolled</td>
<td>108</td>
<td>100</td>
<td>101</td>
</tr>
<tr>
<td>Avg Section Enrollment</td>
<td></td>
<td></td>
<td>1.6</td>
</tr>
<tr>
<td># Faculty Taught</td>
<td>68</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>% Faculty Taught</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

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 Security
  - 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**

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

**Cryptology Track:**

**Table 19**

<table>
<thead>
<tr>
<th>Course</th>
<th>Number</th>
<th>Credits</th>
<th>Required / Elective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryptography</td>
<td>MAD 6477</td>
<td>3</td>
<td>Required</td>
</tr>
<tr>
<td>Cryptanalysis</td>
<td>MAD 6478</td>
<td>3</td>
<td>Required</td>
</tr>
<tr>
<td>Coding Theory</td>
<td>MAD 6607</td>
<td>3</td>
<td>Required</td>
</tr>
<tr>
<td>Algebraic Number Theory</td>
<td>MAS 6215</td>
<td>3</td>
<td>Required</td>
</tr>
<tr>
<td>Analysis of Algorithms</td>
<td>COT 6405</td>
<td>3</td>
<td>Required</td>
</tr>
<tr>
<td>Course</td>
<td>Number</td>
<td>Credits</td>
<td>Required / Elective</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>-----------</td>
<td>---------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Computer Networks</td>
<td>CNT 5008</td>
<td>3</td>
<td>Elective</td>
</tr>
<tr>
<td>Enumerative Combinatorics</td>
<td>MAD 6206</td>
<td>3</td>
<td>Elective</td>
</tr>
<tr>
<td>Combinatorics 2</td>
<td>MAD 6207</td>
<td>3</td>
<td>Elective</td>
</tr>
<tr>
<td>Introduction to Cryptology and Information Security</td>
<td>MAD 5474</td>
<td>3</td>
<td>Elective</td>
</tr>
<tr>
<td>Information Theory</td>
<td>EEL 6532</td>
<td>3</td>
<td>Elective</td>
</tr>
<tr>
<td>Computer Data Security</td>
<td>CIS 6370</td>
<td>3</td>
<td>Elective</td>
</tr>
<tr>
<td>Computational Group Theory</td>
<td>MAT 6933</td>
<td>3</td>
<td>Elective</td>
</tr>
</tbody>
</table>

Financial Mathematics Track:

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

**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

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\(^1\) Both departments offer a combined BS/MS program, but due to recent changes in the possible double-counting of credits, such programs lose 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

<table>
<thead>
<tr>
<th>Graduate (Program CIP: 270101)</th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2011-2012</td>
<td>2012-2013</td>
<td>2012-2013</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>2</td>
<td>11</td>
<td></td>
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</tr>
<tr>
<td>Total</td>
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<td>19</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
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<td>1</td>
<td>14</td>
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<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
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<td>6</td>
<td>27</td>
</tr>
<tr>
<td>African American (Not of Hispanic Origin)</td>
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<tr>
<td>Female</td>
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</tr>
<tr>
<td>Total</td>
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<tr>
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<tr>
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<td>1</td>
<td>27</td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>6</td>
<td>52</td>
</tr>
<tr>
<td>White (Not of Hispanic Origin)</td>
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<td></td>
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</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>7</td>
<td>158</td>
</tr>
<tr>
<td>Male</td>
<td>21</td>
<td>20</td>
<td>143</td>
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<tr>
<td>Total</td>
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<td>301</td>
</tr>
<tr>
<td>Non-Resident Alien</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>9</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td>Male</td>
<td>22</td>
<td>19</td>
<td>53</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>27</td>
<td>91</td>
</tr>
</tbody>
</table>
### Table 22

<table>
<thead>
<tr>
<th>Graduate (Program CIP: 270101)</th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2011-2012</td>
<td>2012-2013</td>
<td>2012-2013</td>
</tr>
<tr>
<td><strong>Not Reported</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>4</td>
<td>71</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>19</td>
<td>19</td>
<td>253</td>
</tr>
<tr>
<td>Male</td>
<td>60</td>
<td>56</td>
<td>254</td>
</tr>
<tr>
<td>Total</td>
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<td>75</td>
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</table>

