Academic Program Review, 2009-2010

Applied Mathematics (B.S.) and Mathematics (B.A.)

Degrees Awarded: B.S. in Applied Mathematics/B.A. in Mathematics

Program Review Panel:

Chair and Program Coordinator:

Robert McCullough, Professor, Mathematics

Program Faculty:

Dr. Kent Sun, Professor, Mathematics
Holly Schalk, Associate Professor, Mathematics

Individual with special interest in the program:

Cynthia Milligan, Alumnus and 9-month adjunct faculty

Faculty member from outside the College of Arts and Sciences:

Chuck Drake, Professor, Mechanical Engineering Technology

Mathematics Department Chair:

Dr. Kirk Weller

Academic Program Review, 2009-2010

Applied Mathematics (B.S.) and Mathematics (B.A.)

Program Evaluation Plan

Purpose: To evaluate the degree programs offered by the department of mathematics to determine their strengths and weaknesses so that informed decisions can be made concerning the future of these programs.

Data Collection Techniques:

1. Graduate follow-up survey
2. Employer follow-up survey
3. Evaluation of our programs by current students
4. Faculty perceptions of the programs
5. Advisory Board perceptions of our programs
6. Labor market analysis information from NSF surveys
7. FSU cost and productivity data analysis
8. Evaluation of facilities and equipment
9. Curriculum evaluation

Schedule of Events:

Activity	Leader	Target Date
Graduate Survey	Sun/Schalk/Milligan	January 30, 2009
Employer Survey	Sun/Schalk/Milligan	January 30, 2009
Student Evaluation	Weller	January 30, 2009
Faculty perception	McCullough	January 30, 2009
Advisory Board Survey	McCullough	January 30, 2009
Labor Market Analysis	McCullough	January 30, 2009
FSU Cost/Productivity Data Analysis	McCullough	January 30, 2009
Evaluation of Facilities	Weller	January 30, 2009
Curriculum Evaluation	McCullough	January 30, 2009

Academic Program Review, 2009-2010

Applied Mathematics (B.S.) and Mathematics (B.A.)

Budget:

For the cost of the surveys: ((number of pages per survey x 0.64 cents/page) x (84 cents for postage and return postage) x (number of people surveyed))

Surveys	
Graduate Survey (50)	$54.00
Employer Survey (50)	$54.00
Student Evaluation (35)	$38.00
Faculty perception (21)	$23.00
Advisory Board Survey (8)	$9.00
Student Wage Support (40 hours at $7.40/hour)	$296.00
Phone Expenses	$150.00
Final Document Copying Costs (150 pages x 16 copies x 0.64 cents/copy)	$15.40
Binders for Final Copies ($6 x 16)	$96.00
Incidental expenses (department letterhead paper, other extra expenses)	$30.00
Total anticipated expenses	**$765.40**
Total approved amount (12/23/08)	**$750.00**

Report Department Guidelines

We are using the outline for our report that is suggested in the document ***Academic Program Review: A Guide for Participants –June 13, 2005.*** We have added a few categories not mentioned in the outline but have otherwise followed this recommended format completely. The suggested form is reproduced here as a reference to committee members reading this report.

Section 1: An overview of the program that addresses broadly the areas of the program included in the Administrative Program Review document (see page xx). This section should acquaint the reader with the program: mission, history, impact (on the University, state, and nation), expectations, plans for improvement, and any other items that would help the reader fully appreciate the remainder of the report.

A. PROGRAM GOALS

1. State the goals of the program.
2. Explain how and by whom the goals were established.
3. How do the goals apply to preparing students for careers in and meeting employer needs in the community/region/marketplace?
4. Have the goals changed since the last program review? If so, why and how? If not, why not?
5. Describe the relationship of the program goals to the University's mission, and the departmental, college and divisional strategic plans.

B. PROGRAM VISIBILITY AND DISTINCTIVENESS

1. Describe any unique features or components of the program.
2. Describe and assess the program's ability to attract quality students.
3. Identify the institutions that are the main competitors for prospective students in this program.
   - **a.** How are these programs similar and different from the FSU program?
   - **b.** What can be learned from them that would improve the program at Ferris?

C. PROGRAM RELEVANCE

1. Provide a labor market demand analysis: This activity is designed to assess the marketability of future graduates. Reports from the Department of Labor and from industry are excellent sources for forecasting demand on graduates. Request information from your Library Liaison.
2. Describe and assess how the program responds to emerging issues in the discipline, changes in the labor force, changes in employer needs, changes in student needs, and other forces of change.
3. Assess why students come to FSU for the program. Summarize the results of the graduate exit survey and the student program evaluation.
   a. How well does the program meet student expectations?
   b. How is student sentiment measured?

D. PROGRAM VALUE Please refer to the faculty survey.

1. Describe the benefit of the program, facilities, and personnel to the University.
2. Describe the benefit of the program facilities, and personnel to the students enrolled in the program.
3. What is the assessment of program personnel of the value of the program to employers? Explain how is this value is determined.
4. Describe the benefit of the program, faculty, staff and facilities to entities external to the University (services that faculty have provided to accreditation bodies, and regional, state, and national professional associations; manuscript reviewing; service on editorial boards; use of facilities for meetings, etc.).
5. What services for extra-University general public groups (e.g., presentations in schools or to community organizations) have faculty, staff or students provided? Describe how these services benefit students, program, and community.

<u>Section 2</u>: Collection of Perceptions. The survey sections must include, among others, a discussion of techniques used in collecting the information, difficulties encountered during the surveying process, number and percent of respondents, and analysis of data in accordance with established methodologies. The survey instruments <u>must</u> be designed and distributed, in consultation with Institutional Research and Testing, to reflect general aspects of program review as well as the specific nature of the program itself. All comments should be included, but the names of individuals mentioned should be deleted.

A. Graduate follow-up survey: The purpose of this activity is to learn from the graduates their perceptions and experiences regarding employment based on program outcomes. The goal is to assess the effectiveness of the program in terms of job placement and preparedness of the graduate for the marketplace. A mailed or e-mailed questionnaire is most preferred; however, under certain conditions telephone or personal interviews can be used to gather the data.

B. Employer follow-up survey: This activity is intended to aid in assessing the employers' experiences with graduates and their perceptions of the program itself. A mailed or e-mailed instrument should be used to conduct the survey; however, if justified, telephone or personal interviews may suffice.

C. Graduating student exit survey: Graduating students are surveyed every year on an ongoing basis to obtain information regarding quality of instruction, relevance of courses, and satisfaction with program outcomes based on their own expectations. The survey must seek student suggestions on ways to improve the effectiveness of the program and to enhance the fulfillment of their expectations. This survey is mandatory for all program graduates.

D. Student program evaluation: Current students are surveyed to obtain information regarding quality of instruction, relevance of courses, and satisfaction with program outcomes based on their own expectations. The survey must seek student suggestions on ways to improve the effectiveness of the program and to enhance the fulfillment of their expectations. This survey should be conducted during the year before the PRP report is submitted.

E. Faculty perceptions: The purpose of this activity is to assess faculty perceptions regarding the following aspects of the program: curriculum, resources, admissions standards, degree of commitment by the administration, processes and procedures used, and their overall feelings. Additional items that may be unique to the program can be incorporated in this survey.

F. Advisory committee perceptions: The purpose of this survey is to obtain information from the members of the program advisory committee regarding the curriculum, outcomes, facilities, equipment, graduates, micro- and megatrends that might affect job placement (both positively and adversely), and other relevant information. Recommendations for improvement must be sought from this group. In the event that a program does not have an advisory committee, a group of individuals may be identified to serve in that capacity on a temporary basis.

Section 3: Program Profile: *Include Administrative Program Review document in this section. Provide the number and percentage for the variable addressed for each of the years since inception (for new programs) or the last program review.*

A. PROFILE OF STUDENTS

1. Student Demographic Profile.
   - **a.** Gender, race/ethnicity, age (use annual institutional data).
   - **b.** In-state and out-of-state.
   - **c.** Full-time and part-time.
   - **d.** Attend classes during the day, in the evenings, and on weekends.
   - **e.** Enrolled in classes on- and off-campus.
   - **f.** Enrolled in 100% on-line and/or mixed delivery courses.
   - **g.** Discuss how the information presented in (a) through (f) impacts the curriculum, scheduling, and/or delivery methods in the program.
2. Quality of Students.
   - **a.** What is the range and average GPA of all students currently enrolled in the program? ACT? Comment on this data.
   - **b.** What are the range and average GPA's of students graduating from the program?

ACT? Comment on this data.

  c. In addition to ACT and GPA, identify and evaluate measures that are used to assess the quality of students entering the program.

  d. Identify academic awards (e.g., scholarships or fellowships) students in the program have earned. Comment on the significance of these awards to the program and students.

  e. What scholarly/creative activities (e.g., symposium presentations, other presentations or awards) have students in the program participated in? Comment on the significance of these activities to the program and students.

  f. What are other accomplishments of students in the program? Comment on the significance of these accomplishments to the program and students.

3. Employability of students.

  a. How many graduates have become employed full-time in the field within one year of receiving their degree? Comment on this data.

  b. What is the average starting salary of graduates who become employed full-time in the field since inception (for new programs) or the last program review? Compare with regional and national trends.

  c. How many graduates have become employed as part-time or temporary workers in the field within one year of receiving their degree? Comment on this data.

  d. Describe the career assistance available to the students. What is student perception of career assistance?

  e. How many graduates continue to be employed in the field? Comment on this data.

  f. Describe and comment on the geographic distribution of employed graduates.

  g. How many students and/or graduates go on for additional educational training? (Give annual average.) Comment on this data.

  h. Where do most students and/or graduates obtain their additional educational training? Comment on this data.

B. ENROLLMENT

1. What is the anticipated fall enrollment for the program?
2. Have enrollment and student credit hour production (SCH) increased or decreased since the last program review? Supply a table and comment on any enrollment trends.
3. Since the last program review, how many students apply to the program annually?
4. Of those who apply, how many and what percentage are admitted?
5. Of those who are admitted, how many and what percentage enroll?
6. What are the program's current enrollment goals, strategy, and efforts to maintain/increase/decrease the number of students in the program? Please explain.

C. PROGRAM CAPACITY

1. What is the appropriate program enrollment capacity, given the available faculty, physical resources, funding, accreditation requirements, state and federal regulations, and other factors? Which of these items limits program enrollment capacity? Please explain any difference between capacity and current enrollment.

D. RETENTION AND GRADUATION

1. Give the annual attrition rate (number and percent of students) in the program.
2. What are the program's current goals, strategy and efforts to retain students in the program?
3. Describe and assess trends in number of degrees awarded in the program.
4. How many students who enroll in the program graduate from it within the prescribed time? Comment on any trends.
5. On average, how long does it take a student to graduate from the program? Please comment.

E. ACCESS

1. Describe and assess the program's actions to make itself accessible to students. Use examples such as off-site courses, accelerated courses or other types of flexible learning, use of summer courses, multiple program entry points, e-learning, mixed delivery

courses, scheduling.

2. Discuss what effects the actions described in (1) have had on the program. Use examples such as program visibility, market share, enrollment, faculty load, computer and other resources.
3. How do the actions described in (1) advance or hinder program goals and priorities?

F. CURRICULUM. The curriculum review section must also contain appropriate check sheets and example syllabi, which may be attached as an appendix.

1. Program requirements. Describe and assess the program-related courses required for graduation.
   - **a.** As part of the graduation requirements of the current program, list directed electives and directed General Education courses. Provide the rationale for these selections.
   - **b.** Indicate any hidden prerequisites (instances where, in order to take a program-required course, the student has to take an additional course. Do not include extra courses taken for remedial purposes).
2. Has the program been significantly revised since the last review, and if so, how?
3. Are there any curricular or program changes currently in the review process? If so, what are they?
4. Are there plans to revise the current program within the next three to five years? If so, what plans are envisioned and why?

G. QUALITY OF INSTRUCTION

1. Discuss student and alumni perceptions of the quality of instruction.
2. Discuss advisory committee and employer perceptions of the quality of instruction.
3. What departmental and individual efforts have been made to improve the learning environment, add and use appropriate technology, train and increase the number of undergraduate and graduate assistants, etc.?
4. Describe the types of professional development have faculty participated in, in efforts to enhance the learning environment (e.g. Writing Across the Curriculum; Center for Teaching and Learning, etc.) .

5. What efforts have been made to increase the interaction of students with faculty and peers? Include such items as developmental activities, seminars, workshops, guest lectures, special events, and student participation in the Honors Program Symposium.
6. Discuss the extent to which current research and practice regarding inclusive pedagogy and curriculum infuse teaching and learning in this program.
7. What effects have actions described in (5) and (6) had on the quality of teaching and learning in the program?

H. COMPOSITION AND QUALITY OF FACULTY Describe and assess the composition of the faculty teaching courses in the program.

1. List the names of all tenured and tenure-track faculty by rank.
   - **a.** Identify their rank and qualifications.
   - **b.** Indicate the number of promotions or merit awards received by program faculty since the last program review.
   - **c.** Summarize the professional activities of program faculty since inception or the last program review (attendance at professional meetings, poster or platform presentations, responsibilities in professional organizations, etc.).
2. Workload
   - **a.** What is the normal, annualized teaching load in the program or department? Indicate the basis of what determines a "normal" load. On a semester-by-semester basis, how many faculty have accepted an overload assignment?
   - **b.** List the activities for which faculty receive release time.
3. Recruitment
   - **a.** What is the normal recruiting process for new faculty?
   - **b.** What qualifications (academic and experiential) are typically required for new faculty?
   - **c.** What are the program's diversity goals for both gender and race/ethnicity in the faculty?
   - **d.** Describe and assess the efforts being made to attain goals in (c).
4. Orientation. Describe and assess the orientation process for new faculty.

5. Reward Structure: e.g., salary, professional development funds, travel funds, UCEL and FSUGR incentive money
   a. Describe the reward structure in the program/department/college as it relates to program faculty. Indicate the type of reward and eligibility criteria.
   b. Does the existing salary structure have an impact on the program's ability to recruit and retain quality faculty?
   c. Is the reward structure currently in place adequate to support faculty productivity in teaching, research, and service? If not, what recommendations would you make to correct the situation.
   d. Is enhancing diversity and inclusion a component of the reward structure? Please explain.
6. Graduate Instruction (if applicable)
   a. List all faculty teaching graduate courses.
   b. What percentage of graduate courses is taught by non-tenure-track faculty? Please comment.
   c. What are the program's (or department's) criteria for graduate faculty?
   d. Have all graduate faculty (including non-tenure-track faculty) met the criteria? Please comment.
7. Non-Tenure-Track and Adjunct Faculty.
   a. Please provide a list for the last academic year of full-time non-tenure-track and adjunct faculty who taught courses in the program. For full-time non-tenure track faculty, indicate the length of their appointments and the number of years of service at the University. Comment on the program's ability to retain non-tenure-track faculty.
   b. What percentage of program courses is taught by the faculty in (a)? What courses are they teaching? Please comment.
   c. Describe the required qualifications (academic and experiential) for faculty listed in (a). Indicate if all faculty have met the criteria, and if not, what is being done to resolve the situation?
   d. Does the program consider the current use of non-tenure-track faculty to be appropriate? Why or why not?

e. If the program is accredited, what position if any does the accrediting body have regarding the use of non-tenured and adjunct faculty?

I. SERVICE TO NON-MAJORS. *Describe and assess the impact that delivery of service courses offered by the program or the department has on the program.*

a. Identify and describe the General Education service courses provided by the program faculty for other departments at FSU.

b. Identify and describe any non-General Education service courses or courses required for other programs. Comment on your interaction with the departments or programs for which the courses are provided.

c. Discuss the impact of the provision of General Education and non-General Education courses has on the program.

d. Does the program plan to increase, decrease, or keep constant its level of service courses? Explain.

J. DEGREE PROGRAM COST AND PRODUCTIVITY DATA. *Submit Institutional Research and Testing data. Comment on the data.*

K. ASSESSMENT AND EVALUATION. *Describe and evaluate the program's assessment mechanisms.*

a. List and describe what variables are tracked and why when assessing the effectiveness of the program (e.g. mastery of essentials of subject area, graduation rates, employment rates, pass rates on professional exams).

b. Provide trend data for the variables listed in (1). Compare the data to accreditation benchmark standards if applicable, or provide some other type of assessment of the data.

c. Describe how the trend data in (2) is used to assess the rigor, breadth, and currency of the degree requirements and curriculum.

d. Describe how the trend data in (2) is used to assess the extent to which program goals are being met.

L. ADMINISTRATION EFFECTIVENESS

1. Discuss the adequacy of administrative and clerical support for the program.
2. Are the program and/or department run in an efficient manner? Please explain.
3. Are class and teaching schedules effectively and efficiently prepared? Please comment.
4. Are students able to take the courses they need in a timely manner? Please comment.

Section 4: Facilities and equipment

A. INSTRUCTIONAL ENVIRONMENT

1. Are current classrooms, labs, and technology (both on-campus and at off-site locations) adequate? Explain.
2. How does the condition of current facilities impact program delivery? Explain.
3. Describe the program's projected needs with respect to instructional facilities.
4. Describe current plans for facilities improvements and indicate their status.
5. Describe how proposed changes or improvements to facilities would enhance program delivery.

B. COMPUTER ACCESS AND AVAILABILITY

1. Outside of computers in faculty and staff offices, identify the computing resources (hardware and software) that are allocated to the program.
2. Discuss how these resources are used.
3. Discuss the adequacy of these resources and identify needed additional resources.
4. Does an acquisition plan to address these needs currently exist? Describe the plan. Has it been included in the department or college's planning documents?
5. Discuss the efficacy of online services (including WebCT) available to the program.
6. Discuss the adequacy of computer support, including the support for on-line instruction if applicable.

C. OTHER INSTRUCTIONAL TECHNOLOGY

1. Identify other types of instructional technology resources that are allocated or available

to the program.

2. Discuss how these resources are used.
3. Discuss the adequacy of these resources and identify needed additional resources.
4. Does an acquisition plan to address these needs currently exist? Describe the plan. Has it been included in the department or college's planning documents?
5. Discuss the impact of adequacy of other types of instructional technology resources and support of these resources on the program.

D. LIBRARY RESOURCES

1. Discuss the adequacy of the print and electronic and other resources available through FLITE for the program.
2. Discuss the service and instruction availability provided by the Library faculty and staff with respect to the needs of the program.
3. Discuss the impact of the budget allocation provided by FLITE to your program. Is the budget allocation adequate? Explain.

Section 5: Conclusions based on data analysis derived from Sections 2-4 and on the collective wisdom and judgment of the PRP. In arriving at these conclusions, the PRP should summarize the relationship of the program to each of following specific categories and any other categories it deems appropriate:

A. RELATIONSHIP TO FSU MISSION
B. PROGRAM VISIBILITY AND DISTINCTIVENESS
C. PROGRAM VALUE
D. ENROLLMENT
E. CHARACTERISTICS, QUALITY AND EMPLOYABILITY OF STUDENTS
F. QUALITY OF CURRICULUM AND INSTRUCTION
G. COMPOSITION AND QUALITY OF THE FACULTY

Applied Mathematics/Mathematics Program Review

Fall, 2009

Table of Contents

Section 1: Program Overview

This section consists of an overview of our mathematics programs, including their history, impact, expectations, plans for the future and brief descriptions of each program.

Section 1

Program Overview

The mathematics department at Ferris State University offers a Bachelor of Science degree in Applied Mathematics with five (soon to be six) different application concentrations for students to choose from. Although Ferris has offered an Applied Mathematics degree since the late 1970s, the degree was completely revised in response to the Program Review in the fall of 1997. The main outcome of the review was the idea of dividing our degree into five options, or "concentrations", which would, hopefully, make our program more attractive to students. Several of these concentrations are unique in the state of Michigan. For example, we don't believe any other university or college has a concentration in operations research or industrial mathematics at the undergraduate level. An overview of the six concentrations appears below.

Applied Mathematics (B.S.)

Actuarial Science concentration

Actuarial science deals with the design, financing and operation of insurance plans. Financial security for people and companies is the main goal of an actuary. Typical problems could include setting the premium for automobile insurance, insuring an athlete against injury or determining the pay out for a sweepstakes contest. Actuaries are in demand in business and industry, and the average salary is quite high. Prospective actuaries take a series of tests, and this program prepares students for the first test. Success on this first exam should lead to quick employment.

Applied Mathematics concentration

This concentration is designed for students who want a broad knowledge of mathematics and its many types of applications. Courses in statistics, operations research and computer science can be combined for a well-rounded applied mathematics foundation, which can lead to careers in business and industry.

Computer Science concentration

Virtually every organization relies heavily on computers. Computer scientists write programs, develop algorithms and design software. The field of computational mathematics combines knowledge of computer science with that of mathematics and is in great demand throughout the world.

Industrial Mathematics concentration

Industrial mathematics is a rapidly growing field of applied mathematics. It prepares students to be successful in working in industry. Recent advances in technology have increased the demand for professionals capable of modeling and simulating these technologies. Modeling, analysis and computations performed by mathematicians can provide technical advantages and cost savings, important for a company's future. Applications of industrial mathematics are wide ranging, including areas from aircraft and automobile design to software development, computer security, and weather modeling. In recent years the field has expanded to include non-industrial topics such as supply, distribution, transportation, communication and information handling, medical care and safety.

Operations Research concentration

Operations research is a relatively new field of mathematics having begun during World War II. The military had to answer such questions as "How do we distribute supplies to troops?" or "What is the best way to position our fleet?" Businesses adapted these mathematical techniques to industry for production scheduling, inventory and marketing problems. Operations research deals with determining the optimum way of solving a problem based on a mathematical model. Job opportunities include working in business or industry or for the military.

Statistics concentration

Statistics has been described as the science of making sense of numbers. It involves collecting, analyzing and interpreting data, as well as designing new methods of analysis. Many statistical problems have become so complicated that computers are needed to calculate solutions. A typical statistics problem might be to calculate what degree of confidence a polling firm can claim in its latest Presidential survey. The federal government is a major employer of statisticians, as are many companies in business and industry.

Mathematics (B.A.)