<table>
<thead>
<tr>
<th>Graduate (Program CIP: 270301)</th>
<th>Applied Mathematics &amp; Statistics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>2012-2013</td>
<td>2012-2013</td>
</tr>
<tr>
<td><strong>American Indian/Alaskan Native</strong></td>
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<td></td>
<td></td>
</tr>
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<td>Female</td>
<td>2</td>
<td>11</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Total</td>
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<td>1</td>
<td>14</td>
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<tr>
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</tr>
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<td>10</td>
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<td>624</td>
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<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td><strong>Hispanic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>27</td>
<td>495</td>
</tr>
<tr>
<td>Male</td>
<td>1</td>
<td>25</td>
<td>318</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td></td>
<td>52</td>
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<tr>
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<td></td>
<td></td>
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<tr>
<td>Female</td>
<td>1</td>
<td>158</td>
<td>1,926</td>
</tr>
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<td>Male</td>
<td>4</td>
<td>3</td>
<td>143</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>3</td>
<td>301</td>
</tr>
<tr>
<td><strong>Non-Resident Alien</strong></td>
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<td></td>
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<tr>
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<td>38</td>
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## Graduate (Program CIP: 270301)

<table>
<thead>
<tr>
<th></th>
<th>Applied Mathematics &amp; Statistics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2011-2012</td>
<td>2012-2013</td>
<td>2012-2013</td>
</tr>
<tr>
<td>Male</td>
<td>1</td>
<td>1</td>
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<td>Total</td>
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</tr>
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<td>9</td>
<td>5</td>
<td>254</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>6</td>
<td>507</td>
</tr>
</tbody>
</table>

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

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**

<table>
<thead>
<tr>
<th>Master’s Degrees</th>
<th>Year Degree Granted</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single major</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>Double major</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>8.0</td>
</tr>
</tbody>
</table>

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

**Table 25**

<table>
<thead>
<tr>
<th>Doctoral Degrees</th>
<th>Year Degree Granted</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>1.0</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Instructional Faculty (Tenured, tenure-earning, &amp; non-tenure-earning)</th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010-2011</td>
<td>2011-2012</td>
<td>2012-2013</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Instructional Faculty (Tenured, tenure-earning, &amp; non-tenure-earning)</td>
<td>Mathematics</td>
<td>College Total</td>
<td>University Total</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>-------------</td>
<td>---------------</td>
<td>------------------</td>
</tr>
<tr>
<td></td>
<td>2010-2011</td>
<td>2011-2012</td>
<td>2012-2013</td>
</tr>
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<td>Male</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
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<td>9</td>
<td>10</td>
</tr>
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<td></td>
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<tr>
<td>Female</td>
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<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hispanic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
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<td>1</td>
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<tr>
<td>White (Not of Hispanic Origin)</td>
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<td>Female</td>
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<tr>
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</tr>
<tr>
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<tr>
<td>Total</td>
<td>39</td>
<td>40</td>
<td>40</td>
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</tbody>
</table>

Table 27

<table>
<thead>
<tr>
<th>Adjuncts</th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2010-2011</td>
<td>2011-2012</td>
<td>2012-2013</td>
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<td>American Indian/Alaskan Native</td>
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<td></td>
</tr>
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</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>Female</td>
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<td>1</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
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.)

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.
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>
<thead>
<tr>
<th></th>
<th>2010-2011</th>
<th>2011-2012</th>
<th>2012-2013</th>
<th>2012-2013</th>
<th>2012-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>18.2</td>
<td>21.8</td>
<td>24.2</td>
<td>19.4</td>
<td>19.1</td>
</tr>
<tr>
<td>Graduate</td>
<td>1.1</td>
<td>0.9</td>
<td>0.8</td>
<td>1.1</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>Mathematics</td>
<td>College Total</td>
<td>University Total</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>-------------</td>
<td>---------------</td>
<td>------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010-2011</td>
<td>19.3</td>
<td>22.8</td>
<td>20.5</td>
<td></td>
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</tr>
<tr>
<td>2011-2012</td>
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<td>20.5</td>
<td>21.9</td>
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<td></td>
</tr>
<tr>
<td>2012-2013</td>
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<tr>
<td>Total</td>
<td>21.9</td>
<td>22.8</td>
<td>25.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Departmental Research</th>
<th>Tenured &amp; tenure-earning faculty</th>
<th>Non-tenure-earning faculty</th>
<th>Other personnel paid on faculty pay plan</th>
<th>Total</th>
<th>Sponsored Research</th>
<th>Tenured &amp; tenure-earning faculty</th>
<th>Non-tenure-earning faculty</th>
<th>Other personnel paid on faculty pay plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Professor, Assoc Professor, Asst Professor</td>
<td>Instructors, Lecturers, Visiting Faculty</td>
<td>--</td>
<td></td>
<td></td>
<td>Professor, Assoc Professor, Asst Professor</td>
<td>Instructors, Lecturers, Visiting Faculty</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Person-Years</td>
<td>Person-Years</td>
<td>Person-Years</td>
<td>Person-Years</td>
<td>Person-Years</td>
<td>Person-Years</td>
<td>Person-Years</td>
<td>Person-Years</td>
</tr>
<tr>
<td></td>
<td>5.2</td>
<td>4.8</td>
<td>4.1</td>
<td>20.0</td>
<td>92.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.2</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th></th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010-2011</td>
<td>2011-2012</td>
<td>2012-2013</td>
</tr>
<tr>
<td>Total Person-Years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>0.7</td>
<td>0.2</td>
</tr>
<tr>
<td>Total FTE</td>
<td>0.7</td>
<td>1.0</td>
<td>0.3</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Books (including monographs &amp; compositions)</td>
<td>#</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>146</td>
</tr>
<tr>
<td>2. Other peer-reviewed publications</td>
<td>#</td>
<td>58</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44</td>
<td>29</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>229</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1,161</td>
</tr>
<tr>
<td>3. All other publications</td>
<td>#</td>
<td>36</td>
<td>11</td>
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<tr>
<td></td>
<td></td>
<td>36</td>
<td>11</td>
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<td></td>
<td></td>
<td>6</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>501</td>
</tr>
<tr>
<td>4. Presentations at professional meetings or conferences</td>
<td>#</td>
<td>67</td>
<td>39</td>
</tr>
<tr>
<td>5. Productions/Performances/Exhibitions</td>
<td>#</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>4</td>
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<td>36</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>377</td>
</tr>
<tr>
<td>6. Grant Proposals Submitted</td>
<td>#</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>385</td>
</tr>
<tr>
<td>Sponsored Research &amp; Program Expenditures</td>
<td>#</td>
<td>$767,881</td>
<td>$343,834</td>
</tr>
<tr>
<td>7. Organized Research</td>
<td>#</td>
<td>$18,464</td>
<td>$26,602</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$18,464</td>
<td>$26,602</td>
</tr>
<tr>
<td>8. Sponsored Instruction</td>
<td>#</td>
<td>$0</td>
<td>$9,999</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$0</td>
<td>$9,999</td>
</tr>
</tbody>
</table>
Table 32