We also offer a Bachelor of Arts (BA) degree in pure mathematics. This degree, along with numerous other BA degrees, was added in the early part of this decade as an attempt to offer Ferris students more of a liberal arts education. The emphasis of this program is on mathematical understanding and theory, rather than on applications. Very few of our students choose this option. Currently we have over 50 majors and only one of them is in the BA program. The applied mathematics coordinator has also been the program coordinator for mathematics, since the program has so few students. We consider the BA degree to be another option for our students.

In this section we will provide information on our programs, their relevance, distinctiveness and value. Detailed checksheets on each of our programs will appear on Section 3.

A. Program Goals

1. The goals of our Applied Mathematics B.S. degree program are as follows:

   a. provide our students with a quality applied mathematics education, exposing them to many applications of mathematics in real-world situations.

   b. A graduate of this program will be able to:

      1. apply the mathematical principles, theory, and concepts in analytical geometry, calculus, linear algebra, statistics and computer programming.

      2. solve applied problems in their specific concentration of mathematics.

      3. analyze real-world problems and appropriately communicate the results.

2. These goals and program outcomes were established by the program coordinator in consultation with the assessment representative of the mathematics department and the department head.

3. The intent of our program is to make our graduates immediately employable in an applied setting or to be able to enter graduate school for further studies. Our program goals were designed with this intent in mind. By introducing our students to as many applied courses as we can, we make them more employable at the end of their undergraduate career.

4. We feel that our goals are very good and don't need to be changed. Individual courses have changed to reflect new techniques and methodologies in the field. For example, in our MATH 360 Operations Research class, the new Karmarkar Algorithm is now discussed when solving linear programming

problems. In earlier years this was not possible due to copyright infringement. Also, our computer science courses are constantly being updated to take into account new software and hardware. This fall we will be teaching programming in the *Python* computer language for the first time.

5. The mission of Ferris State University is as follows:

> *Ferris State University prepares students for successful careers, responsible citizenship, and lifelong learning. Through its many partnerships and its career-oriented, broad-based education, Ferris serves our rapidly changing global economy and society.*

We feel that our program goals are an almost perfect match to this mission. As you will see in Section 2, in every survey we have done there is near-unanimous agreement among students, faculty, graduates, employers, graduating students and our Advisory Board that the applied mathematics program at Ferris State University is in line with the mission of the University.

All of our strategic planning is based on attainment of these goals.

The goal of our Mathematics BA degree program is to provide our students with a quality mathematics education, emphasizing the concepts of mathematical thought and to prepare them for further study in mathematics.

B. Program Visibility and Distinctiveness

1. Our system of offering students six different concentrations to choose from is unusual in the state of Michigan. Our concentrations in industrial mathematics (new next fall) and operations research are **unique** in the state of Michigan and fit perfectly with the mission of Ferris to provide a quality applied education to our students. Graduates of these concentrations will be fully prepared to step into graduate programs in industrial mathematics or operations research or attain jobs in applied mathematics.

2. We feel that our programs are among the most difficult in the University and require a great deal of advanced mathematics. Having quality students is essential for the success of our programs. Many of our students come out of high school with very good mathematical backgrounds. The Ferris Honors Program has been a great success in bringing top students to Ferris. We make a concentrated effort to recruit Honors Program students with mathematical abilities into our programs, and have been quite successful in doing so. We also make an effort to attract students who initially enroll in pre-pharmacy or pre-optometry who might be interested in an alternative degree program. These are usually among the best students at the University. Similarly, students enrolled in mathematics education are encouraged to pursue a second degree in applied mathematics or, in some cases, to consider switching majors also. The Allan Puterbaugh mathematics scholarship is specifically designed for incoming freshmen, and we have used this scholarship as a recruiting tool in the past. Often a non-math major will stand out in a low-level mathematics class and will then be encouraged to consider the mathematics options available. We feel that through all of these activities we attract students with the desire and ability to be successful in our programs.

3. There are several universities in Michigan that offer B.S. programs in actuarial science (e.g., Grand Valley State University, University of Michigan, Central Michigan University and Eastern Michigan University). Michigan Tech offers an actuarial concentration similar to ours.

   As mentioned earlier, the concentrations in industrial mathematics and operations research are unique in the state of Michigan, although several universities offer Masters programs in these areas. Western Michigan University offers a Masters degree in operations research and Michigan State University offers a Master's degree in industrial mathematics.

   Other institutions in Michigan offer degrees in applied mathematics including University of Michigan, Michigan State University and Western Michigan University, and we have learned from these programs, but none of them have the combination of choices that we offer to our students.

   Almost every university in the state offers a degree similar to our BA degree in mathematics. There is nothing that makes our program stand out. It simply gives our students another option in their collegiate plans.

   a. Although our actuarial science concentration cannot compare to a full B.S., our requirements prepare our students for the first actuarial test and in some cases provide more mathematics classes than some of the other universities. They require more economics and finance classes than we do, although our students are encouraged to take these extra classes as electives.

      One of the professors in the WMU Masters program, Dr. Steven Butt, is a member of our Advisory Board and currently has one of our students nearing completion of the Masters at WMU. Our industrial mathematics concentration is modeled on the requirements for entry into the industrial mathematics Masters program at Michigan State University. These are programs that our students could naturally go into after graduation, if that is their wish.

None of the applied mathematics programs offer the combination of choices that we offer to our students.

b. We can learn a lot from these other programs. In the case of the Masters programs, we have already adjusted our courses to better prepare our students for graduate school. By monitoring the other applied mathematics programs, we can more easily become aware of trends or changes in the applied mathematics curriculum. We look at our programs as constantly evolving over time, changing when necessary to changing times. These other programs help give us a window into the dynamic world of applied mathematics and help us ensure that our programs are relevant in today's world and compare to the programs offered by our main competitors.

Note: Although not specifically asked for in this document, we would like to add here a short discussion on the similarities and differences between our computer science concentration and the CIS program in the College of Business. While the two programs may appear superficially similar in content, there are vast differences between them. A CIS graduate typically has a mathematics background through college algebra, whereas an applied mathematics/computer science graduate has a mathematics background well beyond calculus. The types of applications solved by a CIS student are primarily business-related, whereas the applications encountered by our students are mathematically and scientifically oriented. The types of jobs the students would apply for can be quite different. We feel that our computer science concentration is very distinctive within Ferris State University and offers students mathematical challenges they could not get from the CIS program.

C. Program Relevance

1. Below is a labor market demand analysis both on a national level and as it applies to our program.

National Surveys

There is a great demand for graduates in the mathematical sciences. The National Science Foundation regularly conducts surveys of bachelor's degree graduates in the mathematical sciences through its Division of Science Resources Studies. The most recent comprehensive survey of these graduates is the 2006 survey, which uses data from the previous three years.

We have included some of the pertinent tables in Appendix E of this report. To summarize the tables, the survey received over 44,000 responses from graduates in the mathematical sciences within the three years of the survey. Of these respondents, 48% had jobs in education or were pursuing an advanced degree, 46% in business and industry and 6% in government, and an insignificant number (< 100) were neither employed nor going to school. The median salary for these recent graduates was around $37,000. 55% of these graduates were male and 45% female.

In the field of computer and information sciences, 164,000 responses were received with only insignificant numbers (< 100) indicating not pursuing a higher degree or unemployed. Their median salary was around $45,000. There were dramatic differences between males and females in this field, with 75% of the respondents being male, 25% female. This is approximately what the ratio was six years ago.

Summarizing from this data, it can be concluded that the mathematical sciences, especially computer science, remain a strong area for students to pursue in order to receive a good job at the end of their collegiate studies. There is no evidence that this will change in the foreseeable future and the demand for graduates with a mathematical and computer science background may actually increase in the years ahead.

FSU Applied Mathematics/Mathematics Program

Our students have traditionally done very well after graduation at securing good quality jobs related to their field of study. For the purposes of this report, we want to concentrate only on our graduates within the past twelve years, since that is the time frame for the evaluation of our new degree with its numerous specialty concentrations.

Several of our recent graduates have chosen to pursue advanced degrees. One student, who graduated under the statistics concentration, completed her Masters degree in statistics from the University of Michigan, having received an assistantship to help in her education. She received several teaching awards and is now a tenured Associate Professor in our department. Several graduates from our actuarial science concentration have completed all of the series of actuarial tests and are currently employed in very prestigious jobs. A graduate of our operations research concentration is nearing completion of his Ph.D. at North Carolina State University.

Other graduates have become employed directly after graduation in business and industry. Auto Owners, State Farm, Allstate, Ford and Ferris State University are some of the companies that have hired our graduates. Many of our graduates have become teachers, having pursued dual degrees in education and mathematics.

Our program suffered from low enrollment before the program was revised into concentrations. We think that the above record of employment is one to be proud of and we continually strive to help our students attain good jobs after graduation.

2. Our programs are constantly assessing changes in mathematics and trying to respond to those changes and innovations. The introduction of our new concentration in industrial mathematics and the major overhaul of our computer science concentration are prime examples of our willingness to adapt our programs to emerging issues. There are plans to change the computer science concentration into a separate degree program, very much enhanced, in computational science.

3. Approximately one-quarter of our students come to Ferris to major in mathematics. Many of our majors come from other programs in the University. For example, we get a lot of our students from the pre-pharmacy and pre-optometry programs. Once they start these programs, some students decide that health science isn't the field they want to go into, or they fail to make it into the program. We also got a lot of majors from the Honors Program during orientation and their first year at Ferris.

a. Below is a summary of the results of our graduate exit survey and our student program evaluation survey. More information can be found concerning these surveys in Section 2 of this report, with all comments appearing in Appendix B.

Graduate Exit Survey

We are very pleased with the responses to this survey. It appears that our graduates, at least the last seven graduates who taken our newly developed exit survey, are satisfied with the education that we have provided them and with their preparation for the future. We had unanimous consent from these students that the program provided them with a good understanding of mathematics and how to apply it to real-world problems. Concerning the answers to question number 6, the cancellation of required classes, this continues to be an ongoing problem. As is mentioned in several different places in our report, sometimes upper-level classes are cancelled due to low enrollment. This seems to be a recurring theme with our programs. We are currently working with the department head to try to alleviate the need for cancelled classes. In our Strategic Planning document for spring of 2009, we have attempted to take the first steps in this direction. A schedule of when classes will be offered has been developed and will be adhered to as much as possible. There are several courses that only meet once every two years and students are encouraged to register for these courses when they are offered if they hope to graduate on time.

Student Program Evaluation

We are basically pleased with the responses from this survey, although they highlighted some areas we need to work on in the future. We note that the best responses we received, 4.50 and 4.46 averages, came on the last two questions, asking about their experience at Ferris and their satisfaction with their education. Some of their comments were very enlightening. Several students commented on the lack of rigor in our program and the difficulty they have had continuing on to graduate school. A common theme running through all of these surveys is the frustration felt by students who sign up for classes that are subsequently cancelled, or required classes that are not offered in a timely manner. This will be a major topic of discussion within our department as we move forward.

b. Student sentiment is measured in numerous ways. We survey our students every semester as they prepare to graduate, using the above mentioned exit interviews. We also take surveys of our terminal classes every semester to gauge the preparedness of our students for these classes. The results of these terminal class surveys can be found in Section 3, subsection K on assessment.

In addition to these measurements, each of our majors meets with an advisor every semester to talk about their progress and hear any comments they wish to make concerning our programs. We also do a complete student survey every six years as part of the Academic Program Review Process.

D. Program Value

1. The University benefits greatly from the mathematics programs at Ferris. The emphasis at Ferris State University has always been, and is now, on applying knowledge to solve real-world problems. Mathematics, the "Queen" of the sciences, is the perfect subject to lead Ferris in this endeavor. Our applied mathematics program is unique in the state of Michigan and two of our concentrations are the only ones of their kind in the state. This positions the department to play a major role in carrying out the mission of the University.

2. Similarly, our students benefit from our programs by being exposed, through classes and other experiences, to real-world applications of mathematics, which make them able upon graduation to start helping the world run more efficiently. Several of our faculty members have distinguished records in teaching, research or real-world experience and bring a wealth of knowledge, not to mention excitement, to our students.

3. Members of the Mathematics Department were surveyed. Of the 21 tenured or tenure-track members of the department, 13 submitted completed surveys. We consider this to be a very good return rate, since a number of our faculty are not directly involved in teaching the courses required for our degree programs. The questionnaire consisted of seven questions and the opportunity to write comments.

   There is unanimous agreement on several issues; namely, that the Applied Mathematics/Mathematics programs are in line with the mission of Ferris State University and that the coordinators do an effective job in advising students. It is interesting to note that in every question, the perception of the faculty has improved from the previous survey in the answers to every question except one and it remained the same in that one question. This demonstrates a real improvement in the perception of our programs among the faculty since the last review six years ago. More comments on the faculty survey can be found in Section 2 and a complete list of the comments appears in Appendix B. We tried to contact the employers of each of the graduates in our program since the program has been restructured into concentrations and were successful in contacting 11 employers. The survey consisted of seven questions and the opportunity to write comments.

We are very pleased with the responses from this survey. We note that not one employer gave us a rating of less than 3 on any question. These employers represent insurance companies, academic institutions, and companies in business, industry and health. We are particularly encouraged that the highest rating in any one question is in #7" "Overall I have a positive impression of graduates of the Applied Mathematics program at Ferris." Previous surveys have never had enough responses to infer anything about our graduates. More comments on the employer survey can be found in Section 2 and a complete list of the comments appears in Appendix B.

4. Our faculty are very involved in numerous professional activities external to the university. For complete information on the professional activities of our faculty, please refer to Appendix D. Here is a partial list of some of the more noteworthy achievements of our faculty.

a. Dr. David Burns has reviewed over 100 publications in the field of graph theory.

b. Robert McCullough has reviewed over 70 publications for *Science Books & Films*.

c. Many of our faculty routinely attend national and international conferences and make presentations. For example, Dr. Bahodir Siddikov recently was chair of a discussion at two different international math conferences, in addition to making presentations himself.

d. Several of our faculty have applied for and received external grants for educational purposes. For example, Dr. Hengli Jiao is currently administering the S-STEM scholarship program at Ferris.

e. Several members of our department have had notable publications. For example, Robert McCullough has recently had the third edition of his textbook *Mathematics for Computer Technology* published by Morton Publishing Company.

f. Many of our faculty are active members of professional mathematics and computer science organizations, including the Mathematical Association of America (MAA), the American Mathematical Society (AMS), the National Council of Teachers of Mathematics (NCTM), the National Association of Developmental Education (NADE) and the Society of Industrial and Applied Mathematics (SIAM), among others.

5. Our faculty have volunteered their time in many extra-University general public endeavors. For complete information on these activities of our faculty, please refer to Appendix D. Here is a partial list of some of the achievements of our faculty in this area.

a. Robert McCullough has conducted over 130 presentations to local (and national and international) groups on space exploration. He has also been involved with the MATHCOUNTS program for middle school students, also serving as the moderator of the Countdown Round.

b. Several faculty members (most notably Phil Stich who retired last May) have been extensively involved with Habitat for Humanity.

c. Fran Allegretto has volunteered her time in numerous local community endeavors, including the Big Rapids library and the Recycling Center.

These activities help the programs and the Big Rapids area by making the Ferris State University mathematics department more visible in the community, and indirectly helping with recruitment.

Section 2: Collection of Perceptions

This section consists of the tabulated results of our surveys of graduates, employers, exit interviews, students, faculty and our Advisory Board. Each subsection includes preliminary data when appropriate, detailed results and a brief analysis of the results of each survey.

A. Graduate Follow-up Survey

We tried to contact each of the graduates in our programs since the applied mathematics program has been restructured into concentrations and were successful in contacting 24 graduates out of a total of 58. This represents a contact rate of 41.3%, which is slightly better than our last survey (38%), but is more than three times the number of graduates as last time (7) who responded.

Many graduates seemed to shy away from interviews and some were reluctant to have us contact their employer. We are pleased with the return rate of our surveys and expect that they will give us a good picture of where we stand and what improvements we can make in the programs.

The survey consisted of seven questions and the opportunity to write comments. A copy of the survey, the responses to each question and a short analysis of the results appear on the following pages

Graduate Survey

Answer each question as follows:

5. Strongly agree
4. Agree
3. No opinion
2. Disagree
1. Strongly disagree

1. Graduates of the Applied Mathematics program at Ferris are capable of applying their education to practical situations.

Rating	5	4	3	2	1	
# of responses	10	12	1	1	0	Average: **4.29**

2. Students from the Applied Mathematics program at Ferris have training/knowledge comparable to those from other universities working in the same field.

Rating	5	4	3	2	1	
# of responses	6	8	6	4	0	Average: **3.67**

3. The academic rigor of the required courses in the Applied Mathematics program adequately prepares students for the job market.

Rating	5	4	3	2	1	
# of responses	5	13	2	4	0	Average: **3.79**

4. The Applied Mathematics programs are in line with the mission of Ferris State University.

Rating	5	4	3	2	1	
# of responses	8	11	5	0	0	Average: **4.13**

5. Students in the Applied Mathematics program at Ferris are taking the kinds of classes that are necessary for success in the job market.

Rating	5	4	3	2	1	
# of responses	9	11	3	1	0	Average: **4.17**

6. Overall I have a positive impression of the Applied Mathematics program at Ferris.

Rating	5	4	3	2	1	
# of responses	14	9	0	1	0	Average: **4.50**

7. I am satisfied with the mathematics education I received at Ferris State University.

Rating	5	4	3	2	1	
# of responses	12	11	1	0	0	Average: **4.46**

Please make any comments you would like to make concerning the Applied Mathematics program at Ferris State University.

Analysis of Graduate Follow-up Survey

We are basically pleased with the responses from this survey, although they highlighted some areas we need to work on in the future. We note that the best responses we received, 4.50 and 4.46 averages, came on the last two questions, asking about their experience at Ferris and their satisfaction with their education.

Some of their comments were very enlightening. Several students commented on the lack of rigor in our program and the difficulty they have had continuing on to graduate school. A common theme running through all of these surveys is the frustration felt by students who sign up for classes that are subsequently cancelled, or required classes that are not offered in a timely manner. This will be a major topic of discussion within our department as we move forward. Below is a sample of some of the comments made by our graduates. A complete list of every comment made by our graduates appears in Appendix B.

Excellent program. Prepared me well for my graduate studies. I am about to receive my Ph.D. in astronomy.

Frustrating scheduling of classes. Couldn't take courses that you wanted. Tried to go to graduate school in Applied math but felt unprepared. Really struggled with material.

Overall classes seemed fine while taking them, but currently in graduate school, others seem better prepared.

If I would suggest anything, I would try to make research opportunities available. That process teaches experiences that are priceless.

B. Employer follow-up survey

We tried to contact each of the graduates of our programs since the applied mathematics program has been restructured into concentrations and were successful in contacting 24 graduates out of a total of 58. Of these 24 students, we were able to contact 11 employers, nearly 50%, compared to only 4 employers from the last review.

Many graduates seemed to shy away from interviews and some were reluctant to have us contact their employer. We are pleased with the return rate of our surveys and expect that they will give us a good picture of where we stand and what mprovements we can make in the programs.

The survey consisted of seven questions and the opportunity to write comments. A copy of the survey, the responses to each question and a short analysis of the results appear on the following pages.

Employer Survey

Name ________________________

Name of Organization ________________________

Work Address ________________________

Work Phone ________________________

Answer each question as follows:

6. Strongly agree
5. Agree
4. No opinion
3. Disagree
2. Strongly disagree

1. Graduates of the Applied Mathematics program at Ferris are capable of applying their education to practical situations.

Rating	5	4	3	2	1	
# of responses	6	5	0	0	0	Average: **4.55**

2. I would consider hiring more graduates of the Applied Mathematics program at Ferris State University.

Rating	5	4	3	2	1	
# of responses	6	5	0	0	0	Average: **4.55**

3. Students from the Applied Mathematics program at Ferris have training/knowledge comparable to those from other universities working in the same field.

Rating	5	4	3	2	1	
# of responses	2	3	6	0	0	Average: **3.64**

4. The academic rigor of the required courses in the Applied Mathematics program adequately prepares students for the job market.

Rating	5	4	3	2	1	
# of responses	2	5	4	0	0	Average: **3.81**

5. The Applied Mathematics programs are in line with the mission of Ferris State University.

Rating	5	4	3	2	1	
# of responses	5	1	5	0	0	Average: **4.00**

6. Students in the Applied Mathematics program at Ferris are taking the kinds of classes that are necessary for success in the job market.

Rating	5	4	3	2	1	
# of responses	2	5	4	0	0	Average: **3.82**

7. Overall I have a positive impression of graduates of the Applied Mathematics program at Ferris.

Rating	5	4	3	2	1	
# of responses	8	2	1	0	0	Average: **4.64**

Please make any comments you would like to make concerning the Applied Mathematics program at Ferris State University.

Analysis of Employer Follow-up Survey

We are very pleased with the responses from this survey. We note that not one employer gave us a rating of less than 3 on any question. These employers represent insurance companies, academic institutions, and companies in business, industry and health. We are particularly encouraged that the highest rating in any one question is in #7" "Overall I have a positive impression of graduates of the Applied Mathematics program at Ferris." Previous surveys have never had enough responses to infer anything about our graduates.

Only a few employers made comments and they are all included here and also in Appendix B.

> *Both employees I have from FSU's Applied Math program are able to "think" and 'work through" problems without direct supervision – this is a big plus.*
>
> *Very happy with Eric.*
>
> *Jennie's college career also included an advanced degree from University of Iowa, which is difficult to separate from her Ferris State education. However, we are very happy with Jennie's work and mathematical skills.*
>
> *For this rating I tried to assume that I knew nothing about the FSU program other than being familiar with Holly's work.*

C. Graduating student exit survey

As part of our annual assessment, two years ago the mathematics department developed an exit survey to give to our graduating students. This will be an ongoing task which we hope to give to all of our graduating students in the future. We have collected surveys from our last seven graduating students. It is our hope that the information given in these surveys by our graduating students will help us to improve our degree programs. We realize that these students are just leaving Ferris and have yet to begin their professional careers, so their responses will be taken as one piece of data on our programs to be combined with other assessment tools to help us move forward. The survey consisted of six questions and the opportunity to write comments. A copy of the survey, the responses to each question and an analysis of the results appear on the following pages.