<table>
<thead>
<tr>
<th></th>
<th>Mathematics</th>
<th>College Total</th>
<th>University Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010-2011</td>
<td>2011-2012</td>
<td>2012-2013</td>
</tr>
<tr>
<td>1. Books (including monographs &amp; compositions) per faculty member</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>2. Other peer-review publications per faculty member</td>
<td>2.2</td>
<td>1.7</td>
<td>1.2</td>
</tr>
<tr>
<td>3. All other publications per faculty member</td>
<td>1.4</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>4. Presentations at professional meetings or conferences per faculty member</td>
<td>2.6</td>
<td>1.5</td>
<td>1.7</td>
</tr>
<tr>
<td>5. Productions/Performances/Exhibitions per faculty member</td>
<td>0.0</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>6. Grant proposals submitted per faculty member</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Sponsored Research &amp; Program Expenditures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Organized research expenditures per faculty member</td>
<td>$29,534</td>
<td>$13,224</td>
<td>$8,189</td>
</tr>
<tr>
<td>8. Sponsored instruction expenditures per faculty member</td>
<td>$710</td>
<td>$1,023</td>
<td>$213</td>
</tr>
<tr>
<td>9. Other sponsored activity expenditures per faculty member</td>
<td>$0</td>
<td>$385</td>
<td>$699</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Table 33</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mathematics</strong></td>
</tr>
<tr>
<td>Mathematics Indicators</td>
</tr>
<tr>
<td>1. Faculty memberships on department, college or university committees</td>
</tr>
<tr>
<td>2. Faculty memberships on community or professional committees</td>
</tr>
<tr>
<td>3. Faculty serving as editors or referees for professional publications</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>F 06</th>
<th>S 07</th>
<th>F 08</th>
<th>S 08</th>
<th>F 09</th>
<th>S 09</th>
<th>F 10</th>
<th>S 10</th>
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<th>S 11</th>
<th>F 12</th>
<th>S 12</th>
<th>F 13</th>
<th>S 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 1033</td>
<td>Intermediate Algebra</td>
<td>30</td>
<td>25</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>16</td>
<td>22</td>
<td>15</td>
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<td>17</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC 1105</td>
<td>College Algebra</td>
<td>62</td>
<td>62</td>
<td>53</td>
<td>42</td>
<td>39</td>
<td>32</td>
<td>27</td>
<td>29</td>
<td>28</td>
<td>36</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>34</td>
</tr>
<tr>
<td>MAC 1114</td>
<td>Trigonometry</td>
<td>30</td>
<td>65</td>
<td>52</td>
<td>47</td>
<td>42</td>
<td>47</td>
<td>38</td>
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<td>40</td>
<td>27</td>
<td>44</td>
</tr>
<tr>
<td>MAC 1140</td>
<td>Precalculus Algebra</td>
<td>49</td>
<td>51</td>
<td>43</td>
<td>48</td>
<td>59</td>
<td>38</td>
<td>35</td>
<td>47</td>
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<td>32</td>
<td>22</td>
<td>30</td>
<td>38</td>
<td>44</td>
</tr>
<tr>
<td>MAC 1147</td>
<td>Precalc. Alg. &amp; Trig</td>
<td>58</td>
<td>50</td>
<td>54</td>
<td>62</td>
<td>72</td>
<td>51</td>
<td>10</td>
<td>32</td>
<td>21</td>
<td>23</td>
<td>25</td>
<td>10</td>
<td>45</td>
<td>59</td>
</tr>
<tr>
<td>MAC 2233</td>
<td>Methods of Calculus</td>
<td>51</td>
<td>47</td>
<td>38</td>
<td>43</td>
<td>27</td>
<td>22</td>
<td>24</td>
<td>28</td>
<td>35</td>
<td>48</td>
<td>33</td>
<td>27</td>
<td>54</td>
<td>41</td>
</tr>
<tr>
<td>MAC 2281</td>
<td>Calculus for engineers 1</td>
<td>39</td>
<td>45</td>
<td>53</td>
<td>41</td>
<td>48</td>
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<td>54</td>
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<tr>
<td>MAC 2282</td>
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<td>31</td>
<td>40</td>
<td>32</td>
<td>51</td>
<td>57</td>
<td>55</td>
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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. 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

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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 Perceptions of Teaching” responses for the quality of instruction and instructor in mathematics classes, compared with college and university averages.