Mathematics Department Graduation Exit Survey

1. Are you satisfied with the mathematics education that you have received at Ferris State University?

7: yes

2. Do you feel that your mathematical background has prepared you well for pursuing your career goals?

7: yes

3. Do you feel that you now have a good understanding of mathematics and how it relates to real-world problems?

7: yes

4. Were the mathematical prerequisites for your course appropriate?

7: yes

5. Would you recommend any changes in the prerequisites

7: no

6. Sometimes upper-level mathematics/computer science courses are cancelled due to low enrollment. Has this practice slowed down or disrupted your pursuit of a degree?

5: no
2: yes

7. Do you have any suggestions for improvement of the applied mathematics program or any comments you would like to make concerning this program?

All 7 students made comments*

* See the following page for a summary of these comments and Appendix A for a complete list of the comments.

Analysis of Graduation Exit Interview

We are very pleased with the responses to the first five questions. It appears that our graduates are satisfied with the education that we have provided them and with their preparation for the future. Concerning the answers to question number 6, this continues to be an ongoing problem. As is mentioned in several different places in our report, sometimes upper-level classes are cancelled due to low enrollment. This seems to be a recurring theme with our program. We are currently working with the department head to try to alleviate the need for cancelled classes. In our Strategic Planning document for spring of 2009, we have attempted to take the first steps in this direction. A schedule of when classes will be offered has been developed and will be adhered to as much as possible. There are several courses that only meet once every two years and students are encouraged to register for these courses when they are offered if they hope to graduate on time.

A complete list of all comments made on these surveys appears in Appendix B. Some of the comments made by our students include:

> *Help with job placement!*
>
> *Make a Master's program and I would come back for sure.*
>
> *I got a job before graduating*
>
> *More computer-related courses*

Several graduates mentioned the desire to have a Master's program offered at Ferris. With the introduction of our newest concentration in industrial mathematics, the idea has been mentioned of expansion to a Master's degree in industrial mathematics as a long-term goal, once the enrollment has increased to a point where class cancellation is no longer a worry. Other students mentioned the need for more computer science courses. At present we offer a concentration in computer science, which is being completely rewritten in a proposal that is currently being reviewed by the University Curriculum Committee for implementation in the spring of 2010. Our latest Strategic Planning document includes a plan to establish a bachelor's degree in computational science to replace the current concentration within applied mathematics. If approved, this degree could be in place in three years. Some students were concerned about job placement and their ability to be employed after graduation. We need to do a better job in this regard. This topic will be covered in more detail in the response to our graduate survey.

D. Student program evaluation

The chairperson of the mathematics department, Dr. Kirk Weller, met with students in our programs individually in his office to discuss their future and to get results for our survey. Of the approximately 30 students who were enrolled in applied mathematics/mathematics at the time, he collected responses from 14 students who had been in the program long enough to offer opinions. The survey consisted of eight questions, five of which asked for a rating from 1 to 5, with 5 being the highest rating, and the opportunity to write comments. The survey, average of each response, a complete list of student comments and a short analysis of the results appear on the following pages. A complete list of student comments also appears in Appendix B.

Student Survey

In questions 1 – 5, answer each question as follows:

7. Strongly agree
6. Agree
5. No opinion
4. Disagree
3. Strongly disagree

1. Computer hardware /software is adequate for the needs of the program.

Rating	5	4	3	2	1	
# of responses	6	6	0	0	0	Average: **4.5**

2. The coordinators do an effective job in advising students.

Rating	5	4	3	2	1	
# of responses	5	7	2	0	0	Average: **4.2**

3. Opportunities are provided for related work and/or internship experiences.

Rating	5	4	3	2	1	
# of responses	1	1	5	5	0	Average: **2.8**

4. I am satisfied with the instruction in the program.

Rating	5	4	3	2	1	
# of responses	4	7	1	2	0	Average: **3.9**

5. I am satisfied with my mathematics education at Ferris State University.

Rating	5	4	3	2	1	
# of responses	2	10	1	1	0	Average: **3.9**

6. Are there any courses that you would have liked to have taken but were not offered?

- Was able to fit everything, some would have been nicer to take earlier, though.
- Advanced calculus
- Could be better with some required business classes.
- I wanted to take the applied analysis class but I was not able to take it. I am very curious about it and how it can help me.
- Yes, but graduating sooner was more important. The classes are only offered every other year.

7. What was the most positive experience you have had as an applied mathematics major?

- The classes themselves and the ability to work with the professors.
- Attending a math class and genuinely having fun learning higher level material.
- It's nice to have the professors take the time to get to know you.
- My advisor helped rearrange my schedule to graduate on time.
- Getting to know most of my instructors on a one-on-one basis; I like the small classes.
- Having Jennifer come and speak was a very positive experience.
- My advisor and some of my professors. They are very helpful and will sit down and try to help you any way they can.
- One-on-one help that most of the teachers have offered.
- Faculty is very helpful.

8. Do you have any concerns about the applied mathematics program and any suggestions for improvement?

- Scheduling of major classes like 414 and 416 for every year.
- Possibly more required electives – the common problem of course offerings.
- Everything has been satisfactory, although chances for internships or possibly advised research would have been nice.
- I feel the business aspect of it should be included/required.
- Only concern would be that some courses that are offered every once in a while should have the best possible professor for them.
- My only concern is the job possibilities out there for me. There are not a lot of things around campus that helped so I am basically left to find out on my own.
- Fulfill purpose – department unity, course objectives.
- Evaluations of teachers should affect their ability to teach these courses again.
- Classes offered more often, and maybe a broader base of classes.
- I feel internship opportunities would help.

9. Please feel free to make any comments, good or bad, concerning the applied mathematics program.

- More information on scholarships and more outside class work dealing with the department.
- Teachers are good and helpful – try to accommodate students the best they can.
- It would be great to see some job placement or internship opportunities.
- I would like to see classes not be cancelled due to small class size, especially for specialized classes that may only be offered once a year.
- All the math professors I have had are very willing and flexible about working with students outside of class.
- Overall, it is good, the courses and faculty are great.

Impressions of students' discussions

Students seem to be concerned about the regularity of course offerings. This may have been addressed (in the short term) with the proposed new two-year schedule.

Several students want more electives. However, the issue, as we were able to determine, is not so much about course choice as it is about avoiding certain professors.

Students seem to be concerned about job opportunities. They realize that mathematics majors can obtain jobs in a variety of fields, but they don't know where to look. Unlike teaching, where one can actually go to a career office and obtain specific job postings, knowing where to look for jobs for mathematics majors is very difficult.

Students really like having former students come back to make presentations about their careers in mathematics-related fields.

Many of our students would like to apply for internship experiences but do not know how to go about this.

E. Faculty perceptions

Members of the Mathematics Department were surveyed. Of the 21 tenured or tenure-track members of the department, 13 submitted completed surveys. We consider this to be a very good return rate, since a number of our faculty are not directly involved in teaching the courses required for our degree programs. Our department teaches many courses in support of other programs throughout campus and approximately one-third of our faculty teach primarily these service courses and have no direct involvement in our BA and BS programs. Perhaps these faculty members don't feel qualified to offer opinions on our programs. The questionnaire consisted of seven questions and the opportunity to write comments. The surveys were handed out to all faculty members and they were given several weeks to complete them. The survey, average of each response and a short analysis of the results appear on the following pages.

Faculty Survey – Results (last review average in parentheses)

Answer each question as follows:

8. Strongly agree
7. Agree
6. No opinion
5. Disagree
4. Strongly disagree

2. The Applied Mathematics/mathematics program is in line with the mission of Ferris State University.

Rating	5	4	3	2	1	
# of responses	12	1	0	0	0	Average: **4.92** **(4.9)**

3. Adequate funds are provided by the University to support the achievement of program objectives.

Rating	5	4	3	2	1	
# of responses	2	2	7	2	0	Average: **3.08** **(2.9)**

4. The coordinators do an effective job in advising students.

Rating	5	4	3	2	1	
# of responses	12	1	0	0	0	Average: **4.92** **(4.8)**

5. The academic rigor of the required courses in the program adequately prepares students for the job market.

Rating	5	4	3	2	1	
# of responses	6	7	0	0	0	Average: **4.46** **(3.7)**

6. Computer hardware is adequate for the needs of the program.

Rating	5	4	3	2	1	
# of responses	2	3	6	2	0	Average: **3.38** **(3.0)**

6. Program coordinators are well-versed in the requirements of the job market and aid the department in the formulation of new objectives for courses and programs.

Rating	5	4	3	2	1	
# of responses	7	6	0	0	0	Average: **4.54 (4.3)**

7. Ferris has an effective system for locating jobs and placing students in these programs.

Rating	5	4	3	2	1	
# of responses	1	3	6	2	0	Average: **3.00 (3.0)**

Analysis of Faculty Questionnaire

There is unanimous agreement on several issues; namely, that the Applied Mathematics/Mathematics programs are in line with the mission of Ferris State University and that the coordinators do an effective job in advising students. However, there seems to be a real concern among the faculty as to the amount of support the program receives from the Administration. This concern also leads to another concern about the rigor of our program. A complete list of all comments made on these surveys appears in Appendix B. Some of the quotes from the surveys:

"Great program! Keep it going!"

"Computer science especially is underfunded."

"One immediate and easy fix the Dean's Office could make would be to let more (or any) of our smaller upper level courses go. Our students (and teachers) become discouraged when these courses are cancelled."

"Applied Mathematics is not an easy major. Our students are among the best the University has to offer, and they should have the opportunity to take all courses the department offers. Low enrollment classes should be allowed to go regardless of the enrollment in them. To do otherwise is to cheat the students of a quality education."

It is interesting to note that in every question, the perception of the faculty has improved from the previous survey in the answers to every question except one and it remained the same in that one question. This demonstrates a real improvement in the perception of our programs among the faculty since the last review six years ago.

For too many years there has been the perception among the faculty that our program suffers because the high-level classes are either not offered or are cancelled because they don't reach the magic number of students required by the Dean's Office. This perception is based on fact, as many upper level classes are not offered. The frequency of course cancellations varies from semester to semester. This semester CPSC 300 Data Structures and CPSC 340 Hardware and Software Organization were allowed to run with 4 students each. Class cancellations often require the coordinator to substitute other classes for the required classes, since this is not the fault of the students, which results in lowering the standards for our degrees. The program coordinator tries to substitute appropriate classes for those that are cancelled to minimize the effect of the cancellation, but sometimes no similar class exists and a substitution is not possible. Sometimes the substitution is another upper level mathematics class and other times it is a class from some other department (CIS, for instance). While we appreciate the efforts of administrators to offer classes with low enrollments, the problem of cancellation still exists. There are usually two courses each semester that are in peril of being cancelled. Some faculty members won't volunteer to teach the upper level classes simply because they are afraid of the classes being cancelled and their schedules affected.

The committee believes that adequate funding has been provided to the program and that the funding level is adequate at this time to continue the program with no changes. As the program grows, more funding may be needed. The relatively low rating in this category on the faculty survey may be in part because many of the mathematics faculty are dissatisfied in general with the administration and the survey provides them with a means of venting their displeasure.

We don't believe there is a deficiency of computer software or hardware that impacts the program at this time. With the recent hiring of Dr. James Nystrom and the pending redesign of the computer science concentration, however, we may need additional funding for computer software and/or hardware in the future.

Again the reason for the relatively low rating in this area may lie with the mathematics faculty and their perceptions of administration in general.

Several of our students have acquired internships on their own. There has not been any organized attempt to involve students in internships. This is a matter that we need to address in the future.

As will be mentioned elsewhere in this report, the math department is one of the most productive, as far as total number of student credit hours produced, in the entire University through our low-level courses. Perhaps this is some justification for allowing low enrollment courses to run.

F. Advisory Board perceptions

Our initial Advisory Board was formed twelve years ago by department head Dr. John Hansen for the Academic Program Review at that time. The initial board consisted of three people that he knew in business and industry. By the time of the last Academic Program Review six years ago, the Board had grown to six people. Currently there are seven members of our Advisory Board. These members possess a wide range of interests and expertise that should help our programs grow in coming years. They include people from academia, business and industry and include former students and administrators from our department.

On several occasions in the past two years we have invited some of these people to our campus to discuss our programs and give presentations to our faculty and students. This past fall Dr. Steven Butt from Western Michigan University, a key advisor in our operations research concentration, came to FSU with another professor and one of our former students, Amanda Glick, who is now working on her Master's degree at WMU, to give a presentation on their program and how operations research can be applied in the real-world. Earlier in the fall Jennifer McGinnis, a former student in our actuarial science concentration and the newest member of our Board, gave a presentation, which was attended by a very large number of our students, on her success in the actuarial field. We feel that our Board represents a good cross-section of the kinds of people that we need to advise us as our programs move forward. Each of our applied concentrations is covered by at least one member of the Board.

A survey was given to each of the seven members of the Board consisting of six questions and the opportunity to write comments. In some cases we also received verbal responses. All seven Board members returned the survey. A listing of the members of our Board and their background appears on the next page, followed by the results of our survey and an analysis of these results on succeeding pages.

Members of the Applied Mathematics/Mathematics Advisory Board

1. **Mr. Sam Burgess**, Programmer/Project Director, Professional Services Division, Compuware Corporation, Detroit, Michigan. Some of his assignments have included the creation and implementation of statistical databases. He has been a member of our board since it's' inception in 1997.

2. **Dr. Steven Butt**, Professor of Industrial and Manufacturing Engineering, Western Michigan University, Kalamazoo, Michigan. He has a Ph.D. in Industrial Engineering and Operations Research. He has come to Ferris on two occasions in the past three years to talk to our students about future options for education and employment in operations research. He has been a member of our board since 2003.

3. **Ms. Tegan (Reist) Fisher**, Sr. Commodity Manager, Allstate Insurance Company, Murray, Utah. Tegan is a graduate of our Applied Mathematics program in the actuarial science concentration. She won numerous scholarships and awards while a student at FSU. She has been a member of our board since 2003.

4. **Dr. John Hansen**, Professor of Computer Science, Saginaw Valley State University, Saginaw, Michigan. He is as former department head of our mathematics department and the architect of our revised applied mathematics program into separate concentrations. He has been a member of our board since its' inception in 1997.

5. **Mr. Robert McCullough**, Professor and Program Coordinator for the Applied Mathematics/Mathematics programs, Ferris State University, Big Rapids, Michigan. He has been a member of our board since its' inception in1997 and has been the coordinator for the same period of time.

6. **Ms. Jennifer (Sternemann) McGinnis**, Vice President, Swiss Re, Fort Wayne, Indiana. Jennifer is a graduate of our applied mathematics program in the actuarial science concentration. She went on to earn a Master's degree from the University of Iowa in actuarial science and has passed all of the qualifying exams offered for actuaries. This past fall she returned to Ferris to give a very well-attended talk to our students and faculty about actuarial science as a career. She has been a member of our board since 2008.

7. **Dr. Kirk Weller**, Department Head, Mathematics, Ferris State University, Big Rapids, Michigan. He has been the department head and a member of the Board since 2008.

Advisory Board Survey

Name ______________________

Name of Organization ______________________

Work Address ______________________

Work Phone ______________________

Answer each question as follows:

9. Strongly agree
8. Agree
7. No opinion
6. Disagree
5. Strongly disagree

7. Graduates of the Applied Mathematics program at Ferris are capable of applying their education to practical situations.

Rating	5	4	3	2	1	
# of responses	6	1	0	0	0	Average: **4.86**

8. Students from the Applied Mathematics program at Ferris have training/knowledge comparable to those from other universities working in the same field.

Rating	5	4	3	2	1	
# of responses	4	1	1	1	0	Average: **4.14**

9. The academic rigor of the required courses in the Applied Mathematics program adequately prepares students for the job market.

Rating	5	4	3	2	1	
# of responses	4	3	0	0	0	Average: **4.57**

10. The Applied Mathematics programs are in line with the mission of Ferris State University.

Rating	5	4	3	2	1	
# of responses	7	0	0	0	0	Average: **5.00**

11. Students in the Applied Mathematics program at Ferris are taking the kinds of classes that are necessary for success in the job market.

Rating	5	4	3	2	1	
# of responses	4	2	1	0	0	Average: **4.43**

12. Overall I have a positive impression of graduates of the Applied Mathematics program at Ferris.

Rating	5	4	3	2	1	
# of responses	5	2	0	0	0	Average: **4.71**

Please make any comments you would like to make concerning the Applied Mathematics program at Ferris State University.

Analysis of Advisory Board Survey

We believe that we have a very distinguished Advisory Board and we are happy to receive their input. We are encouraged by the positive response we received from our Board members. Some of them chose to make comments and suggestions, while others did not. A complete list of every comment made by our Board members appears in Appendix B. Here are some of the comments received.

I think each group of coursers were very well chosen for their respective concentration; enhancing the basic skills that will be required.

Your program prepares graduates for diverse professional careers in areas where mathematics is applied as well as for graduate study in mathematics and a wide variety of disciplines which depend heavily on mathematics

I hope to have future Ferris students from the Applied Math program consider enrolling in our Operations Research or Industrial Engineering programs at Western Michigan University.

I think the department is basically on the right track.

While the general consensus of the Board was favorable, there were some concerns raised by the Advisory Board survey. One Board member was concerned that our actuarial science concentration did not compare favorably with those institutions offering Bachelor's degrees in actuarial science, although as a concentration it serves our students well. A suggestion was made that we consider adding some more courses to the actuarial science concentration , or at least recommend them to our students, Another Board member thought that we should increase opportunities for internships and research projects to provide our students with more opportunities and help them gain employment after graduation. One other Board member suggested adding a Physics requirement to the new industrial mathematics concentration. These suggestions are very good and we will consider incorporating them into our department Action Plans in the future.

It should be noted that we have made several changes in our concentrations since the last Academic Program Review six years ago based on suggestions of our Advisory Board. Specifically, we have added a computer simulation course to our operations research concentration, have introduced a new concentration in industrial mathematics and are rewriting the computer science concentration. All of these actions come directly from comments and suggestions our Board gave us last time.

Although we are pleased with the makeup of our Board, we hope to add additional members to our Advisory Board in the future, to keep us in touch with changing times.

Section 3: Program Profile

This section starts off with the last Yearly Administrative Report (YAR), which occurred in 2006, followed by more up-to-date evaluations of our students, enrollment, faculty and curriculum.

Yearly Administrative Review Program: Applied Mathematics/Mathematics

Purpose of Administrative Program Review

1. to facilitate a process led by the deans and department heads/chairs to assess and evaluate programs under their supervision
2. to facilitate long term planning and recommendations to the VPAA
3. to collect and analyze information that will be useful in the University's accreditation efforts; Academic Program Review deliberation; and assessment.

Instructions: Please prepare a report following the outline below.

I. Summary of Modifications since last report:

Please provide a brief summary of the changes that have taken place in the program since the last report.

Since the last report, there have been several substantial changes involving assessment. We have identified specific learning outcomes for our program. This past fall we have developed a questionnaire and started collecting data on students in courses that have been identified as "key" courses in our curriculum. An exit interview for graduating students has also been developed and used for the first time this past semester. Course learning objectives in one key course have been determined with more to follow next semester. We hope to use all of this information to improve our program in the future.

II. Program Assessment/Assessment of Student Learning

a) What are the program's learning outcomes?

1. Know and understand the basic mathematical principles, theory and concepts in our basic mathematics courses, including analytical geometry and calculus 1, 2 and 3, linear algebra, statistics and computer programming.

2. Apply basic mathematical knowledge to solve applied problems in the specific concentration of mathematics.

3. Communicate through projects and tests the analysis of applied problems.

4. Demonstrate competence in the use of computer software and in the ability to write computer programs to help solve problems appropriate in the applied mathematics field.

b) What assessment measures are used, both direct and indirect?

See attachment

c) What is the assessment cycle for the program?

See attachment

d) What assessment data were collected in the past year?

See attachment

e) How have assessment data been used for programmatic or curricular change?

This is a process that is just beginning and we only have preliminary data at this time. In the future, we expect to make appropriate changes to our curriculum based on the results of these assessment practices.

Course Outcomes Assessment

a) Do all multi-sectioned courses have common outcomes?
b) If not, how do you plan to address discrepancies?
c) How do individual course outcomes meet programmatic goals?

III. Program Features

1. Advisory Board

a) Does the program have a board/committee? When did it last meet? When were new members last appointed? What is the composition of the committee (how many alumni, workplace representatives, academic representatives, etc.)

Yes. The Advisory Board was formed in 2004. It consists of six individuals at the present time, with the goal of adding more members in the future. These individuals include the department chair, the coordinator of the mathematics programs and four representatives from education and industry. There currently is one alumnus of our program on the Board. We hope to add more former students as they progress through their professional careers. Two members are from academia and two members are from private industry. Thee was a meeting involving three of the Board members this fall.

b) If no advisory board exists, please explain by what means faculty receive advice from employers and outside professionals to inform decisions within the program.

Not applicable

c) Has feedback from the Advisory Board affected programmatic or curricular change?

Yes. This past fall we solicited advice from one of our Board members concerning several of our concentrations. Based on his recommendations, we will be submitting several changes to our curriculum this spring, including the introduction of a new concentration in industrial mathematics.

2. Internships/Cooperative or Experiential Learning

a) Is an internship required or recommended?

Internships are encouraged, but not required for the program. Several students have participated in summer internships. This past year three students presented the results of their research at a national mathematics conference.

b) If the internship is only recommended, what percentage of majors elect the internship option?

Approximately 15%. Hopefully this number will grow in the coming years.

c) What challenges does the program face in regard to internships? What is being done to address these concerns?

One challenge regarding summer internships is that many of our students need to work in the summer to provide the money to attend school in the fall. Another challenge is that these internships tend to be very competitive nationally. We are working to find more internship opportunities for our students and advertise them more widely. Since many internships pay quite well, students financially limited students should be able to have the internship experience while still saving money for college. We need to do a better job of informing our students about the details of the internships.

d) Do you seek feedback from internship supervisors? If so, does that feedback affect pedagogical or curricular change?

We receive feedback from some internship supervisors. All feedback has been favorable. We try to monitor the success of the internships for our students in terms of how beneficial these experiences are to the students involved. One student presented the results of his internship at a Math Club meeting and another student acquired a full-time position at the company with whom he interned. So far, the internships have tended to validate the quality of our program. One supervisor who employed one of our students two years ago wanted him back for another project this summer.