Table 35

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<th>College Total</th>
<th>University Total</th>
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<tr>
<td>Mean Rating</td>
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Table 36

<table>
<thead>
<tr>
<th>Scale: 1=One of Most Effective 5=One of Least Effective</th>
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<th>College Total</th>
<th>University Total</th>
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<td>Mean Rating</td>
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<td>2.5</td>
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</table>

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  
radams22@fau.edu  
Florida Atlantic University  
(561)-297-1344  
636 NW13th street apt:33  
Boca Raton, FL USA

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 Applications. Orlando, Florida (July 1 - 5, 2012)

Teaching Experience

<table>
<thead>
<tr>
<th>Term</th>
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<th>Course</th>
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<tr>
<td>Spring</td>
<td>2013</td>
<td>Lecturer, Trigonometry</td>
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<tr>
<td>Fall</td>
<td>2012</td>
<td>Lecturer, Calculus for Engineers 1</td>
</tr>
<tr>
<td>Summer</td>
<td>2012</td>
<td>Lecturer, Calculus-Analytic Geometry 3</td>
</tr>
<tr>
<td>Spring</td>
<td>2012</td>
<td>Lecturer, Precalculus Algebra</td>
</tr>
<tr>
<td>Fall</td>
<td>2011</td>
<td>Lecturer, Calculus for Engineers 2</td>
</tr>
<tr>
<td>Spring</td>
<td>2011</td>
<td>Lecturer, Calculus-Analytic Geometry 1</td>
</tr>
<tr>
<td>Fall</td>
<td>2010</td>
<td>Lecturer, Intermediate Algebra</td>
</tr>
<tr>
<td>Spring</td>
<td>2010</td>
<td>Lecturer, Trigonometry</td>
</tr>
<tr>
<td>Fall</td>
<td>2009</td>
<td>Lecturer, Methods of Calculus</td>
</tr>
</tbody>
</table>

Awards

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


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 PREPARATION

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.

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

Northwestern University
Department of Mathematics

Northeastern Illinois University
Department of Mathematics

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


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 6th to 8th graders
• Coordinator of the middle school program across all disciplines
• Teaching Kindergarten to 8th 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 the Nation Science Foundation National Teacher of the Year Award Ceremony in Washington D.C., 2006
• 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:
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.

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


ROGER M. GOLDWYN

Professional Preparation

<table>
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<th>Field</th>
<th>Institution</th>
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<th>Year</th>
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<tr>
<td>Electrical Engineering</td>
<td>Rice University</td>
<td>B.A.</td>
<td>1958</td>
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<tr>
<td>Engineering</td>
<td>Rice University</td>
<td>B.S.</td>
<td>1959</td>
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<tr>
<td>Engineering</td>
<td>Rice University</td>
<td>M.S.</td>
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<tr>
<td>Mathematics</td>
<td>Harvard University</td>
<td>A.M.</td>
<td>1961</td>
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<tr>
<td>Applied Mathematics</td>
<td>Harvard University</td>
<td>Ph.D.</td>
<td>1964</td>
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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
1997-1998: Vice President Worldwide Research and Development, Registry Magic, 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 evaluations 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
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).
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.
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.

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

Other Publications and Submitted Papers:


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 grade 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


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.
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.

Refereed Works – Journal Publications
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.


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:
Hyunjoo 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


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


(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


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.


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 Waterloo), Prof. Carl Pomerance (Dartmouth College), Prof. Igor Shparlinski (University of New South Wales), Prof. Berkant Ustaoglu (Izmir Institute of Technology).

(g) Courses Taught:

2. Cryptography (FAU-MAD 6477-Fall 2013).
3. Linear Algebra (FAU-MAS 5145-Fall 2014).
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.
   1.1 July 29: “Solving Puzzles Provably”.
   2.2 July 31: "Crypto Games".
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


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
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.

(Selected) Grant Proposals
(Selected) Invited Talks

(Selected) Doctoral Students

(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.
3. Member of state General Education Committee, 2012-present.
5. Member of FAU’s Association of Women in Science Taskforce, 2014-present.
Jose M. Laborde

Contact Information
117 N. Woodward Av
Florida State University
32306 USA
Voice: (850) 644-3218
Department of Statistics
Fax: (850) 644-5271
E-mail: laborde@stat.fsu.edu
32306 USA
web: www.stat.fsu.edu/~laborde
Tallahassee, FL

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

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


Papers in revision


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


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).