3. On-Line Courses

a) Please list the web-based courses, both partial internet and fully online, offered last year.
b) What challenges and/or opportunities has web-based instruction created?
c) What faculty development opportunities have been encouraged/required in order to enhance web-based learning within the program?
d) How has student feed-back been used to enhance course delivery?
e) Is there any plan to offer this program on-line? If yes, what rationale is there to offer this program online?" (emerging market opportunity?, expand enrollment?, demand for niche program offering?, etc.)

4. Accreditation

a) Is the program accredited or certified?

No. There is no accrediting agency for mathematics programs.

b) By whom?

Not applicable

c) When is the next review?

Not applicable

d) When is the self-study due?

Not applicable

e) How has the most recent accreditation review affected the program?

Not applicable

5. Student/Faculty Recognition

a) Have students within the program received any special recognition or achievement?

Yes. Several students have participated in mathematical competitions. Our team finished **first** in the Lower Michigan Mathematics Competition last spring. Two students were inducted into Who's Who Among College Students. Several students have achieved advanced degrees in the past year.

b) Have faculty within the program received any special recognition or achievement?

Yes. Several faculty members have been promoted and one faculty member has published the third edition of his textbook.

6. Student Engagement

a) Is volunteerism and student engagement a structured part of the program?

No.

b) Does the program utilize service learning in the curriculum?

No, but we encourage our students to get involved in such activities, and many do.

c) Does the program participate in the American Democracy Project?

The Math Club was involved in this, but it ceased existence upon the graduation of its officers.

IV. Academic Program Review Recommendations:
Please indicate the recommendations (enhancements or changes) made by APRC in the most recent review of the program by the APRC council. What actions have been taken in response to these recommendations?

Areas of Strength:

- Small classes
- Five different concentrations (areas of specialization) to choose from
- Good job prospects for graduates
- Good alternative program for pre-optometry, pre-pharmacy, pre-medicine, pre-engineering and math education majors
- Applied aspect fits the Ferris mission
- Enrollment has remained steady in the low to mid-30s

Areas of Concern (and proposed actions to address them)

- Cancellation of some classes with low enrollment requires substituting classes, which impacts the overall quality of the program

(and proposed actions to address them):

- Recruiting in local high schools, community colleges, and within the university
- Continue to advocate for allowing upper level math classes to run with low enrollments while the program grows

Future Goals:

- Continue to advertise our programs and work toward increasing enrollment
- Employ more faculty with strong backgrounds in mathematics, computer science and statistics
- Encourage students to participate in internships
- Update our concentration requirements as the job market changes

Other Recommendations:

None

A. Profile of Students

1. Student Demographic Profile

The annual institutional data on our students is incomplete, so the following statistics represent that data plus data that the program coordinator has used to fill in the missing pieces. We believe that the data below is accurate.

a. Here is a breakdown of our majors for the past five years by **gender**.

Year	Total	Male	Female
2004	34	27 (79%)	7 (21%)
2005	29	23 (79%)	6 (21%)
2006	29	21 (72%)	8 (28%)
2007	30	23 (77%)	7 (23%)
2008	31	16 (52%)	15 (48%)

Here is a breakdown of our majors for the past five years by **race/ethnicity**. If an ethnic group is not listed, the number of majors for this period is 0.

Year	Total	White	Black	Indian/Alaskan
2004	34	31 (91%)	3 (9%)	0 (0%)
2005	29	28 (94%)	1 (3%)	1 (3%)
2006	29	28 (97%)	1 (3%)	0 (0%)
2007	30	29 (97%)	1 (3%)	0 (0%)
2008	31	30 (97%)	1 (3%)	0 (0%)

Here is a breakdown of our majors for the past five years by **age**.

Year	Total	Average Age
2004	34	25.1
2005	29	23.7
2006	29	22.7
2007	30	21.5
2008	31	21.1

b. Here is a breakdown of our majors for the past five years by **residency**.

Year	Total	Resident	Non-Resident
2004	34	31 (91%)	3 (9%)
2005	29	27 (93%)	2 (7%)
2006	29	29 (100%)	0 (0%)
2007	30	30 (100%)	0 (0%)
2008	31	30 (97%)	1 (3%)

c. Here is a breakdown of our majors for the past five years by **full-time and part-time**.

Year	Total	Full-time	Part-time
2004	34	32 (94%)	2 (6%)
2005	29	27 (93%)	2 (7%)
2006	29	27 (93%)	2 (7%)
2007	30	28 (93%)	2 (7%)
2008	31	29 (94%)	2 (6%)

d. All of our students take classes during the day. We do not offer classes on the weekends and none of our program courses are offered in the evening.

e. All of our students are enrolled in classes on campus.

f. Our online courses are designed for students who are off-campus. The courses that we have put online are those for mathematics education majors and non-majors. Rarely will our majors take an online course.

g. Since all of our program courses are taught on campus, the above statistics have very little impact on curriculum or scheduling. It is interesting to note the decline in the average age of our majors over the past five years. We believe this is a statistical anomaly and does not really represent a significant drop in the average age. The dramatic increase in the number of female majors is significant. Traditionally, mathematics has not been a strong field to attract women and minorities. This is changing. Although we don't have official statistics for this year yet, the program coordinator reports that of our current 50 plus majors, very close to 50% of them are women, many of them in the actuarial science concentration. There are also at least five African-American majors as of the spring of 2009.

2. Quality of Students

a. For our majors, the GPAs ranges from a low of 2.16 to a high of 4.00, with the average GPA being 3.20. The minimum ACT score of our majors is 20, the maximum ACT score is 32 and the average ACT score for our students is 25. We note that the ACT scores are significantly higher than the average ACT score for Ferris students, with the overall average university-wide now at its highest level ever at 21.3.

b. For graduates of our program, the GPAs ranged from a low of 2.55 to a high of 4.00, with the average GPA being 3.50. The minimum ACT score of our graduates is 20, the maximum ACT score is 32 and the average ACT score for our graduates is 26. It seems reasonable to us that these numbers would be higher than the ones for our students since they represent those students who were able to complete our rigorous requirements.

c. In addition to ACT scores and GPAs, we assess the quality of students entering the program by several means. If they are entering the program as freshmen, we look at their high school transcripts, paying particular attention to the level of mathematics and computer science courses that they have taken. If, as is the case with many of our majors, they transfer into our programs from another program at Ferris, we consider their academic record while at Ferris, in particular their mathematics and computer science and related courses.

d. We award several scholarships within the mathematics degree programs. The Helen Ferris Vartan Scholarship is awarded to our top returning upperclassman and the Allan Puterbaugh Scholarship is awarded to our top freshman. We also award a total of $3,200 in ability-based scholarships each year to our best students. Many of our students are members of the Honors Program, which is an honor in itself. Our students also receive awards outside of our department. One of our majors won a very prestigious Leadership Award in 2005. Other mathematics scholarships will be offered starting next year due to the generosity of some Ferris faculty and staff.

e. Our students have been very active in numerous scholarly/creative activities.

i. We compete every year in the MATH Challenge competition, earning a top ten place and recognition in 2004.

ii. We also compete in the Lower Michigan Mathematics Competition, winning first place in 2006 and bringing the impressive Klein Bottle Trophy to Ferris for a year.

iii. We had a team compete in the International Modeling contest in 2005, receiving an Honorable Mention classification.

iv. One of our students made a presentation at the Michigan Undergraduate Mathematics Conference in Mt. Pleasant (Robert McCullough, advisor).

v. Three of our students, under the direction of Dr. Bahodir Siddikov, presented the results of their research at the prestigious Joint Meeting of the MAA and AMS in Arizona in 2005.

vi. Several of our majors have made presentations at our Mathematics Colloquium.

We think that these are impressive accomplishments and have put into our most recent Strategic Plan a request for additional funds to send more students to conferences.

f. A few years ago, under the direction of Ms. Holly Schalk, our students organized a mathematics club, which met regularly and had speakers and discussions on mathematical topics. Although the club disbanded when some key students graduated, we hope to start this activity up again, now that our enrollment is more robust.

3. Employability of Students

a. We do not have complete data on the employment of all of our graduates. A significant number of our graduates have received employment in their field within one year of graduation. All of the graduates of our actuarial science concentration receive jobs quickly after graduation. In fact, one student this past fall received a job offer from Auto Owner's before graduation, due to the intervention of another Ferris graduate, who works for Auto Owners, and he is currently being trained by yet another Ferris graduate. Some of our recent graduates in other concentrations have had a harder time finding employment in their field. In the past few years, all of our graduates have found employment, but only about two-thirds are employed in their field. The department needs to do a better job of helping students before they graduate to acquire job-hunting skills. Several recent graduates who are having trouble finding employment in their field have contacted faculty members within our department and are actively getting advice and suggestions from us on possible courses of action. We care about our students just as much after graduation as before graduation and hope to keep in contact with them for decades as they pursue their lifetime ambitions.

b. The starting salary for our graduates varies a great deal. Two of our recent graduates went on to get Masters degrees in actuarial science and received starting salaries after that of around $60,000. They are now making six-figure salaries, four or five years after graduation. That is the exception. In the actuarial field, it makes a big difference whether a graduate has passed the first actuarial exam or not. While many of our actuarial science graduates have become employed in a short period of time after graduation without passing this first exam, one graduate now holding a high executive position and serving as a member of our Advisory Board, employment often happens after a graduate has passed the first one of the tests. The starting salary for these graduates who have not passed the first exam is more in the range of $35,00 to $40,000 per year. In non-actuarial positions, the salaries are probably lower. We don't have complete records on the starting salaries of our graduates and feel that this is personal information that some of them don't want to share with us, which is understandable. From the information we have, these starting salaries are competitive on regional and national levels.

c. Most of our graduates are employed full-time, unless they are pursuing graduate studies. We don't know of any graduates working part-time in their field.

d. We refer our students to the guidance center at Ferris for career assistance, in addition to talking to them ourselves. Each potential graduate meets with the program coordinator shortly before graduation for an exit interview. Having former students come back and make presentations to our students has been a tremendous help to our students in helping them to decide on their future plans. Those students who have internships during the summer come back to Ferris with a better idea of where they want their careers to go. Although we try to encourage our students to do internships and summer workshops, we need to do a better job in this regard in the future. Many of our students don't think about their future goals until they are very near graduation. We need to have them thinking about this years before they graduate and actively working on post-graduate employment a full year before graduation. Several graduates have commented on our survey that they wished they had better career guidance wile at Ferris. It has become one of the goals of our latest strategic plan to improve in this area.

e. We don't know of any graduates of our newly designed programs who were employed in their field and are now not employed in the field, except for those who have decided after working for a few years to go to graduate school. The program is new enough that none of our graduates would be close to retirement and none have lost their jobs or voluntarily left, as far as we know.

f. Ferris State University is located in a very rural setting. Over 90% of our students each year come from Michigan. So it is not surprising that a large number of our graduates end up with jobs in the state. Some of the employers of our student in Michigan include Auto Owners, State Farm, Allstate and Ford. It would be safe that say that at least 80% of our graduates find jobs in Michigan. Some that go elsewhere would include graduate students (North Carolina and Iowa, for example) and others who end up somewhere else in the Midwest. One graduate got a job in Chicago and has been transferred to Utah, but this is the exception.

g. The number of our graduates going on to graduate school has been increasing in the past few years. The annual average is now close to 30%. This would equate to about three or four graduates per year. Several of our recent graduates have decided to pursue advanced studies after being in the workplace for a few years. They do this because they either want more of a challenge in their careers or they have found a passion for a certain career. Two-thirds of these people pursue masters degrees, while the other one-third are studying for a doctorate in a mathematics-related field. We are happy to see our students pursue advanced degrees and hope to have some of them return to Ferris to talk to our students or become members of our Advisory Board.

h. Most of our graduates attain their additional educational training at mid-western universities, many of them in Michigan. The universities that our students have attended, are currently attending or plan to attend include the following: Michigan State University, University of Michigan, Central Michigan University, Western Michigan University, Oakland University, University of Iowa, and North Carolina State University. This is an impressive list of universities, with several of them being national leaders in their field (e.g.

University of Iowa in actuarial science, North Carolina State University in operations research, Michigan State University in applied mathematics, and University of Michigan in statistics). We are proud that our students can be successful at these prestigious universities.

B. Enrollment

1. We are anticipating a fall enrollment of around 50 students, including returning and new students. Our current enrollment is always hard to calculate because students come and go and we are not always notified in a timely manner.

2. Enrollment in our applied mathematics/mathematics program has shown a steady increase over the past six years and now stands at its highest total ever. The most obvious reason for the increase may lie with the revision of our program into five (soon to be six) distinct concentrations. Here are the numbers for the past six years, starting with Fall, 2003, the last time the program was reviewed. These numbers come from the Ferris State University Fact Book and differ slightly from the numbers that the program coordinator has since students come and go frequently early in the fall.

Fall, 2003:	28 students
Fall, 2004:	34 students
Fall, 2005:	29 students
Fall, 2006:	29 students
Fall, 2007:	29 students
Fall, 2008:	31 students

Graduates from our program, again from the Ferris State University Fact Book, are as follows:

2003-2004	8 students
2004-2005	10 students
2005-2006:	9 students
2006-2007:	13 students
2007-2008:	8 students
2008-2009:	8 students (6 anticipated this spring)
Total graduates:	**56 students**

A comparison of these numbers with the similar numbers from the last review period, when our enrollment varied from 7 in 1997 to 28 in 2003, is illuminating. The total number of our graduating students during that six year period was 16, compared to 56 for the past six year period. This is an increase of **350%**! We are proud of our students and graduates. Hopefully, our enrollment will continue to be at least this good during the next six years. During this time we have graduated students from each of our concentrations and currently (Spring, 2009) have an enrollment of over 50 students, as far as we can determine, which is the highest total in the history of the program.

The program has had a steady enrollment for the past six years with the exception of this year, when we have added over twenty majors to our total. There may be several reasons behind this dramatic increase:

a. We have had several former students return to talk to our students and prospective majors about their careers, and these events have been very well attended.

b. Dr Kent Sun has become an assistant coordinator to the Honors Program and has encouraged many honors students to consider our mathematics programs.

c. Our new department head, Dr. Kirk Weller, has taken an active interest in our programs and has met with virtually all of our majors, and has helped promote the programs.

d. Dr. Hengli Jiao applied for and received an S-STEM Scholarship grant to offer to students majoring in the sciences. Hengli currently runs the program and seven of our students have taken advantage of the scholarships.

We are very happy to see this increase and hope to have continued success in the future.

3. The number of students who apply to the program annually is difficult to determine because we get some freshman right out of high school, but also many Ferris students who change majors once they are here. Typically we get around three incoming freshmen in the program, but this has varied in the past from one to five incoming freshmen. We also get usually between five and ten FSU students switching majors to mathematics during the year. This year we have had over twenty Ferris students switch their major into our program. Whether this is an exception or a trend we won't know until next year.

4. Everyone who has applied to our program in the past has been accepted. We typically get about three freshmen each fall and between five and ten FSU students switching majors to mathematics during the year. Around 80% of our mathematics students come to Ferris initially majoring in something other than mathematics and then switch once they start their academic career.

5. Usually two of the three entering freshmen actually come to Ferris and start the program. This was the case this past year. Every student already enrolled at Ferris who is admitted to the program, of course, starts the program.

6. Up until this year, we would have said that our enrollment goal was to maintain about 30-35 majors, since that seemed to be the trend over the past four or five years. However, starting with an enrollment of 31 students in the fall, we are now over 50 majors, a dramatic increase. If we can maintain this level, then we might be able to offer some of our advanced courses more frequently, and maybe even offer some courses that are normally not taught, due to lack of enrollment. So our new enrollment goal is to reach and maintain around 50 mathematics majors. This would be unprecedented in our history, if achieved. Our strategy for maintaining this level of students includes such things as increasing scholarship and internship possibilities for our students, recruiting students who are already at Ferris in other related majors, bringing more former students back to talk to our majors about future possibilities, and working with the Admissions Office to recruit new majors right out of high school.

We should point out that pursuing an applied mathematics or mathematics major is not an easy path and our students are among the best in the university. It would be unrealistic to expect that our programs would ever have an enrollment equal to some of the other programs at Ferris for this reason.

Note: It is difficult to accurately measure the number of students in each concentration because a student does not need to officially specify a concentration until he/she applies for graduation. When filling out the graduation form, a student can opt to have only the words *applied mathematics* listed on their diploma or *applied mathematics* with the concentration listed also. They have this option regardless of the specific concentration they have chosen. If an entering student does not know which concentration to specialize in, which happens quite often, that student is put into the general applied mathematics concentration. As of January, 2009 we had the following breakdown within our concentrations (number of graduates this year from the program is in parentheses):

actuarial science concentration	11	(1)
applied mathematics concentration	21	(5)
computer science concentration	7	(1)
operations research concentration	1	
statistics concentration	0	
mathematics BA	1	

These numbers change frequently. The operations research and statistics concentrations and the mathematics BA program have always had relatively low enrollment. As mentioned elsewhere in this report, there is no extra cost associated with offering these additional programs (and the new industrial mathematics concentration), and they do give our students more options as to their course of study. Several operations research and statistics graduates have gone on to graduate school and excelled, so we feel that all of our programs are beneficial to our students and think that they appreciate having the choices that we make available to them at Ferris State University.

C. Program Capacity

1. We are currently at a record high in enrolled majors in applied mathematics/mathematics with well over 50 majors, which is up over twenty from any previous total. This increase is due, in part, to the increased visibility of the program through invited speakers who are former students and by a push from our newly formed department recruitment committee. We currently have an adequate number of faculty members to handle this number of majors, and even for an increase of up to 20 more students. Many of our upper-level classes have relatively small enrollments, so an increase of 20 majors would not impact classroom needs at this time. The newly redesigned computer science concentration, however, has hardware and software needs that, in many cases, are independent of the number of majors in the program.

   The biggest limiting factors in our growth are the projected retirement of some of our faculty in the next few years, that should be replaced to keep the continuity of our programs moving forward, and the increased workload put on the program coordinator by the influx of new students. The release time for the program coordinator has been at 0.25 (one-quarter release time) for the past twelve years, in which time the enrollment in our programs have increased by over 600%. An increase to 0.33 or even 0.50 in release time for the program coordinator can be justified by the large increase in the number of majors in the program.

D. Retention and Graduation

1. The annual attrition rate in the mathematics programs is roughly 20%. The reasons that students leave our program vary. Often they switch majors because they find our programs more difficult than they expected, while others leave simply because they find another program more to their interest. Rarely one of our students drops out of school for academic or personal reasons.

2. Our goals/strategy to retain students in the program involve meeting with each student at least once very semester for advising and counseling. Our new department head, Dr. Kirk Weller, has met with every mathematics or mathematics education major in the program personally to get a feel for the needs of the students and the courses that are needed to be offered. Since we are a small department, the professors who teach the advanced courses get to see our majors on a regular basis and this helps us keep in contact with the students and to know what is going on in their academic lives.

3. The trend in the number of degrees awarded in the program has been very consistent during the past six years. We graduate an average of 10 students each year, with the yearly numbers ranging from 8 to 13. With the large increase in the number and quality of our students during this past academic year, we can expect that the number of graduates will increase sharply during the next few years. We feel that our programs are strong and are happy with this trend toward more graduates.

4. A few of our graduates are able to finish their degree in three years. These are the students who come to Ferris knowing exactly what they want, become mathematics majors as freshmen and have a drive to complete the program early. We do not encourage our students to choose this path since we feel that four years allows them time to explore other possibilities and take more courses that could help them in their careers. We also have a few students who take longer than four years to complete the program. This usually happens because they are having academic difficulties and either don't pass the required courses the first time they take them, or because they fail to meet our graduation

requirement of a 2.5 overall GPA in mathematics courses. Sometimes, students decide to major in mathematics later in their academic careers, some as late as seniors, and it takes time to satisfy all of the requirements of the program.

The vast majority (90%) of our majors graduate in four years. The way our programs are designed, there is a lot of elective space built in to our programs. This past year we have started having the students work with their advisors to come up with a tentative four-year plan for graduation. It is not difficult to find a four-year sequence that will allow the students to graduate on time, as long as they are aware of when certain required courses will and will not be offered and plan their schedules around this. This plan runs into difficulty when students either don't take the courses they need when they are offered or fail to pass some of these courses.

5. As was mentioned above, on average our students graduate in four years, a few earlier and a few later. We feel that our programs, as currently designed, make it very realistic for a student to expect to graduate in four years from any of our programs, with plenty of room for taking elective courses of interest.

E. Access

1. Several members of our department have written and are now teaching online sections of several of our courses, including some courses that our mathematics majors take. These online courses were all developed within the last six years and include the following:

   MATH 116: Intermediate Algebra and Numerical Trigonometry
   MATH 117: Contemporary Mathematics
   MATH 126: Algebra and Analytic Trigonometry
   MATH 324: Fundamental Concepts in Mathematics
   MATH 325: College Geometry

   These courses were designed to be taken by off-campus students and have been quite popular.

   Also, every semester we offer a course via distance learning, in which a professor teaches a high-level mathematics class in FLITE and the lectures are sent electronically in real-time to a classroom in Traverse City, allowing the students there to take some of their required classes for our degrees without traveling to Big Rapids.

   The MOISD Math Science/Technology Center students regularly take courses offered by the department. Usually starting in their junior year there are specially offered sections of MATH 130 and MATH 220 just for these students. More advanced students take upper-level courses on their own as part of the regular course offerings. Many of these students are at or near the top of the grading scale in these classes.

2. The above actions have had a positive effect on our program, making it easier for many of our students to pursue their education at times and places that are convenient for them. It also has made our program more visible to students who might otherwise have never taken our classes. For example, students in the Traverse City area can fulfill a fair amount of the requirements for our degrees by taking classes online or through distance-learning. Some of

our brightest students come from the Math Science Technology Center, and they probably would not have considered Ferris without the exposure that our programs gave to them.

3. Again, for the reasons stated in 2. above, we feel that these actions have advanced our programs in many ways, the most important ones being visibility and opportunity for students. If they have hindered the programs in any way, it would be from the awkward setup for distance-learning classes, which requires the professor to stay within a narrow range to be in view of the video equipment. This tends to stifle the delivery and impact on the quality of instruction, but most professors who have taught these classes have adapted to this restriction.

F. Curriculum

1. Program requirements

In the applied mathematics degree program there are now six concentrations for the students to choose from. All majors must complete the standard General Education requirements for a B.S. degree as determined by the University. Our department requirements include a list of five core courses that all applied mathematics majors must take and additional courses that are designed for the specific concentration.

In the mathematics degree program all majors must complete the General Education requirements for a Bachelor of Arts degree as determined by the University. Our department requirements include specific courses designed to give our students a broad understanding of mathematics and its place in the world.

a. In the actuarial science and industrial mathematics concentrations we require ECON 221 Principles of Macroeconomics. We also highly encourage our students in these programs to take ECON 222 Principles of Microeconomics as an elective. Through the efforts of our program coordinator, these two courses are approved for VEE (Validation with Educational Experience) certification. The significance of this certification is that any of our graduates who have passed these two courses receive the VEE certification without having to pass an external exam. We also specify FINC 300 The Mathematics of Finance as the directed elective for the actuarial science concentration because this course ties together the fields of finance and mathematics, two areas that are vitally important in actuarial science.

b. The only hidden prerequisites in any of our programs are at the front end. Our programs all start with MATH 220 Analytical Geometry and Calculus I. If students are not prepared for calculus, they need to take MATH 130 Precalculus or even earlier courses to prepare them for our program courses. Similarly, CPSC 200 Object Oriented Programming is the first computer science course required in some of our programs, and students who have not had any programming courses before starting the program may need to take a beginning programming course before starting the program courses. Our students understand these beginning levels and know what they need to do to be prepared for our programs. There are no hidden prerequisites later in the program, nor should there be.

The mathematics requirements for each of our programs is included on the following pages, along with a rationale for the changes that have been made, if any, in the concentrations since the last program review. Detailed information on each of the courses in our programs can be found on the course content sheets included in Appendix C.

Applied Mathematics – Actuarial Science Concentration

Program Requirements:

Applied Mathematics Core - 19 credit hours required

1.	MATH 220	Analytical Geometry & Calculus 1	5 credits
2.	MATH 230	Analytical Geometry & Calculus 2	5 credits
3.	MATH 251	Statistics for the Life Sciences	3 credits
4.	MATH 320	Analytical Geometry & Calculus 3	3 credits
5.	MATH 322	Linear Algebra	3 credits

Concentration Requirements – 24-25 credit hours required

1.	CPSC 200 CPSC 244	Object Oriented Programming or Sci Programming in Fortran	3 - 4 credits
2.	MATH 310	Linear Models in Statistics	3 credits
3.	MATH 314	Probability	3 credits
4.	MATH 340	Numerical Analysis	3 credits
5.	MATH 414	Mathematical Statistics 1	3 credits
6.	MATH 416	Mathematical Statistics 2	3 credits
7.	ECON 221	Principles of Macroeconomics	3 credits
8.	Directed elective		3 credits

Since the last program review this concentration has been changed due to the elimination of the INSR 243 Risk Management course. That requirement has been changed to a directed elective, with this elective being either FINC 300 The Mathematics of Finance or ECON 222 Principles of Microeconomics to complete (along with ECON 221) a VEE certification. This VEE certification has also been added since the last program review, due to the efforts of the program coordinator.

Applied Mathematics – Applied Mathematics Concentration

Program Requirements:

Applied Mathematics Core – 19 credit hours required

1.	MATH 220	Analytical Geometry & Calculus 1	5 credits
2.	MATH 230	Analytical Geometry & Calculus 2	5 credits
3.	MATH 251	Statistics for the Life Sciences	3 credits
4.	MATH 320	Analytical Geometry & Calculus 3	3 credits
5.	MATH 322	Linear Algebra	3 credits

Concentration Requirements – 21-22 credit hours required

1.	CPSC 200 CPSC 244	Object Oriented Programming or Sci Programming in Fortran	3 - 4 credits
2.	MATH 330	Differential Equations	3 credits
3.	MATH 340	Numerical Analysis	3 credits
4.	MATH 360	Operations Research	3 credits
5.	MATH 380	Applied Analysis	3 credits
6.	MATH 440	Mathematics Modeling	3 credits
7.	CPSC/MATH 30/400	elective	3 credits

There have been no changes made to this concentration since the last program review.

Applied Mathematics – Computer Science Concentration

Program Requirements:

Applied Mathematics Core – 19 credit hours required

1.	MATH 220	Analytical Geometry & Calculus 1	5 credits
2.	MATH 230	Analytical Geometry & Calculus 2	5 credits
3.	MATH 251	Statistics for the Life Sciences	3 credits
4.	MATH 320	Analytical Geometry & Calculus 3	3 credits
5.	MATH 322	Linear Algebra	3 credits

Concentration Requirements - 23 credit hours required

1.	CPSC 200	Object Oriented Programming	4credits
2.	CPSC 244	Scientific Program with FORTRAN	3 credits
3.	CPSC 300	Data Structures and Algorithms	4 credits
4.	MATH 328	Discrete Structures	3 credits
5.	MATH 340	Numerical Analysis	3 credits
6.	MATH 420	Introduction to Abstract Algebra	3 credits
7.	CPSC/MATH 300/400 elective		3 credits

This concentration is currently undergoing significant changes that have been proposed to the University Curriculum Committee for implementation in Spring, 2010. A description and rationale for these changes appears on the following page.

Computer science concentration proposed changes

This proposal is a curriculum clean-up of the Applied Mathematics Computer Science Concentration. The rationale behind the proposal is twofold: First, we are updating the introductory course sequence so that we will have only one introductory course in the program (i.e., the new CPSC 130). Currently, before this update, we now offer three introductory courses in the program (i.e., CPSC 150, CPSC 244, and CPSC 200). The update of the introductory course, CPSC 130, will provide an easier introduction to programming and problem solving for beginning students, partially through use of a more general introductory programming language. We set this updated introductory course at 4 credits, which will allow for a dedicated lab hour each week to go along with the three lecture hours. By having a single entry point into the programming language sequence, one of the previous introductory courses, CPSC 200, can now be taught at a more appropriate intermediate level. (The CPSC 200 course will remain the main service course required for Applied Mathematics students in concentrations other than Computer Science.) The second main reason for the update is to set a more complete applied computer science education experience for students, by requiring a computer hardware component, and requiring a parallel programming component; both important topical areas in modern computer science. We have also updated some of the elective choices available to students both within the major and for students wishing to pursue the updated Computer Science Minor. We are collaborating with the EET & CNS Department as we move to update our offerings, and have included (at this time) one course from that department (i.e., ECNS 323) among the elective choices for both majors and minors in our program. With our updated scheduling of courses, students can enter the program in their second year and complete all requirements during their fourth year. With this concentration clean-up, and our efforts in recruitment, these classes should run with good numbers within a reasonably short time period.

Applied Mathematics – Industrial Mathematics Concentration

Program Requirements:

Applied Mathematics Core – 19 credit hours required

1.	MATH 220	Analytical Geometry & Calculus 1	5 credits
2.	MATH 230	Analytical Geometry & Calculus 2	5 credits
3.	MATH 251	Statistics for the Life Sciences	3 credits
4.	MATH 320	Analytical Geometry & Calculus 3	3 credits
5.	MATH 322	Linear Algebra	3 credits

Concentration Requirements – 24-25 credit hours required

1.	CPSC 200 Object Oriented Programming or CPSC 244 Sci Programming in Fortran	3 - 4 credits
2.	MATH 330 Diferential Equations	3 credits
3.	MATH 340 Numerical Analysis	3 credits
4.	MATH 360 Operations Research	3 credits
5.	MATH 414 Mathematical Statistics	3 credits
6.	MATH 430 Advanced Calculus	3 credits
7.	CPSC/MATH 300/400 elective	3 credits
8.	CPSC/MATH 300/400 elective	3 credits

The rationale for this new program appears on the next page.

Applied Mathematics – Industrial Mathematics Concentration – Rationale

Where did the idea for this concentration come from?

Several years ago the program coordinator attended a mathematics conference at CMU. One of the speakers was the head of the MS Industrial Mathematics program at MSU. After his talk he was asked what he considered to be the ideal qualifications for a student entering the MS Industrial Mathematics program at MSU. His response: (in order): the calculus sequence, linear algebra, differential equations, numerical analysis, operations research, a computer science course, economics, physics, advanced calculus and analysis.

How does this concentration compare to the other concentrations in total requirements?

It is comparable to the other concentrations on total credits (43-44) and in the number of mathematics/computer science electives (two).

How does this concentration differ from the other concentrations?

This is the only concentration we offer that combines mathematical statistics (MATH 414) with operations research (MATH 360). It is also the only concentration we offer that combines mathematical statistics (MATH 414) with differential equations (MATH 330).

Why do we need another concentration?

Industrial mathematics is a rapidly growing field of applied mathematics. It prepares students to be successful in working in industry. Recent advances in technology have increased the demand for professionals capable of modeling and simulating these technologies. Modeling, analysis and computations performed by mathematicians can provide technical advantages and cost savings, important for a company's future. Applications of industrial mathematics are wide ranging, including areas from aircraft and automobile design to software development, computer security, and weather modeling. In recent years the field has expanded to include non-industrial topics such as supply, distribution, transportation, communication and information handling, medical care and safety. Besides, **no university in the state of Michigan currently has an undergraduate degree program in industrial mathematics**. This will also allow Ferris in the future to develop our own masters degree in industrial mathematics.

Applied Mathematics - Operations Research Concentration

Program Requirements:

Applied Mathematics Core – 19 credit hours required

1.	MATH 220	Analytical Geometry & Calculus 1	5 credits
2.	MATH 230	Analytical Geometry & Calculus 2	5 credits
3.	MATH 251	Statistics for the Life Sciences	3 credits
4.	MATH 320	Analytical Geometry & Calculus 3	3 credits
5.	MATH 322	Linear Algebra	3 credits

Concentration Requirements – 21-22 credit hours required

1.	CPSC 200 CPSC 244	Object Oriented Programming or Sci Programming in Fortran	3 - 4 credits
2.	MATH 330	Differential Equations	3 credits
3.	MATH 360	Operations Research	3 credits
4.	MATH 440	Mathematics Modeling	3 credits
5.	CPSC 320	Computer Simulation	3 credits
6.	CPSC/MATH 300/400 elective		3 credits
7.	CPSC/MATH 300/400 elective		3 credits

This concentration was changed since the last program review by replacing one of the CPSC/MATH 300/400 electives with the required course CPSC 320 Computer Simulation.

Rationale: The CPSC 320 Simulation course was recommended to be added to our operations research curriculum by Dr. Steven Butt, PhD. in operations research from WMU and a member of our Applied Mathematics Advisory Board. Previously the operations research concentration had the fewest required courses of any of our concentrations. Adding this course brings it in line with the other concentrations. CPSC 320 is a course that already exists and has been offered several times in the past few years.

Applied Mathematics – Statistics Concentration

Program Requirements:

Applied Mathematics Core - 19 credit hours required

1.	MATH 220	Analytical Geometry & Calculus 1	5 credits
2.	MATH 230	Analytical Geometry & Calculus 2	5 credits
3.	MATH 251	Statistics for the Life Sciences	3 credits
4.	MATH 320	Analytical Geometry & Calculus 3	3 credits
5.	MATH 322	Linear Algebra	3 credits

Concentration Requirements – 21-22 credit hours required

1.	CPSC 200 CPSC 244	Object Oriented Programming or Sci Programming in Fortran	3 - 4 credits
2.	MATH 310	Linear Models in Statistics	3 credits
3.	MATH 314	Probability	3 credits
4.	MATH 414	Mathematical Statistics 1	3 credits
5.	MATH 416	Mathematical Statistics 2	3 credits
6.	CPSC/MATH 300/400 elective		3 credits
7.	CPSC/MATH 300/400 elective		3 credits

There have been no changes made to this concentration since the last program review.

Mathematics – BA degree

Program Requirements

Required courses – 25-26 credits required

1.	CPSC 200	Object Oriented Programming or	
	CPSC 244	Sci Programming in Fortran	3 - 4 credits
2.	MATH 220	Analytical Geometry & Calculus 1	5 credits
3.	MATH 230	Analytical Geometry & Calculus 2	5 credits
4.	MATH 320	Analytical Geometry & Calculus 3	3 credits
5.	MATH 322	Linear Algebra	3 credits
6.	MATH 420	Abstract Algebra	3 credits
7.	MATH 430	Advanced Calculus	3 credits

Electives – 9 credits

1.	MATH 300/400 elective	3 credits
2.	MATH 300/400 elective	3 credits
3.	MATH 300/400 elective	3 credits

There have been no changes made to this concentration since the last program review.

2. There have been several revisions of our programs since the last review.

   a. In the operations research concentration, a MATH/CPSC 300/400 elective has been replaced the required courses CPSC 320 Computer Simulation. This change was recommended by a member of our Advisory Board as a way to improve the concentration. This change became effective in the fall semester of 2007.

   b. In the actuarial science concentration, the requirement of taking INSR 243 Risk Management was changed to FINC 300. This change was needed because the university stopped offering the INSR 243 course. This change became effective in the fall semester of 2007.

   c. A new concentration in industrial mathematics was approved this past spring and will start with the fall semester of 2009.

3. A major revision of the computer science concentration is currently in the review process. We hope to have this revision approved in the fall semester of 2009 and to take effect in the spring semester of 2010. It is anticipated that this revision will improve our concentration by bringing it up to date with current technology.

4. We anticipate more revisions to our programs in the future. Once the Program Review process is over, we will react to the recommendations of the APR committee. One segment of our latest departmental Action Plan includes taking a look at all of our programs and making needed revisions where necessary to improve both the quality and timeliness of our programs. This review could lead to revisions of some of our programs within the next two years. These revisions could include consolidation of some of the concentrations or even the eventual splitting off of the computer science concentration into a B.S. degree in computational science.

G. Quality of Instruction

1. For complete results on the student and graduate surveys, please see Section 2. Below is a summary of the results.

Student survey

Students seem to be concerned about the regularity of course offerings. This may have been addressed (in the short run) with the proposed new two-year schedule.

Several students want more electives. However, the issue, as we were able to determine, is not so much about course choice as it is avoiding certain instructors.

Students seem to be concerned about job opportunities. They realize that mathematics majors can obtain jobs in a variety of fields, but they don't know where to look. Unlike teaching, where one can actually go to a career office and obtain specific job postings, knowing where to look for jobs for mathematics majors is very difficult.

Students really like having former students come back to make presentations about their careers in mathematics-related fields.

Many of our students would like to apply for internship experiences but do not know how to go about this.

Graduate Follow-up Survey

We are basically pleased with the responses from this survey, although they highlighted some areas we need to work on in the future. We note that the best responses we received, 4.50 and 4.46 averages, came on the last two questions, asking about their experience at Ferris and their satisfaction with their education.

Some of their comments were very enlightening. Several students commented on the lack of rigor in our program and the difficulty they have had continuing on to graduate school. A common theme running through all of these surveys is the frustration felt by students who sign up for classes that are subsequently cancelled, or required classes that are not offered in a timely manner. This will be a major topic of discussion within our department as we move forward. Below is a sample of some of the comments made by our graduates. A complete list of every comment made by our graduates appears in Appendix B.

Excellent program. Prepared me well for my graduate studies. I am about to receive my Ph.D. in astronomy.

Frustrating scheduling of classes. Couldn't take courses that you wanted. Tried to go to graduate school in applied math but felt unprepared. Really struggled with material.

Overall classes seemed fine while taking them, but currently in graduate school, others seem better prepared.

If I would suggest anything, I would try to make research opportunities available. That process teaches experiences that are priceless.

2. For complete results on the Advisory Board and employer follow-up surveys, please see Section 2. Below is a summary of the results.

Advisory Board Survey

We believe that we have a very distinguished Advisory Board and we are happy to receive their input. We are encouraged by the positive response we received from our Board members. Some of them chose to make comments and suggestions, while others did not. A complete list of every comment made by our Board members appears in Appendix B. Here are some of the comments received.

I think each group of courses were very well chosen for their respective concentration; enhancing the basic skills that will be required.

Your program prepares graduates for diverse professional careers in areas where mathematics is applied as well as for graduate study in mathematics and a wide variety of disciplines which depend heavily on mathematics.

I hope to have future Ferris students from the Applied Math program consider enrolling in our Operations Research or Industrial Engineering programs at Western Michigan University.

I think the department is basically on the right track.

While the general consensus of the Board was favorable, there were some concerns raised by the Advisory Board survey. One Board member was concerned that our actuarial science concentration did not compare favorably with those institutions offering Bachelor's degrees in actuarial science, although as a concentration it serves our students well. A suggestion was made that we consider adding some more courses to the actuarial science concentration, or at least recommend them to our students. Another Board member thought that we should increase opportunities for internships and research projects to provide our students with more opportunities and help them gain employment after graduation. One other Board member suggested adding a Physics requirement to the new industrial mathematics concentration. These suggestions are very good and we will consider incorporating them into our department Action Plans in the future.

It should be noted that we have made several changes in our concentrations since the last Academic Program Review, based on suggestions of our Advisory Board. Specifically, we have added a Computer Simulation course to our operations research concentration, have introduced a new concentration in industrial mathematics and are rewriting the computer science concentration. All of these actions come directly from comments and suggestions our Board has given us.

Although we are pleased with the makeup of our Board, we hope to add additional members to our Advisory Board in the future, to keep us in touch with changing times.

Employer Follow-up Survey

We are very pleased with the responses from this survey. We note that not one employer gave us a rating of less than 3 on any question. These employers represent insurance companies, academic institutions, and companies in business, industry and health. We are particularly encouraged that the highest rating in any one question is in #7: "Overall I have a positive impression of graduates of the Applied Mathematics program at Ferris." Previous surveys have never had enough responses to infer anything about our graduates. Only a few employers made comments and they are all included here and also in Appendix B.

Both employees I have from FSU's Applied Math program are able to "think" and "work through" problems without direct supervision – this is a big plus.

Very happy with Eric.

Jennie's college career also included an advanced degree from University of Iowa, which is difficult to separate from her Ferris State education. However, we are very happy with Jennie's work and mathematical skills.

For this rating I tried to assume that I knew nothing about the FSU program other than being familiar with Holly's work.

3. As mentioned elsewhere in this report, Dr. Jim Nystrom has proposed some sweeping changes to our computer science concentration and has included requests for considerable computer hardware and software to help prepare our graduates for the future. In some of our other classes, appropriate technology is being used on an experimental basis, even in some of our low-level classes, in an attempt to improve our teaching. For example, quite a few professors routinely use the computer for class assignments and schedules.

4. Dr Hengli Jiao has applied for and received a substantial S-STEM grant to award scholarships for under-represented groups of students, in particular women and minorities. This grant has awarded scholarships to many deserving students.

   Dr. Bahodir Siddikov has done undergraduate research with three of our students and this allowed them to go to a national mathematics conference and present the results of their research.

   With Robert McCullough as an advisor, student Jon Oaks gave a presentation at a conference in Mount Pleasant designed for undergraduate mathematics students. His talk was very well received.

   The participation of mathematics students in mathematical competitions began nine years ago when Robert McCullough got a team together to compete in the Math Challenge, a regional competition, usually involving around 50 or 60 teams from the Midwest. One year we finished as high as 10^{th}, getting Ferris mentioned on the web site for the Math Challenge.

   Four years ago Dr. Mike Dekker initiated Ferris' participation in the Lower Michigan Math Competition. Ferris won first place and the coveted Klein Bottle trophy in its second year of competition.

5. Under the direction of Dr. Bahodir Siddikov, the department has established a Mathematics Colloquium, which meets about once a month. We have had speakers at this colloquium from overseas and from outside of Michigan, but the predominant number of speakers have been from Ferris. We encourage our students to attend these colloquia and have had great turnouts of students. On two occasions within the past year we have had two former students, Jennifer (Sternemann) McGinnis and Amanda Glick, give presentations specifically designed for students, detailing actuarial science and operations research in the real-world. We have also had two students (Jonathan Oaks

and Adam Jensen) give presentations for faculty and students while they were still students at Ferris.

Holly Schalk became the advisor for the newly established Math Club, consisting of mathematics and mathematics education students. This club met, had speakers and other activities throughout the year. Although the Math Club ended due to lack of interest after the graduation of its officers a few years ago, we hope to resurrect this activity in the future.

This past fall Dr. Kent Sun took on an assistant coordinator role with the Honors Program and has been quite active in informing honors students about our programs. Many Honors Program students have attended our Math Colloquium and numerous mathematics faculty have been invited to the Honors Program Awards Dinner.

6. The mathematics chair, Dr. Kirk Weller, is submitting a grant proposal to the Ferris Foundation for a year-long professional development project for the department to deal with assessment and pedagogy issues of assessment. In addition to Foundation money, he is anticipating other sources for additional funding.

7. We believe that our efforts mentioned above have had a positive impact on the quality of teaching and learning in our program,. Any activity that can improve the interaction between students and faculty is beneficial to the program. In our most recent departmental Action Plan the department has asked for money to hold student/faculty activities similar to the Pi Day celebration that was held on March 17 (Pi Day was actually March 14, but we were on break at that time).

H. Composition and Quality of Faculty

1. a. The following is a list of the tenured or tenure-track faculty members of the mathematics department, their rank and highest degree attained.