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

E. Synergistic Activities
   - Technical Editor, Forum Geometricorum.

F. Collaborators and Other Affiliations

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**


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

E. **Synergistic Activities**

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

G. (Selected) Courses Taught


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

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)

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

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.
4. Organizing (jointly with Dr. Lianfen Qian) a special session on “Recent Advances in Probability and Statistics” for the 2009 AMS sectional meeting, Florida Atlantic University, Boca Raton, Florida, October 30-November 1, 2009.

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)

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

Assistant Professor of Mathematics

Assistant Professor of Mathematics and Computer Science

Cornell University, Ithaca, NY (September 1984 - June 1988)
H.C. Wang Assistant Professor of Mathematics

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


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
ESSLLI, Opole, Poland, Aug. 6-17, 2012
Computability in Europe, Cambridge, UK, Jun. 18-23, 2012
The Incomputable, Milton Keynes, UK, Jun. 11-16, 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
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)
Problem Solving
Math and Politics (freshman honors seminar)
Linear Programming and Game Theory
Erik Lundberg (abbreviated CV)

A. Professional Preparation:

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.

C. Recent Publications:


D. Grants (Proposals and Funded):

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


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


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  

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.  
- NSERC Visiting Professor, C&O Department, University of Waterloo, 1993.  
- Visiting Prof. at the University of Waterloo, 1993, 1999–2000.  
- Visiting Prof. at the University of Rome, La Sapienza, 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, 2003–2013; 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

Collaborators
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.


**Selected Manuscripts in Process.**

20. *The 392 Conjecture* (with J. Selfridge) 57 pages

**Invited Adresses**

Idaho State University, June 1988 Wright State University, June 1989 University of Wisconsin, 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 2004 (invited)

**Recent Reviewing**

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

**Editorial Board**

Forum Geometricorum
J.D. Mireles James


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


F. **Collaborators and Other Affiliations:** Past and Present Student Research Projects Rigorous Computation for Infinite Dimensional Stable Manifolds for PDEs with Jonathan Jaquette, Rutgers University.--- 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 Deschenes, Laval University, Quebec City.---Invariant Manifolds, the Hartman-Grobman Theorem, and Applications with Yuri Boaventura, USP Sao Carlos.


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, Fairfax Virginia, 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


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

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, Universite 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

   • “On the index of finite determinacy of vector fields with resonances”, by

   • “Analytic invariants associated with a parabolic fixed point in C2”,

   • “Linearization of families of germs” by V. Naudot and J. Yang. Dynamical

   • “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.

   • “Dynamical Stabilization of expression States in Genes”, by L.S. Liebovitch,

   • “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.
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. Bonekaert (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.
- 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
• 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:

- **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

- 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”.
- Covering small alternating groups with proper subgroups (with Spyros Magliveras and Michael Epstein), to be submitted.

D. Grants (Proposals and 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.
- 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. 

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/ 

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,

“Aine 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 größten projektiven unzerlegbaren Moduls in einem
regulären 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)

Quasi-hereditary algebras via generator-cogenerators of local self-injective algebras and

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  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.
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.

D. Grants (Proposals and Funded) (last 7 years)
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.
- 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 4102 Computational Statistics 1
  STA 4442 Probability and Statistics 1
  STA 4032 Probability and Statistics for Engineers
- Graduate Statistics Courses Taught:
  STA 5195/4906 Biostatistics
  STA 6446 Regression Analysis
  STA 6857/4930 Applied Time Series
  STA 6208/4930 Applied Statistical Methods
  STA 6907 Internship
- Other: 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.
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
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
2008 Pure Random Search with Exponential Rate of Convergence, D. Radulovic Optimization 2008, Vol1 pg 1-15


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


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

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


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**Molecular Biology/Biostatistics**


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

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
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 valued groups
2000 Dawne Richards, Categorical syllogisms

BOOKS

College trigonometry, Scott, Foresman, and Co., Chicago 1970. (with C. Walker and E. A. Walker)
Number theory, an introduction to algebra, Brooks-Cole, Monterey, California, 1971.
(with D. S. Bridges) MR 88k:03127
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)
Darel Hardy and Carol Walker)