Ram Agrawal, Professor,
PhD Mathematics, Michigan State University

Fran Allegretto, Assistant Professor,
MS Mathematics, Northern Arizona University

Sandra Brigance, Assistant Professor,
MA Mathematics, Western Michigan University

David Burns, Professor,
PhD Mathematics, Western Michigan University

Michael Dekker, Associate Professor,
PhD Mathematics, University of Notre Dame

Mary Forintos, Associate Professor,
MA Math Education, University of Michigan

Roy Gifford, Assistant Professor,
MA Mathematics, University of Michigan

Suellen Gifford, Assistant Professor
MA Education, Michigan State University

James Howard, Associate Professor,
MS Mathematics, University of Michigan

Hengli Jiao, Associate Professor,
PhD Applied Math, Michigan State University

John Linnen, Assistant Professor,
MS Mathematics, University of Notre Dame

Robert McCullough, Professor,
MS Mathematics, Michigan State University

Lakshmi Mukundan, Professor,
PhD Applied Mathematics, North Carolina State University

James Nystrom, Assistant Professor,
PhD Elect. Eng, MS Comp Sci, University of Idaho

Holly Schalk, Associate Professor,
MA Applied Statistics, University of Michigan

Ron Shepler, Professor,
PhD Mathematics, University of Maryland

Bahodir Siddikov, Professor,
PhD Mathematics, University of Wisconsin-Milwaukee

Kent Sun, Professor,
PhD Applied Math/Statistics, SUNY at Stony Brook

Joseph Tripp, Professor,
PhD Math Education, Syracuse University

Jerome Trouba, Assistant Professor,
PhD Math Education, Montana State University

Shaw Walker, Associate Professor,
MS Sci Computing, Stanford University

b. Since the last Program Review in Fall, 2003, the following faculty members have received promotion or merit.

Robert McCullough, Promotion to Professor, 2009/2010

Bakhodir Siddikov, Promotion to Professor, 2009/2010

Joseph Tripp, Promotion to Professor 2009/2010

Robert McCullough, Merit, 2008/2009

Kent Sun, Promotion to Professor 2008/2009

Sandra Brigance, Merit 2007/2008

Michael Dekker, Promotion to Associate Professor 2006/2007

Mary Forintos, Promotion to Associate Professor 2006/2007

Holly Schalk, Promotion to Associate Professor 2006/2007

Hengli Jiao, Promotion to Associate Professor 2005/2006

Shaw Walker, Promotion to Associate Professor 2005/2006

Bakhodir Siddikov, Promotion to Associate Professor 2004/2005

Robert McCullough, Merit 2003/2004

Kent Sun, Promotion to Associate Professor 2003/2004

Joseph Tripp, Promotion to Associate Professor 2003/2004

c. Our faculty are very involved in numerous professional activities. For complete information on the professional activities of our faculty, please refer to Appendix D. Here is a partial list of some of the more noteworthy achievements of our faculty.

1. Dr. David Burns has reviewed over 100 publications in the field of graph theory.

2. Robert McCullough has reviewed over 70 publications for *Science Books & Films*.

3. Many of our faculty routinely attend national and international conferences and make presentations. For example, Dr. Bahodir Siddikov recently was chair of a discussion at two different international math conferences, in addition to making presentations himself.

4. Several of our faculty have applied for and received external grants for educational purposes. For example, Dr. Hengli Jiao is currently administering the S-STEM scholarship program at Ferris.

5. Several members of our department have had notable publications. For example, Robert McCullough has recently had the third edition of his textbook *Mathematics for Computer Technology* published be Morton Publishing Company. This book has been used by over 100 universities in 8 countries.

6. Many of our faculty are active members of professional mathematics and computer science organizations, including the Mathematical Association of America (MAA), the American Mathematical Society (AMS), the National Council of Teachers of Mathematics (NCTM), the National Association of Developmental Education

(NADE) and the Society of Industrial and Applied Mathematics (SIAM), among others.

2. a. The normal, annualized teaching load in the department is 23-25 credits, with a minimum of 11 credits each semester and a maximum of 13 credits each semester. The following number of faculty have accepted an overload assignment.

Semester	## of Overloads
Fall, 2003	10
Spring, 2004	2
Fall, 2004	10
Spring, 2005	7
Fall, 2005	10
Spring, 2006	8
Fall, 2006	9
Spring, 2007	3
Fall, 2007	6
Spring, 2008	7
Fall, 2009	11
Spring, 2009	8

b. The following faculty have received release time since Fall, 2003.

Sandra Brigance .75 release time Fall 2007 – Spring 2008
Department Administrative Asst.

Sandra Brigance .25 release time Fall 2008 – Spring 2009
Assessment Coordinator

Mary Forintos .33 release time Spring 2006
Math Minor for Elem. Education

Roy Gifford .5 release time Fall 2004-Spring 2006
Math Department Coordinator

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Mary Forintos .33 release time Spring 2006
Math Minor for Elem. Education

Roy Gifford .5 release time Fall 2004-Spring 2006
Math Department Coordinator

Hengli Jiao .25 release time, Fall 2007 – Spring 2009
STEM grant coordinator

Robert McCullough .25 release time, Fall 2003 – Spring 2009
Program Coordinator, Applied Mathematics/Mathematics

Kent Sun .5 Release time, Fall 2007 – Spring 2009
Honors Advising

3. **a.** The normal recruitment policy for new tenure-track faculty has been to form a Search Committee early in the fall, or possibly the previous spring if the need is identified that early. This committee will write the position announcement, including degree requirements and preferred teaching and experience background, and bring it to the department for approval. The Search Committee then reviews the applications and, through phone interviews and discussions, narrows the list to three people to bring to campus for interviews. After the on campus interviews, the entire department meets to give its recommendations to the Search Committee, who makes the final recommendation to the Dean.

   b. For a tenure-track position, the normal qualifications would include a Ph.D. or an expected Ph.D. by time of employment in mathematics or a mathematically related field (e.g., computer science, statistics, math education). During the past six years we have hired the following people in tenure-track positions.

   Dr. James Nystrom, 2007
   Dr. Jerome Trouba, 2009

   c. We will have 21 tenured or tenure-track faculty in the mathematics department this coming fall, including 5 women. We do not have any diversity goals in our department.

   d. N/A

4. We have no structured orientation program for new faculty, but believe that we are a friendly and open department, willing to help new faculty in any way we can. Many faculty have commented on how helpful the other faculty members were when they first

came here. We feel that no formal orientation process is needed. In previous years there has been a designated "mentor" for new faculty, but funds for this activity disappeared a few years ago.

5. **a.** We currently have professional development funds allocated to our department. These funds are available for travel and other approved activities. We also have a department professional development committee which has set up a system to allow any tenured or tenure-track faculty member to apply for these funds. This is handled in a perfectly fair and equal way and the faculty is content with the system of allocation as now outlined. Our funds have been used completely every year.

b. Our recently completed faculty search was successful and we got our first choice. The salary offered to this individual was very competitive nationally.

c. Faculty productivity in research, teaching and service, of course, would be enhanced by a larger faculty development fund. Several faculty members have applied for grants from other sources, both external and internal, to supplement the faculty development money available to the department.

d. As mentioned above, all of our faculty development money is distributed in a fair and equal way and diversity and inclusion are not issues.

6. We do not, at the present time, offer graduate classes.

7. Non-Tenure-Track and Adjunct Faculty

a. Here is a list of the adjunct faculty who taught courses in the mathematics department during the this year, and information on their background and length of service.

Name	Type of Position	Original Hire Date	Degree/Field
Mary Baxter	1SPT – Fall, 2008 1SPT – Spring, 2009	September, 2008	BS-Math, CMU
Scot Foos	1SFT – Fall, 2008 1SFT – Spring, 2009	August, 2003	BS-Math, FSU ME-Eng. U of Va
Harvey Hanna	2YT – Fall, 2008 2YT – Spring, 2009	August, 2006	MA-Math, EMU
Ted Lehnen	1SFT – Fall, 2008 1SPT – Spring, 2009	August, 2006	MA-Math, CMU Spec in Ed, CMU
Cindy Milligan	1YT – Fall, 2008 1YT – Spring, 2009	August, 2002	MA-Math, Syracuse
Alice Routley	1SPT – Fall, 2008	September, 1985	BS-math, WMU
Dharma Shetty	1SFT – Fall, 2008 1SPT – Spring, 2009	August, 2002	MS-Math, CMU
Jean Walling	1SFT – Fall, 2008 1SFT – Spring, 2009	August, 1995	MS-Physiology, U of Az BS-Math, U of M

We would like to point out that Harvey Hanna, one of our adjunct faculty members, just won the first-ever Adjunct Teacher of the Year Award. This award says something about the quality of the people that we have teaching for us on a non-tenure-track level.

Recently we have begun offering multiple-year contracts to some of our adjunct faculty to entice them to remain here. We currently have a larger portion of our classes taught by adjuncts than we have had in previous years.

b. It is our intent that all mathematics classes above MATH 126 are to be taught by tenured or tenure-track personnel. This would include all of the courses required for our degrees. On rare occasions we have found it necessary to have an adjunct teach a beginning calculus class, but it is not the intent now, and will not be in the future, to have adjuncts teach any classes in our program.

c. The required qualifications for adjunct faculty include at least a bachelor's degree in mathematics or a closely related field, with a master's degree preferred. The qualifications of our adjunct faculty appear in a. above.

d. As far as the programs are concerned, adjuncts have little or no teaching responsibilities in this regard, so the current use of adjunct faculty is appropriate. The department remains concerned about the diminishing number of tenured and tenure-track faculty in the department as a whole, however.

e. There is no accrediting body for our programs

I. Service to Non-Majors

a. There are four mathematics courses that are taken by Ferris State students to satisfy General Education graduation requirements. These classes are:

MATH 010 Fundamentals of Mathematics
MATH 110 Fundamentals of Algebra
MATH 115 Intermediate Algebra
MATH 117 Contemporary Mathematics

MATH 010 is a course for students who aren't ready for algebra. The General Education mathematics requirement for an Associate's Degree is completion of MATH 110. For a Bachelor's Degree the requirement is either MATH 115 or MATH 117. MATH 117 is designed to satisfy the General Education requirement for those students whose program does not specifically require MATH 115 or any higher mathematics class.

b. The mathematics department provides many non-General Education courses to support other departments at Ferris.

1. We teach the following sequence of courses for students in the College of Technology:

MATH 116 Intermediate Algebra and Numerical Trigonometry
MATH 126 Algebra an Analytic Trigonometry
MATH 216 Applied Calculus
MATH 226 Fourier Series and Applied Differential Equations

2. We teach the following courses for students in the College of Business:

MATH 122 Mathematical Analysis for Business
MATH 132 Calculus for Business

3. We teach the following courses for students in Allied Health:

MATH 135 Calculus for the Life Sciences
MATH 251 Statistics for the Life Sciences

4. In support of the Math Education programs at Ferris we teach the following courses:

MATH 118 Mathematics for Elementary Teachers 1
MATH 119 Mathematics for Elementary Teachers 2
MATH 324 Fundamental Concepts in Mathematics
MATH 325 College Geometry

Mathematics and applied mathematics students can also take the MATH 324 and MATH 325 courses as part of their program.

5. In addition to these courses, other programs require some courses that are part of our mathematics and applied mathematics programs. For example, surveyors take our MATH 322 Linear Algebra course and our regular calculus sequence. Students from other programs often enroll in our program courses either as electives or as part of a mathematics or computer science minor.

We have a good working relationship with the departments to whom we provide these courses and try to coordinate classes meeting at times that fit the schedules of the students. We are in contact with these departments every semester concerning their needs for the upcoming semester. We have been providing these service courses for many years and have a good working relationship with the other departments.

c. The impact of teaching these General Education and non-General Education courses has minimal effect on our program. We are happy to help other departments and sometimes while teaching these courses we can identify promising students who later join our program.

d. We will respond to any needs expressed to us about service courses in the future, but there are no current plans to either increase or decrease the level of our service courses.

J. Degree Program Cost and Productivity Data

Program Cost

The most current cost data comes from the 2003-2004 academic year report on costs by the Office of Institutional Research and Testing Office. This report ranks programs using many factors according to cost. The main statistic is the average cost per student credit hour for each program at Ferris.

The total average cost per student per credit hour:

Applied Mathematics (actuarial science concentration)	BS	$150.93
Applied Mathematics (applied mathematics concentration)	BS	$157.52
Applied Mathematics computer science concentration)	BS	$154.45
Applied Mathematics (operations research concentration)	BS	$156.36
Applied Mathematics (statistics concentration)	BS	$151.96
Mathematics	BA	$161.45

Compare these costs with related programs:

University average		$191.56
Computer Information Systems	BS	$183.13
Mathematics	BA	$161.45
Applied Mathematics (average of all concentrations)	BS	$154.24

Of the 185 degree programs in the University ranked from least expensive (Pre-Pharmacy: $112.49) to most expensive (Fine Arts/Painting: $629.08), the mathematics degree programs rank:

Applied Mathematics (actuarial science concentration)	41
Applied Mathematics (statistics concentration)	46
Applied Mathematics computer science concentration)	47
Applied Mathematics (operations research concentration)	53
Applied Mathematics (applied mathematics concentration)	57
Mathematics	66

If we only look at Bachelor's programs, there are 112 such programs at Ferris (according to this data) and the ranking from least expensive (Elementary Education: $132.87) to most expensive (New Media Printing and Publishing: $326.64), the mathematics degree programs rank:

Applied Mathematics (actuarial science concentration)	18
Applied Mathematics (statistics concentration)	23
Applied Mathematics computer science concentration)	25
Applied Mathematics (operations research concentration)	30
Applied Mathematics (applied mathematics concentration)	33
Mathematics	38

So all of our applied mathematics programs are ranked, by any measure, to be in the top third as far as least expensive cost to run the program, and the mathematics BA degree is almost in the top third in this regard. We feel that this data confirms that the mathematics degree programs are cost-effective and a good bargain for the university.

We have included the relevant pages of the report on costs issued by the Office of Institutional Research and Testing in Appendix F of this report.

Productivity data

The following data comes from the Institutional Research and Testing Office at Ferris State University and covers the past six years. This report ranks departments in numerous areas with the primary statistic being Total Student Credit Hours produced (SCH) divided by Full-Time Equated Faculty (FTEF). The report considers the SCH/FTEF statistic to be "a measure of productivity" for a department. The average SCH/FTEF for all departments at Ferris State University is **450.88**.

The SCH/FTEF for the mathematics department for the past five years:

2003-04	**647.57**
2004-05	**576.05**
2005-06	**621.62**
2006-07	**577.05**
2007-08	**625.78**

The value of **625.78** ranks the mathematics department 4th out of 36 departments at Ferris. For the past year we have a total SCH of 15,318 and an FTEF total of 28.07. The highest rated department in this statistic has a value of **714.65** and the lowest of the 36 departments has a value of **228.6**.

Comparing this data with related programs gives:

University average	**450.88**
Mathematics	**625.78**
Computer Information Systems Accounting, and Finance	**581.43**
Professional-Tech Studies	**325.66**

This statistic is the result of counting all of the service courses that the mathematics department teaches in addition to the advanced courses, but is still very impressive. It should allow us to offer upper-level courses with small enrollments and still remain one of the most productive departments on campus. We have included the relevant pages of the report on productivity issued by the Office of Institutional Research and Testing in Appendix F of this report.

K. Assessment and Evaluation

We have determined the desired program outcomes and established assessment plans for both the applied mathematics B.S. and mathematics B.A. degrees programs. In addition, we have also determined the desired program outcomes and established assessment plans for each of the six concentrations within the applied mathematics program. These documents appear on the following pages.

Outcomes Statement and Assessment Plan – Applied Mathematics

Applied Mathematics B.S. Degree Program Outcomes

A graduate of this program will be able to:

1. apply the mathematical principles, theory, and concepts in analytical geometry, calculus, linear algebra, statistics and computer programming.
2. solve applied problems in their specific concentration of mathematics.
3. analyze real-world problems and appropriately communicate the results.

Applied Mathematics B.S. Degree Program – Assessment Plan

To assess our program outcomes, we will:

1. administer comprehensive final exams in key courses in the program.
2. assign large special projects in select courses testing mastery of key concepts.
3. analyze the results of alumni, employer, student, faculty and advisory board surveys.
4. conduct an exit interview/questionnaire for students graduating from the program.
5. evaluate student responses from terminal course questionnaires to be given in key courses in the concentration.

Actuarial Science Concentration – Student Learning Outcomes

A graduate of this concentration will be able to:

1. solve a wide-variety of applied problems in fields related to actuarial science, including linear algebra, mathematical statistics and business applications.

Actuarial Science Concentration – Assessment Plan

To assess our concentration outcomes, we will:

1. administer comprehensive final exams in key courses in the concentration.

2. evaluate student responses from terminal course questionnaires to be given in MATH 414 Mathematical Statistics.

Applied Mathematics Concentration – Student Learning Outcomes

A graduate of this concentration will be able to:

1. solve a wide-variety of applied problems in fields related to applied mathematics, including operations research, analysis and modeling.

Applied Mathematics Concentration – Assessment Plan

To assess our concentration outcomes, we will:

1. administer comprehensive final exams in key courses in the concentration.

2. assign large special projects in select courses, including MATH 360 Operations Research, testing mastery of key concepts.

3. evaluate student responses from terminal course questionnaires to be given in MATH 440 Mathematical Modeling and MATH 360 Operations Research.

Computer Science Concentration – Student Learning Outcomes

A graduate of this concentration will be able to:

1. solve a wide-variety of applied problems in fields related to computer science, including programming, software and hardware, data structures and parallel programming.

Computer Science Concentration – Assessment Plan

To assess our concentration outcomes, we will:

1. administer comprehensive final exams in key courses in the concentration.

2. assign applied programs in select courses, including CPSC 200 Structured Programming and CPSC 300 Data Structures, testing mastery of key concepts.

3. evaluate student responses from terminal course questionnaires to be given in select courses.

Industrial Mathematics Concentration – Student Learning Outcomes

A graduate of this concentration will be able to:

1. solve a wide-variety of applied problems in fields related to industrial mathematics, including operations research, statistics, differential equations and numerical analysis

Industrial Mathematics Concentration – Assessment Plan

To assess our concentration outcomes, we will:

1. administer comprehensive final exams in key courses in the concentration.

2. assign large special projects in select courses, including MATH 360 Operations Research, testing mastery of key concepts.

3. evaluate student responses from terminal course questionnaires to be given in MATH 414 Mathematical Statistics 1 and MATH 360 Operations Research.

Operations Research Concentration – Student Learning Outcomes

A graduate of this concentration will be able to:

1. solve a wide-variety of applied problems in fields related to operations research, including linear algebra, optimization and numerical analysis

Operations Research Concentration – Assessment Plan

To assess our concentration outcomes, we will:

1. administer comprehensive final exams in key courses in the concentration.

2. assign large special projects in select courses, including MATH 360 Operations Research, testing mastery of key concepts.

3. evaluate student responses from terminal course questionnaires to be given in MATH 360 Operations Research.

Statistics Concentration – Student Learning Outcomes

A graduate of this concentration will be able to:

1. solve a wide-variety of applied problems in fields related to operations research, including linear algebra, optimization and numerical analysis

Statistics Concentration – Assessment Plan

To assess our concentration outcomes, we will:

1. administer comprehensive final exams in key courses in the concentration.

2. evaluate student responses from terminal course questionnaires to be given in MATH 414 Mathematical Statistics.

Outcomes Statement and Assessment Plan – Mathematics

Mathematics B.A. Degree Program Outcomes

A graduate of this program will be able to:

1. use the mathematical principles, theory, and concepts in analytical geometry, calculus, linear algebra, statistics and computer programming.

2. solve general problems in the field of mathematics.

3. conceptualize the basic principles underlying and uniting mathematics.

Mathematics B.A. Degree Program – Assessment Plan

To assess our program outcomes, we will:

1. administer comprehensive final exams in key courses in the program.

2. assign large special projects in select courses testing mastery of key concepts.

3. analyze the results of alumni, employer, student, faculty and advisory board surveys.

4. conduct an exit interview/questionnaire for students graduating from the program.

5. evaluate student responses from terminal course questionnaires to be given in key courses in the concentration.

1. We try to measure several variables in the assessment of the effectiveness of our programs. We measure mastery of essentials in the chosen area, adequacy of our prerequisites, graduation rates and employment rates. One of the best measurements of the success of our program is measured by the success of our graduates. We are very interested in what happens to our graduates after they leave Ferris and try to monitor their progress as they pursue their careers.

2. The results of our exit interviews, given to all graduating students near the end of their last semester at Ferris, appear in Section 2, subsection C of this report and a complete list of all comments made on these surveys appears in Appendix B, subsection C of this report. To summarize, it appears that our graduates are satisfied with the education that we have provided them and with their preparation for the future. As is mentioned in several different places in our report, sometimes upper-level classes are cancelled due to low enrollment. This seems to be a recurring theme with our program. Several graduates mentioned the desire to have a Master's program offered at Ferris.

   We also conducted terminal class surveys. The main purpose of these surveys is to evaluate the adequacy of the prerequisites that we place on our upper level classes. Terminal classes are defined to the equivalent of "capstone" classes for each of our programs. Here is a list of the terminal classes in each of our programs:

Applied Mathematics

actuarial science concentration	MATH 414 Mathematical Statistics I
applied mathematics concentration	MATH 440 Mathematical Modeling
computer science concentration	CPSC 300 Data Structures
industrial mathematics concentration	MATH 360 Operations Research
operations research concentration	MATH 360 Operations Research
statistics concentration	MATH 414 Mathematical Statistics I

All comments by students on these terminal class surveys appear in Appendix A, subsection G of this report. The responses to this survey by our students were overwhelmingly positive. Here are the questions asked on the survey and the responses:

Mathematics Department Terminal Class Survey

1. When you took this course had you met all prerequisites listed in the catalog?

yes: 37 no: 3

2. Do you feel that your mathematical background prepared you well for this course? If not, what other background would you have liked to have had prior to taking the course?

yes: 39 no: 1

3. Do you feel that you now have a good understanding of this branch of mathematics and how it relates to real-world problems.

yes: 39 no: 1

4. Has this course been helpful to you in pursuing your future goals?

yes: 40 no: 0

5. Do you have any suggestions for improvement of this course or concentration or any comments concerning the course?

Similarly, we use the results of all of our surveys to get information on our programs from all perspectives, not just our own perspectives.

We measure course success by administering comprehensive final examinations and by assigning large special projects usually involving an application of what we have studied.

3. The results of our graduate exit interviews, employer and Advisory Board surveys help us considerably in assessing the rigor, breadth and currency of our curriculum. At present we offer a concentration in computer science, which is being completely rewritten based on student concerns of the depth of the concentration. We are currently working with the department head to try to alleviate the need for cancelled classes, a recurring concern expressed in several surveys. With the introduction of our newest concentration in Industrial Mathematics, the idea has been mentioned of expansion to a Master's degree in industrial mathematics as a long-term goal, once the enrollment has increased to a point where class cancellation is no longer a worry. We have made numerous modifications to our programs and courses, as mentioned elsewhere in this report, based on feedback from these surveys.

The results of our terminal class survey are very impressive. We are especially pleased with the response to Question 4: "Has this course been helpful to you in pursuing your future goals?". A response of yes from all 40 students who were surveyed implies that we are achieving our goal of providing our students with meaningful classes that they feel are a benefit to their future.

4. All of our assessment tools are designed specifically to assess the attainment of our program goals. Administering comprehensive final exams in key courses in the program measures mastery of the subject material, while assigning large special projects tests the applications of the mathematical principles. We use the results of all of our surveys to constantly assess the attainment of our program goals.

L. Administrative Effectiveness

1. In addition to the mathematics department head and the program coordinator, who receives one-quarter release time, we have a mathematics secretary and several student helpers in the mathematics office. The clerical support for our program has been adequate in the past and we believe that no additional clerical staff is needed. The mathematics department head has taken an active role in support of our programs, meeting with virtually all of our program majors and many prospective mathematics students. This active role has been one of the reasons for the recent increase in the number of our majors.

2. We believe that both the department and the programs are being run in an efficient manner. Both the department head and the program coordinator have open door policies, ready to talk to students or faculty about the programs. Our goal is to always have a department and programs that are transparent, with input sought from everyone concerning decisions affecting the programs.

3. In consultation with the faculty, the department head develops the list of courses, sections, times and rooms for all classes to be offered. The faculty has developed a scheduling process in which we choose our own schedules, subject to some rules aimed at giving every faculty member a chance at a decent schedule. We are divided into five groups with the order of selection rotating from semester to semester. This procedure has been in place for twenty years and is well-liked by the faculty.

4. One of the biggest problems in our programs, as evidenced on some of the results from our surveys, is the cancellation of needed classes due to low enrollment. We are taking several steps to alleviate this problem. The mathematics department head, in consultation with all faculty involved in the program, has come up with a schedule that shows when upper-level classes will be offered over the next few years, in hopes that this will minimize the threat of cancellation of these classes by making the students aware of when they should sign up for the classes. A copy of this schedule and its rationale by the department head, Dr. Kirk Weller, appear on the following pages. With the huge increase in the number of our majors,

hopefully, this problem will become less important in the future.

Mathematics Department Course Schedule for 2009-10, 2010-11

A shaded box indicates a course offered every other year.
The grid includes the revised Computer Science curriculum.

Semester → Course ↓	Fall Odd	Spring Even	Fall Even	Spring Odd
CPSC	130	130	130	130
		200		200
			300	
	320			
			326	
	330			
		340		
				442
Elementary MATH MINOR	218	218	218	218
	219	219	219	219
	317			
		326		
			319	
				318
	418			
MATH (Applied/Secondary)	220 220	220	220 220	220
	230	230 230	230	230 230
	314		314	
		320		320
	322	322	322	322
	324		324	
		325		325
			328	
	330			
		340		
		360		
			414	416
				420
	440			

Rationale: Last fall, in trying to put together the 2009 Fall schedule, I gathered data from schedules for prior years and discovered that the departmental schedule had not been adhered to – specifically, there were 300+ courses rarely offered, some offered out-of-sequence, and others not offered in the semesters set by the "master" plan. Additionally, I knew that Bob regularly made course substitutions for applied program. Consequently, I had Linda put a registration hold on all majors, both applied and secondary, so that Bob, Lakshmi, Jim, and I could meet with these students to set-up course plans through graduation. What stands above is a near-term solution that is far from ideal. I distributed this last fall and received no objections. However, several of you have asked questions about scheduling so I wanted to give everyone another crack at this.

To help in understanding my thinking, you will see that courses in the "core", CPSC 130, 200, MATH 220, 230, 314, 322, 324, 325, are offered every year. MATH 322 gets scheduled every semester because of the surveying program. That creates an imbalance that pushed 320, ordinarily a fall course, into spring. The shaded MATH courses, 328, 330, 340, 360, 414, 416, 420, and 440, are required by at least one applied program or should be taken by secondary students, but are not part of the "core". To ensure better course enrollments, these courses have been slated for every other year.

Jim is responsible, with help from the Computer Science committee, for the CPSC sequence, which appear in the first block. The elementary math minor sequence has been modified from the original proposal, but was not changed without Mary's approval.

For the CS portion of the program, I wanted to make sure that we didn't offer more than two 300+ courses in any one semester. For the MATH part, you will see that we offer five 300+ courses each semester.

Section 4: Facilities and Equipment

This section consists of evaluations of the instructional environment and technology, computer access and availability and library resources.

In this section, we have found it more convenient to respond to parts A (Instructional Environment) and C (Other Instructional Technology) by the following narrative by department head Dr. Kirk Weller as opposed to going through each item in the proposed outline. We feel that this narrative addresses the issues asked for in the outline.

A. Instructional Environment and C. Other Instructional Technology

Most classrooms used by the applied mathematics/mathematics programs include a computer, with web and network access; equipment to project computer images to a screen or board; and a whiteboard. Thus, an instructor has the capability to perform a demonstration, to run a computer simulation, or to present graphs and illustrations.

One course in the applied mathematics program, MATH 340 (Numerical Analysis), requires one semester of computer programming. Although done infrequently, a portion of the course could be offered in one of the computer labs, either in the Starr Building or the Arts and Sciences Commons, for students to write computer programs to apply theory presented in the course.

Two courses, MATH 360 (Operations Research) and MATH 440 (Mathematical Modeling), could be enhanced through use of computer software, such as *Maple* or *Mathematica*. The Mathematics Department has an inactive *Maple* site license. Increased use of instructional technology is one of the goals listed in the Mathematics Department's recently developed strategic plan. Upgrading the *Maple* site license is among the 2009-10 equipment requests the Mathematics Department forwarded to the College of Arts and Sciences Dean's Office.

One course, MATH 328 (Discrete Mathematics) is cross-listed as a computer science course. This course could coordinate more closely with computer science courses offered by the department.

Several former students have recently made colloquia presentations. They have noted their use of computer technology and software, either in their jobs or as graduate students. Although all of these students have spoken favorably about their preparation in applied mathematics at Ferris, their experiences suggest to the Mathematics Department that it needs to increase use of instructional software and hardware.

B. Computer Access and Availability

1. Outside of computers in faculty and staff offices, identify the computing resources (hardware and software) that are allocated to the program.

   a. A teaching lab is dedicated to the applied mathematics program. The lab, STR 105, has dedicated software available for classes taught by the Mathematics Department.

   b. A group of dedicated systems in the FLITE library have special programs installed to match the installation in the teaching lab.

2. Discuss how these resources are used.

   a. The teaching lab has a scheduling hold which allows the Mathematics Department to schedule their courses first before other campus departments can schedule courses in the remaining time slots.

   b. The FLITE library systems are open systems with priority given to applied mathematics/College of Arts & Sciences students when our students require the systems. A work area is available nearby for group work.

3. Discuss the adequacy of these resources and identify needed additional resources.

   While the current resources provide a workable setup in the short term, we have identified the need for both a new server and a new dedicated computer lab for applied mathematics students. A new departmental Unix/Linux server would enhance educational opportunities for students, and the dedicated student lab would increase student-student interaction and student-teacher interaction (e.g., a professor could hold office hours in the computer lab).

4. Does an acquisition plan to address these needs currently exist?
Describe the plan. Has it been included in the department or college's planning documents?

The Mathematics Department is currently conducting a strategic planning project. The Computer Science working group has submitted two goals which address the computing needs outlined in the previous section. These goals (with action steps and comments) are:

Goal: Computer Server
Outcome: Establish a multi-user computer server for the Mathematics Department.

Actions:
(*) Gather specifications for a server and investigate placement options; including details of how systems administration will be handled.
(*) Include funding for server in research grant proposal (Nystrom).
(*) Install server (if funded through research grant)
(*) Investigate other funding options if server not funded on research grant.

Comments:
Attributes of the server should include a large memory (8 – 32 GB), account management for Mathematics Department faculty and students, periodic backups, and professional systems administration.

Goal: Computer Lab for Math and Computer Science Students
Outcome: Establish a computer lab for use by Mathematics Department faculty and students.

Actions:

(*) Gather data about setup and funding on current departmental labs throughout FSU.

(*) Investigate funding options and operational details.

(*) Create plans for locating, funding, and administering the computer lab.

(*) Implement Computer Lab

Comments:

The computer lab should have card key access for currently registered students. Systems should be equipped with similar software that is available in the main teaching room (STR 105). The lab could also be used by professors to hold office hours in computing-intensive courses, and lab assistants could be on-hand during posted hours for tutoring. Preferably the lab could be a 24 hour access lab. The computer lab should be in operation by Fall 2011.

5. Discuss the efficacy of online services (including WebCT) available to the program.

Ferris State University uses the FerrisConnect system (formerly WebCT Vista) for online classes, and web-supported classes. All instructors can utilize FerrisConnect to enhance their courses. Instructors can also utilize traditional HTML-web pages housed on a university server to provide online resources for students.

6. Discuss the adequacy of computer support, including the support for on-line instruction if applicable.

Ferris State University has a certified training program in place for FerrisConnect, and has user help available. The university has an efficient Technology Assistance Center (TAC) which is available as a clearing house for other technology questions and/or problems that faculty may have in the classroom and/or office, and for questions/problems that students may have.

D. Library Resources

1. We believe that the print and electronic and other resources available through FLITE are adequate for our program now and will continue to be adequate in the future.

2. There are several computers that are located in FLITE that are designated for use by our students and have special software that is used in some of our advanced classes. We also offer an iTV class from FLITE for our students and students in Traverse City, making it possible for them to take the advanced classes they need without traveling to Ferris. We appreciate the help that the FLITE personnel have given us in the past in this regard. The needs of our program are being met by the Library faculty and staff and we have no concerns in this regard.

3. Every year we are allocated a budget from the library for the purchase of mathematics books and other resources from the library. This budget has always been adequate for our needs. We are happy to receive this allocation of resources to our department from the library , and feel that these resources are adequate at the present time.

Section 5: Conclusions

This section consists of the conclusions based on data analysis derived from Sections 2-4 and on the collective wisdom and judgment of the Program Review Panel. In arriving at our conclusions, we summarize the relationship of the programs to each of the specific categories.

A. Relationship to FSU Mission

The mission statement for Ferris State University:

Ferris State University prepares students for successful careers, responsible citizenship, and lifelong learning. Through its many partnerships and its career-oriented, broad-based education, Ferris serves our rapidly changing global economy and society.

Compare this mission statement to the goals of our applied mathematics program:

A graduate of this program will be able to:

1. apply the mathematical principles, theory, and concepts in analytical geometry, calculus, linear algebra, statistics and computer programming.
2. solve applied problems in their specific concentration of mathematics.
3. analyze real-world probiems and appropriately communicate the results.

There is universal (as far as our surveys go) agreement that the applied mathematics/mathematics programs are in line with the mission of Ferris State University. In response to the question of how well our programs related to the Ferris mission, we received the following average responses (with 5 being the highest rating and 1 being the lowest rating) on all surveys that asked this question:

Graduate survey:	4.13
Employer survey:	4.00
Faculty survey:	4.92
Advisory Board survey:	5.00

We are particularly impressed with the average responses of our faculty and our Advisory Board.

The Program Review Panel concludes that our programs, with their emphasis on solving real-world problems, is perfectly in line with the mission of Ferris State University and that we are a vital part of this university.

B. Program Visibility and Distinctiveness

Applied Mathematics

Our system of offering students six different concentrations to choose from is unusual in the state of Michigan and makes us stand out in the state in the field of applied mathematics.

The concentrations in industrial mathematics (new next fall) and operations research are **unique** in the state of Michigan, although some Michigan universities have Masters degree programs in these areas. They fit perfectly with the mission of Ferris to provide a quality applied education to our students. Graduates of these concentrations will be fully prepared to step into graduate programs in industrial mathematics or operations research or attain jobs in applied mathematics.

There are several universities in Michigan that offer B.S. programs in actuarial science. Although our concentration cannot compare to a full B.S., our requirements prepare our students for the first actuarial test and in some cases provide more mathematics classes than some of the other universities.

The computer science concentration is currently being completely revised, with the new program hopefully to be approved for Spring, 2010. This concentration has a stronger mathematics component than other computer sciences programs in the state, although most of these programs are B.S. programs in computer science, not just concentrations, and offer more computer science classes than we do.

Having quality students is essential for the success of our programs. Our students come from many sources: directly from high school, the Honors Program, pre-pharmacy and other programs at Ferris. We attract students with the desire and ability to be successful in our program.

Other institutions in Michigan offer degrees in applied mathematics, but none of them have the combination of choices that we offer to our students.

Mathematics

Almost every university in the state offers a degree similar to our BA degree in mathematics. There is nothing that makes our program stand out. It simply gives our students another option in their collegiate plans.

The Program Review Panel concludes that our programs are very distinctive and visible and offer opportunities to our students that they could not pursue anywhere else.

C. Program Value

The University benefits greatly from the mathematics programs at Ferris. The emphasis at Ferris State University has always been, and is now, on applying knowledge to solve real-world problems. Mathematics, the "Queen" of the sciences, is the perfect subject to lead Ferris in this endeavor. Our applied mathematics program is unique in the state of Michigan and two of our concentrations are the only ones of their kind in the state. This positions the department to play a major role in carrying out the mission of the University.

Similarly, our students benefit from our programs by being exposed, through classes and other experiences, to real-world applications of mathematics, which make them able upon graduation to start helping the world run more efficiently. Several of our faculty members have distinguished records in teaching, research or real-world experience and bring a wealth of knowledge, not to mention excitement, to our students.

Our faculty is very involved in numerous professional activities external to the university. They have also volunteered their time in many extra-University general public endeavors. These activities help the program and the Big Rapids area by making the Ferris State University mathematics department more visible in the community and in the world. For complete information on all of these activities of our faculty, please refer to Appendix D.

The Program Review Panel concludes that our programs are of great value to the University, the department, our students and to the world in general. Additional information on program value may be found in Section 1, subsection D.

D. Enrollment

As has been mentioned elsewhere in this report, our enrollment is now at an all-time high and currently (April, 2009) stands at more than 50 for the first time in program history. Twelve years ago our enrollment was 7 and the decision of your committee was to continue the program "with monitoring". During the next six years our program saw a steady increase to the point where our annual enrollment was around 30. This level of enrollment has been maintained during the past six years, and seemed to be at a level that would continue in the future. However, this past year has seen an explosion in students enrolled in our program, with an influx of over 25 new students enrolled in mathematics. These students come from pre-pharmacy, the Honors Program and other programs at Ferris. Their credentials indicate that they would be successful in pursuing our programs and we are excited to welcome so many new students to the world of mathematics.

Possible reasons for this increase have been mentioned already. We will repeat them here for clarity.

a. We have had several former students return to talk to our students and prospective majors about their careers, and these events have been very well attended.

b. Dr. Kent Sun has become an assistant coordinator to the Honors Program and has encouraged many honors students to consider our mathematics programs.

c. Our new department head, Dr. Kirk Weller, has taken an active interest in our program and has met with virtually all of our majors, and has helped promote the program.

d. Dr. Hengli Jiao applied for and received an S-STEM Scholarship Grant to offer to students majoring in the sciences. Hengli currently runs the program and seven of our students have taken advantage of the scholarships.

In regards to **a.** above, after Jennifer McGinnis came back to talk to students about the field of actuarial science, we have had between 10 and 15 students added to our actuarial science concentration. Several of them have written to her for advice on what elective classes to take and she has sent them detailed responses. We obviously made a wise choice in adding Ms. McGinnis to our Advisory Board.

We realize that mathematics is not the easiest subject to pursue, but we are proud of our majors and hope to maintain this level of enrollment in coming years. The Program Review Panel concludes that our enrollment is robust and is a direct reflection on the quality of the programs that we offer our students.

E. Characteristics, Quality and Employability of Students

Characteristics of Students

Our students are approximately two-thirds male, overwhelmingly white, in their early to mid-twenties, full-time students and residents of Michigan. Traditionally, mathematics has not been a strong field to attract women and minorities and our statistics bear that out. This is changing. Although we don't have official statistics for this year yet, the program coordinator reports that of our current 50 plus majors, very close to 50% of them are women, and 10% of our majors are now African-American.

More information on the characteristics of our students can be found in Section 3, subsection A, part 1of this report.

The Program Review Panel concludes that the characteristics of our students mirror the characteristics of mathematics majors nationwide. We believe that the increased visibility of the programs will help to increase the number of women and minorities, and note that this increase has already started. We recommend that we continue our efforts to attract good students into our programs.

Quality of Students

For our majors, the average GPA is 3.20 and the average ACT mathematics score is 25. These two statistics are considerably higher than the University averages. We feel that our programs are among the most difficult programs at Ferris and demand students with a special ability and interest in mathematics. Our students have won numerous scholarships and awards, including the Leadership Award. Many of our students are members of the Honors Program, which is an honor in itself. Many of our students participate in mathematics competitions, winning awards several times. Other students have presented at regional and national mathematics conferences. We think that these are impressive accomplishments and have put into our most recent Strategic Plan a request for additional funds to send more students to conferences. We are proud of our students' achievements and think that it speaks well to the quality of our students.

More information on the quality of our students can be found in Section 3, subsection A, part 2 of this report.

The Program Review Panel concludes that the quality of our students is good and seems to be getting better. We still have some students who struggle with our programs and either take extra time to finish the programs or don't finish the programs at all. Early advising helps in this regard, but we need to do a better job recognizing when a student is having trouble with our program and counseling that student.

Employability of Students

A significant number of our graduates have received employment in their field within one year of graduation. All of the graduates of our actuarial science concentration receive jobs quickly after graduation. Some of our recent graduates in other concentrations have had a harder time finding employment in their field. In the past few years, all of our graduates have found employment, but only about two-thirds are employed in their fields. The number of our graduates going on to graduate school has been increasing in the past few years. The annual average is now close to 30%. Several of our recent graduates have decided to pursue advanced studies after being in the workplace for a few years. They do this because they either want more of a challenge in their careers or they have found a passion for a certain career.

More information on the employability of our students can be found in Section 3, subsection A, part 3 of this report.

The Program Review Panel concludes that the employability of our students, while impressive for many of our students, could be improved in the future. We feel that the department needs to do a better job of helping students before they graduate to acquire job-hunting skills. Students should start thinking about employment at least one full year before graduation. Several graduates who have trouble finding employment in their field contact faculty members within our department and are actively getting advice and suggestions from us on possible courses of action. We care about our students just as much after graduation as before graduation and hope to keep in contact with them for decades as they pursue their lifetime ambitions. Although we try to encourage our students to do internships and summer workshops, we need to do a better job in this regard as well in the future.

F. Quality of Curriculum and Instruction

Quality of Curriculum

In the applied mathematics degree program there are now six concentrations for the students to choose from: actuarial science, applied mathematics, computer science, industrial mathematics, operations research and statistics. This combination of concentrations is unusual in the state of Michigan, and two of our programs, industrial mathematics and operations research, are unique within the state.

In an attempt to improve the quality of our curriculum, we have improved our curriculum in several areas since the last review. We added a course to our operations research concentration at the suggestion of one of our Advisory Board members; we adjusted the actuarial science requirements as needed; we designed an entirely new concentration, industrial mathematics; and are in the process of major revisions to our computer science concentration. All of these efforts have been to strengthen our programs and to keep them up to date with current job trends. With the help of our Advisory Board, we expect to make more changes in the program as warranted.

More information on the quality of our curriculum can be found in Section 3, subsection F and in the surveys in Section 2 of this report.

The Program Review Panel concludes that the quality of our curriculum is very good and recommends that we continue to use our Advisory Board in the future to improve our curriculum and keep it in line with current employment opportunities.

Quality of Instruction

The professors involved in our programs are very active in professional development activities and other activities directly related to teaching. These activities include, but are not limited to, presenting research at national and international conferences, publishing, advising students, being mentors for student groups, involving students in research, getting scholarship money for students and starting a Mathematics Colloquium, among many other activities. We have professors with expertise in each of our programs and who have been nominated for and received numerous teaching awards, including the Distinguished Teacher Award. Course outlines are continually being updated and new courses being created (several new computer science courses are currently in the review process).

More information on the quality of instruction can be found in Section 3, subsection G and in the surveys in Section 2 of this report.

The Program Review Panel concludes that the quality of instruction in our program is excellent and recommends that as program faculty retire or leave for other reasons that they be replaced with tenure-track people with expertise in at least one area represented by our programs. Without this replacement the quality of instruction and faculty in general will decline and our programs will also, by necessity, decline.

G. Composition and Quality of Faculty

Our faculty is very involved in numerous professional activities, including research, reviews, presentations at conferences, notable publications and grant acquisitions. Many members of our faculty are actively involved in professional mathematics and computer science organizations.

At the present time we feel that our faculty is uniquely qualified to teach in our program. We have professors with expertise in each concentration of our programs and have recently hired professors with expertise in computer science and mathematics education. It is currently planned that the next position that we receive will be filled by a professor with expertise in the applied mathematics field. As senior members of the department retire, they will need to be replaced by people with specialties that will help our programs grow.

For complete information on the professional activities of our faculty, please refer to Appendix D. Additional information can be found in Section 3, subsection H of this report.

The Program Review Panel concludes that the composition and quality of the faculty in the mathematic department is very good. One of our goals for the future is to retain this quality while seeking people who can help us improve our programs.

Appendix A: Administrative Evaluations

This Appendix includes the evaluations of the applied mathematics and mathematics programs by the department head and the Dean.

Mathematics Department Administrative Program Review
Department Head Report
May 4, 2009

The Mathematics Department supports three majors, Applied Mathematics, with five concentrations, a BA in Mathematics, and Secondary Mathematics Education. The latter program is administrated through the School of Education. Bob McCullough serves as the Program Coordinator for the former two programs, and I have assumed principal advising duties for the latter.

Since the last program review, improvements have been made to the Applied Mathematics program, and student enrollment has increased. Much of the credit goes to Bob, who serves the coordinator position with distinction. He excels at teaching, works extremely well with students, and carries out Ferris' mission with enthusiasm. This next year he will take a sabbatical to study a calculus application; he will eventually integrate the results of his study into his teaching. This typifies his commitment to students and his grasp of the University's mission as a teaching oriented institution.