ARTICLES IN JOURNALS AND CONFERENCE PROCEEDINGS (since 2001)

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
2002 Omniscience principles and functions of bounded variation, Mathematical Logic Quarterly, 42,
111-116. MR 2002i:03080
Computing limiting stationary distributions of small noisy networks, Journal of Applied Probability,
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 Mathematicae, 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 countable choice,
Communications in Algebra, 31, No. 4, 1993-2002. MR 1972902
MR 2130479
Mines, and Peter Schuster) MR 2053987
Did Euclid need the Euclidean algorithm to prove unique factorization, American Mathematical Monthly, 113, 196-205 (with David Pengelley) MR 2204484
Van der Waerden's construction of a splitting field, Communications in Algebra, 34, 2351-2356. MR 2240372
Subrings of zero-dimensional rings, Multiplicative ideal theory in commutative algebra, Springer 2006, 73-88 (with Jim Brewer) MR 2265802
Near convexity, metric convexity, and convexity, Rocky Mountain Journal 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, Spyros 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
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

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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

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
University of Minnesota 1970 – 1971

Organization of American States
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

Conferences

Co-organizer (with Klaus Hochschmann (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. Hochschmann, 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.


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
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

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, 15 pp. (2014)
20. The entries in the LR-tableau, Mathematische Zeitschrift 268 (2012), 211–222


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).
   · Symposium on Enumerative Combinatorics, at Florida Atlantic University, April 4, 2014, on the occasion of the retirement of Dr. Heinrich Niederhausen.
   · AMS Special Session on Representations of finite dimensional algebras, November 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):
   · Justyna Kosakowska (Toruń, Poland), April 6–27, 2014
   · Daiva Pucinskaite (Kiel, Germany), April 2014.
   · Hans-Dietrich Gronau (Universität Rostock), 2x, 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

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.
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)


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),

Entropy numbers, Extrapolation, Besov spaces, Orlicz

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.

Maria 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.:
- Grad. Inst.:
  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)

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)

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 *Cryptography, Designs and Finite Groups 2009*, Co-organizer Dagstuhl Seminars 08491, 11381, 13371, 15371
- 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

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
Auburn University, Auburn, AL, USA
May 2007

Master of Science in Mathematics
Dokuz Eylul University, Izmir, Turkey
August 2001

Bachelor of Science in Mathematics
Dokuz Eylul University, Izmir, Turkey
May 1999

B. APPOINTMENTS

Assistant Professor
Florida Atlantic University, Department of Mathematical Sciences
August 2014 - present

Assistant Professor
The University of Tulsa, Department of Mathematics,

John Thompson Research Assistant Professor
University of Florida, Department of Mathematics,
Aug. 2008 – Aug 2011

Lecturer
Georgia State University, Department of Mathematics and Statistics,

C. PUBLICATIONS

- 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.
• 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 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
Technical University of Delft, Delft, Netherlands
Visiting Scholar
KTH, Stockholm, Sweden
COLLABORATORS: Maia Martcheva, Anotida Madzvamuse, A.J. Meir, Alexandra Smirnova

G. COURSES TAUGHT

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, UNIVERSIDAD 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

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
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 Physics and visiting Prof. in Physics Dept.

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 Prototype 5/2013-4/2017 $1,497,075, **Teacher Enhancement for Elementary Mathematics**, 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)


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

**E. Synergistic Activities**
- Publicity Chair, *the 27th Chinese Control and Decision Conference*, May 2014.
- IEEE Fellow, class of 2013.

**F. Collaborators and Other Affiliations**

**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., 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

(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).
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, College 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-learning)
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**
15. Conic construction of a triangle from its incenter, nine-point center, and a vertex, *Journal for Geometry and Graphics*, 16 (2012) 137--149.
D. **Grants (Proposals and Funded)** (last 7 years)


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)
- 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


5. **Zang Y** and Fung WK. “Robust tests for matched case-control genetic association studies” *BMC Genetics 11(91), 2010.*


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 University (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.

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

E. **Synergistic Activities:**
   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, Summer 2007), 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.