The Applied Mathematics program aligns strongly with the University's mission. Surveys of departmental faculty, current and former students, employers, and the Applied Mathematics Advisory Board attest to this. In terms of structure, with a common core of required courses and five concentrations that emanate from that core, the Applied Mathematics program is unique among the public institutions in Michigan. In Fall 2009, a sixth concentration in Industrial Mathematics will be added, and, pending University Curriculum Committee approval, a revised Computer Science concentration will be launched. In response to recommendations made during the last APR, several of the existing concentrations have been revised. Of the six concentrations, two, Operations Research and Industrial Mathematics, are the only such programs of their kind at the undergraduate level in the state of Michigan.

Surveys and interviews conducted with current and former students, members of the Advisory Board, employers, and departmental faculty suggest that the Applied Mathematics program is solid. Concerns expressed by a minority of stakeholders and my own review of the APR report suggest several areas for improvement:

- Elimination of cancelled classes and regular offering of courses;
- Enhancement of computer hardware and software;
- Student recruitment;
- Increased undergraduate research and internship opportunities;
- Systematic career planning.

In response to the first bulleted item, the Mathematics Department recently instituted a short-term two-year course sequencing schedule distributed to all Applied Mathematics majors, Secondary Mathematics Education majors, and students pursuing a BA in Mathematics. Although the Department has a master schedule, it was not followed consistently nor was it realistic. The two-year schedule that appears in the report holds promise. For Fall 2009, projected enrollment in each major course being offered exceeds 15 students.

The second bulleted item is mentioned specifically in the Mathematics Department strategic plan. The Department plans to upgrade its computing facilities, and to modernize the programming languages it uses in its computer science courses. The newly revised concentration in computer science will strengthen the program, as well.

Over the past academic year, the number of students pursuing an Applied Mathematics major has increased significantly. We attribute this to more intentional academic advising, which includes long-range course planning for each student; increased efforts to recruit Honors College students; and departmental colloquia featuring presentations by former graduates. In partnership with the College of Arts and Sciences recruiting coordinator, the department will implement specific strategies to plans to increase the number of freshman students who elect an Applied Mathematics major.

The Mathematics Department strategic plan includes, as one its goals, a focus on the development of undergraduate research and internship opportunities. Many departmental faculty have the capability to guide student research projects, and several have successfully directed such projects in the past. To encourage greater faculty participation, the department, with support from the College of Arts and Sciences, will need to develop support structures to encourage and to reward undergraduate research activity. In addition, the department needs to identify an individual, or group of individuals, who can organize internship opportunities.

Although a great deal of career information can be found from the Mathematical Association of America, the American Mathematical Society, and the Society for Industrial and Applied Mathematics, specific strategies on how to identify specific jobs requiring mathematical expertise is somewhat elusive. This is one of the reasons I recommend that the Program Coordinator position be expanded from .25 FTE to .50 FTE. The increased released-time would enable the coordinator to work with students to develop comprehensive career plans and to formulate strategies to identify suitable career opportunities. The expansion of the position would also aid in stronger support for internships.

One of the strengths of the department is its academic diversity. There is at least one member of the department whose area of expertise aligns with one or more of the concentrations in the Applied Mathematics program. However, the current scheduling model does not account for this. Although I strongly favor faculty autonomy in course selection, I do recommend a more targeted approach, that is, revision of the model to accentuate faculty expertise.

Although the quality of students in the Applied Mathematics program generally exceeds that of the University as a whole, there is a fairly wide range of student abilities. For this reason, I recommend that the Department develop strategies to facilitate higher levels of academic success among its more challenged students. The Department's strategic plan calls for development of a faculty mentoring program, a first step toward addressing this issue.

Over the last 20 years, there has been an increased emphasis in the wider mathematics community on pedagogical reform – specifically, the implementation of alternative forms of assessment, greater integration of instructional technology, wider use of collaborative learning opportunities, and writing across the curriculum. The Mathematics Department strategic plan includes several of these ideas. To take the Applied Mathematics program to the next level, I believe the Department needs to be very intentional about discussing ways to modernize its instructional delivery. The capability is there; the Department features a recent Distinguished Teacher Award winner, a recent semifinalist for the 2008-09 award, and the first recipient of the CAS Adjunct Teacher Award. The Department recently received a $10,000 grant from the University Academic Affairs Assessment Committee to support a yearlong professional development program for the improvement of the Department's assessment plan and revision of the Secondary Mathematics Education program. I expect this project to impact the Applied Mathematics program, as many of the courses taken by prospective secondary teachers are completed by applied mathematics students.

Under Bob McCullough's leadership, the Applied Mathematics program has improved, is solid, and has the potential for growth. The structure of the program is unparalleled in Michigan. Faculty academic diversity ensures adequate support for each concentration within the program. With efforts to implement goals in the recently crafted Departmental strategic plan, the future for the program is promising.

MEMORANDUM

Date: May 18, 2009

To: Academic Program Review Council

From: Matthew A. Klein, Dean, College of Arts and Sciences

Subject: Applied Mathematics Program Review

After review of the Applied Mathematics Program's Self-Study document, I provide the following observations:

1. The Applied Mathematics Program provides a solid background in mathematics that prepares program graduates for work in mathematics-related fields. The program goals are clearly in line with the mission of Ferris State University. Two of the undergraduate concentrations, industrial mathematics and operations research, are unique to Ferris among Michigan universities.
2. There are many strengths in the program: students have been successful in both industry and graduate school; students are engaged in activities across the campus; students have found both academic and professional success through their major.
3. The facilities and equipment meet the needs of the Applied Mathematics Program. The Applied Mathematics Program receives support through the department, college, and university through supply and expense allocations and one-time funds. The server that is mentioned in the self-study is currently being acquired by the department.
4. The self-study has identified several areas where improvement has occurred, including significant growth since the last program review.
5. The program is clearly meeting its expectations and should be continued.

In closing, the self-study appears to be an accurate representation of the current state of the Applied Mathematics Program, and the program faculty are prepared to work with Vice President for Academic Affairs to address the recommendations of the APRC.

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Appendix B: All Comments on Survey Sheets

Complete list of responses to all surveys conducted related to the Applied Mathematics/Mathematics program for the Academic Program Review for 2009-2010.

In this appendix we have compiled a complete list of all of the comments made on all of our surveys, including the terminal class survey which is used for assessment of our programs. The actual surveys may be provided to the committee upon request. They are currently in the possession of the applied mathematics/mathematics coordinator. We are providing this list in lieu of the actual completed surveys to protect the identity of the respondents.

A. Graduate follow-up survey comments

Excellent program. Prepared me well for my graduate studies. I am about to receive my Ph.D. in astronomy.

Like to see more cohesion. Interesting classes but wanted capstone, thesis, to wrap everything up.

Not designed for hands on training. Does not really show what it's like in the real world.

Gearing toward something specific. Should state jobs available in the teaching field at HS or midschool level. Can get certificate on the job. No jobs for math/sci jobs. Must have 18-24 hrs in math.

Not getting enough SAS for survey sampling. Needed to go back to get additional training in statistical software. Not a statistical concentration major.

Should have done more hands- on stuff like comp. program like JAVA, python. When I was there it was only C++. Would have been to have more of a variety so you can adapt better.

Program is good. Students may need help to find jobs. May need to tell them that they may need masters. Need help with operations research. Need more guidance. Program is great, got struck after graduation. Need more assistance. If you go into *this field you can work for these companies. What jobs do you look for?*

Frustrating scheduling of classes. Couldn't take courses that you wanted. Tried to go to graduate school in Applied math but felt unprepared. Really struggled with material

Overall classes seemed fine while taking them, but currently in graduate school, others seem better prepared.

After completing B.S. took 3 years off went back to graduate school part time in Industrial Engineering and math background was great.

If I would suggest anything, I would try to make research opportunities available. That process teaches experiences that are priceless.

I think that leaving the mathematics program as a Statistician, I was not as well as prepared as some of my fellow graduates who left as mathematicians or computer scientists. I have commented on this in the past as well, but I really believe that Ferris should have at least one class in Statistical Programming, covering the basics of R, SAS, Minitab, whatever, because as far as I can tell, Excel is not really a valid statistical package in the real world – even the government has started switching to R.

Besides the Programming, on the mathematics side, I think that it was a big mistake for me not to have finished my Advanced Calculus course at Ferris. I took a "W" in the course because of personal issues that I could not overcome at the time. However, I did not get a second chance to take the course since it is so sporadically offered at Ferris I now realize that most undergraduates have at least some basic Advanced Calculus or Real Analysis class and that I really missed out and am struggling in my current Graduate Real Analysis course because of it. This course is a real must for all students! There are textbooks I've heard of recently such as "Real Analysis for Real People in the Real World" and "Real Analysis for

Teachers" that may make things a little more palatable than the Royden I am using now, but I haven't actually checked them out for myself yet.

B. Employer follow-up survey comments

Both employees I have from FSU's Applied math program are able to "think" and 'work through" problems without direct supervision – this is a big plus.

Very happy with Eric

Jennie's college career also included an advanced degree from University of Iowa, which is difficult to separate from her Ferris state education. However, we are very happy with Jennie's work and mathematical skills.

For this rating I tried to assume that I knew nothing about the FSU program other than being familiar with Holly's work.

C. Graduating student exit survey comments

The prerequisites were fine.

My suggestions for improvement would include assigning more homework since the student s need more practice, and an instructor that can slow down once in awhile.

Help with job placement!

I think the prerequisites for each class are appropriate.

Make a Master's program and I would come back for sure.

I got a job before graduating. I have a wealth of tools for whatever problem-solving I might need to do. I thought all classes had adequate prerequisites. After completion of the calculus progression and linear algebra, you are ready for anything. I enjoyed it and learned a lot. More information about majors online at the beginning would have been helpful.

More computer-related courses.

CPSC 300 made me be here for an entire year because it was not offered last winter. The CPSC degree could use some improvement. It hardly covers half of the degree at other institutions.

I would like to see FSU offer a M.S./M.A.in applied math. This would have been helpful to me. Seriously, you have some good math profs that could do this (i.e., Sun, McCullough, Allegretto). You should consider advertising more. If you're going to offer a B.S./B.A. in math - go all the way and offer a Masters.

D. Student program evaluation comments

Are there any courses that you would have liked to have taken but were not offered?

- *Was able to fit everything, some would have been nicer to take earlier, though.*
- *Advanced calculus*
- *Could be better with some required business classes.*
- *I wanted to take the applied analysis class but I was not able to take it. I am very curious about it and how it can help me.*
- *Yes, but graduating sooner was more important. The classes are only offered every other year.*

What was the most positive experience you have had as an applied mathematics major?

- *The classes themselves and the ability to work with the professors.*
- *Attending a math class and genuinely having fun learning higher level material.*

- *It's nice to have the professors take the time to get to know you.*
- *My advisor helped rearrange my schedule to graduate on time.*
- *Getting to know most of my instructors on a one-on-one basis; I like the small classes.*
- *Having Jennifer come and speak was a very positive experience.*
- *My advisor and some of my professors. They are very helpful and will sit down and try to help you any way they can.*
- *One-on-one help that most of the teachers have offered.*
- *Faculty is very helpful.*

Do you have any concerns about the applied mathematics program and any suggestions for improvement?

- *Scheduling of major classes like 414 and 416 for every year.*
- *Possibly more required electives – the common problem of course offerings.*
- *Everything has been satisfactory, although chances for internships or possibly advised research would have been nice.*
- *I feel the business aspect of it should be included/required.*
- *Only concern would be that some courses that are offered every once in a while should have the best possible professor for them.*
- *My only concern is the job possibilities out there for me. There are not a lot of things around campus that helped so I am basically left to find out on my own.*
- *Fulfill purpose – department unity, course objectives.*
- *Evaluations of teachers should affect their ability to teach these courses again.*
- *Classes offered more often, and maybe a broader base of classes.*
- *I feel internship opportunities would help.*

Open comments

- *More information on scholarships and more outside class work dealing with the department.*
- *Teachers are good and helpful – try to accommodate students the best they can.*
- *It would be great to see some job placement or internship opportunities.*

- *I would like to see classes not be cancelled due to small class size, especially for specialized classes that may only be offered once a year.*
- *All the math professors I have had are very willing and flexible about working with students outside of class.*
- *Overall, it is good, the courses and faculty are great.*

E. Faculty perceptions comments

Great program! Keep it going!

Computer science especially is underfunded. [Computer hardware/software is definitely not adequate].

One immediate and easy fix the Dean's Office could make would be to let more (or any) of our smaller upper level courses go. Our students (and teachers) become discouraged when these courses are cancelled.

Applied Mathematics is not an easy major. Our students are among the best the University has to offer, and they should have the opportunity to take all courses the department offers. Low enrollment classes should be allowed to go regardless of the enrollment in them. To do otherwise is to cheat the students of a quality education.

I am not aware of any system the administration has in place [for locating jobs].

More computer software should be utilized in the courses taught (for linear programming, statistics, etc.).

We need a computer server for the CPSC concentration; maybe a Ferris Foundation grant would help.

F. Advisory committee perceptions comments

I think each group of coursers were very well chosen for their respective concentration; enhancing the basic skills that will be required.

Your program prepares graduates for diverse professional careers in areas where mathematics is applied as well as for graduate study in mathematics and a wide variety of disciplines which depend heavily on mathematics

I currently have a 2007 graduate of Ferris' Applied Mathematics – Operations Research Concentration working for me in the Human Performance Institute at Western Michigan University. Based on her education we were able to integrate her into our research activities immediately. In addition, she is currently enrolled in our Industrial Engineering Masters Degree program and is performing very well. I hope to have future Ferris students from the Applied Math program consider enrolling in our Operations Research or Industrial Engineering programs at Western Michigan University. With respect to the Operations Research Concentration, I would encourage students to take MATH 314 [Probability] as one of their electives, especially if they are considering a Masters degree in Operations Research. With respect to the Industrial Mathematics Concentration, I a student would take an elective calculus-based physics course and a macroeconomics course, they would be able to enter an Industrial Mathematics Masters Program with very few additional prerequisite courses.

By and large, my comment to item #2 [a rating of 2 on the question concerning student s form our program having training/knowledge comparable to those from other universities] is due to the fact that many competing Universities offer a major I Actuarial Science (that therefore covers more topics that are on the exams required for the credentialing process) as opposed to a concentration. As a concentration, I think that the actuarial science students at Ferris are being well served. I would recommend that they be strongly advised to take Econ 222 so that in conjunction with Econ 221 they will have fulfilled one if the three Validation by Educational Experience (VEE) requirements that are part of the credentialing process. I would also recommend determining if any other courses met the VEE requirements and, if so, that approval through the Society of Actuaries be sought.

1. Graduates of the Applied Mathematics program at Ferris are capable of applying their education to practical situations.

   4: *I think this is basically a true statement, but I believe, as we move forward, that we need to be more intentional about incorporating technology into our courses, as well as making sure our students have some programming experience. In addition, it would be helpful if we could partner with local companies to consult on low-level projects. I also believe our courses need to provide opportunities for our students to work on projects, to work in teams, and to write reports.*

2. Students from the Applied Mathematics program at Ferris have training/knowledge comparable to those from other universities working in the same field.

   3: *Other places such as MSU or UM, or even WMU, probably have a wider variety of course offerings. If we think of the smaller state universities, I think we compare favorably, although I think we have to find ways to make ourselves increasingly more distinctive. We can't do this by offering more courses, but we can accomplish this by what we do in those courses.*

3. The academic rigor of the required courses in the Applied Mathematics program adequately prepares students for the job market.

   4: *I tend to agree with this statement, although I wonder whether we focus too much attention on procedural learning as opposed to the process of mathematical thinking and conceptual development.*

4. The Applied Mathematics programs are in line with the mission of Ferris State University.

   5: *No question.*

5. Students in the Applied Mathematics program at Ferris are taking the kinds of classes that are necessary for success in the job market.

   3: *Generally speaking I believe so.*

6. Overall I have a positive impression of graduates of the Applied Mathematics program at Ferris.

   4: I think the department is basically on the right track.

I think the applied program aligns with the University mission, and I think we have a good foundation. I believe we need to find ways to increase opportunities for internships and research projects, incorporate technology into our delivery of our courses, and provide students with opportunities to work on projects. Although I like the different tracks, we have too few students chasing too many tracks, so I think we need to find ways to streamline the program while maintaining the tracking option.

I think the department is basically on the right track.

G. Terminal class survey comments

Math 360

1. When you took this course had you met all prerequisites listed in the catalog?

   No, but I was taking it simultaneously
   Yes, I'm not sure what they were, but I'm assuming I had them since I got in
   No was taking 322 at the same time
   No, I had not taken linear algebra
   No, I still had to take Math 322

2. Do you feel that your mathematical background prepared you well for this course? If not, what other background would you have liked to have had prior to taking the course?

   Yes, I had already taken most of the other math tests.
   Yes, Linear Algebra did a good job preparing for Operations Research
   Yes, I was well prepared

Yes, especially linear Algebra

Yes, my background made this class very understandable

Yes, needed a little more

I feel that I was prepared for this courss.

It prepared me well. Numerical analysis helped a lot.

No. My previous knowledge was not greatly used. I learned so much more. My basic knowledge of algebra was useful.

I think I was well prepared for this class

I felt prepared now knowing what it is

3. Do you feel that you now have a good understanding of this branch of mathematics and how it relates to real-world problems.

Yes – game theory decision theory

Yes, possibly more so than other field of mathematics

Yes, at a basic level

Yes, it was a great class!

I wouldn't say a good understanding cause its only one class if there were an additional class in this concentration it would be better

Yes, it covers the basics of Operations Research but does not go in depth. It is a great introduction.

Definitely. This course is focused completely on real world situations. I feel prepared to pursue a graduate degree.

Little bit

Yes, I've seen so many methods of solving problems already

Yes, for me most part. I think we maybe could have worked on some techniques a wee bit more.

Yes, I feel that I now have a better understanding for finding the "optimal" conclusion in math.

I feel that I have been introduced to a very large branch of mathematics! – but, yes, this course gave me an excellent foundation to the subject.

4. Has this course been helpful to you in pursuing your future goals?

Yes, It seems like valuable information for any math engineer path.

Yes, this course may define my future goals.

It is helping me graduate, so yes

Very helpful because it is a course in my concentration, and has inspired me to pursue getting my Masters in Operations Research.

Yes, it has made me look more at other branches of math and helped me to decide on going farther in my education.

It has prepared me for further education and it has shown me what to expect.

Not sure yet.

Yes, very →graduation

Yes, Has become a passion for me

Yes, very much so!

I think so.

5. Do you have any suggestions for improvement of this course or concentration or any comments concerning the course?

The course was good, maybe more example problems for the material toward the end of the semester (even though they take a long time)

I think this area of study should be promoted more, it is very interesting

No, I feel it's a great class as it is!

It was fun and useful

Nope, all good.

I liked the course the way it was.

It was fun. Maybe have a part II for it.

No, maybe a little more using a computer to help solve real world problems?

I think this course is fantastic and I have no comments concerning it.

Although I appreciated the inexpensive textbook, I suspect that a more comprehensive text might be more helpful and inspiring – not that I was *limited by either of the two! I enjoyed the course a great deal, only sometimes wishing that we could have covered topics in more depth.*

Math 420

1. *No, I hadn't met any.*
2. *No, it was a different kind of math. I think it should have a proof type math pre-req at least, some other math than just the calculatory type math*
3. *Not really.*
4. *Yes, I took a new kind of math and it helped me in reaching graduation requirements.*
5. *go slower and explain it a lot more with lots of examples*

Math 430

2. *I do think with my math background that I was ready although it wouldn't have hurt to take a few more proof writing courses. Math 324 and all of the calculus helped.*
3. *Definitely; I feel like I know calc much more than before and I thought that I knew so much already!*
4. *I am hoping that like Prof. Allegretto said that it will help me when I enroll in grad school.*
5. *I think for as difficult the course matter may have been, it was taught extremely well and I do believe it helped me sharpen my proof writing skills!*

Math 440

1. *Yes, I met all prerequisites.*
   Yes, all prerequisites for this class

2. *Well prepared*

I feel I was prepared in my mathematical background for this course.

Yes, that's why I enjoyed it because I knew what was going on.

Yes, I had all the skills necessary to perform the modeling techniques

I do feel I was prepared mathematically for this class.

3. *Yes, very*

   Yes, this course related everything we covered to real-world examples.

   Yes, very much

   Yes, I plan on using Markov chains to track my sister.

   Yes, it was good to see how to apply the math.

   Yes, I loved doing really world problems even if we make up silly names for them.

4. *Yes, it has shown me different ways to approach real world math problems.*

   Very

   I do not know yet if this class has been helpful, but I do feel more prepared.

   Yes, I wouldn't mind having a job in this field.

   Yes, well worth the time and effort.

   Yup. It will help in modeling trends.

   Yes, it has opened my mind to lots of different things that people do/use in the world with math.

5. *No, the course met and exceeded all expectations. Also the course intrigued me in areas of math I had previously had little to no interest. This is an excellent course!*

   Amazing course recommend it to any student for real-life problems. Great teacher too.

   No I really enjoyed this class

   I feel the course was great and the style it was taught was excellent.

   Maybe add a sequel

   I think we could have handled more and tougher material.

It was a good course & I learned a lot.

No, Dr. McCullough does a great job.

Appendix C: Mathematics Course Content Sheets

This appendix includes the course content sheets for all of the mathematics and computer science courses that are relevant to our Applied Mathematics or Mathematics programs.

Note: In some instances, the faculty member responsible for the course content sheet has retired, but no changes have been made in the sheets since their retirement, so the sheets remain current.

Winter, 2000 | Course Content | A. Sherwood

CPSC 150 | Programming in Basic | 3 credits

Course Description: This course introduces technical and scientific programming in Visual Basic. Documentation, recursive computation, numerical approximation, logical programming, problem solving, sequential and random access files and graphics.

Prerequisites: C- or better in MATH 126 or MATH 130 or equivalent.

Text: *An Introduction to Programming Using Visual 6.0*, 4th Edition, David I. Schneider, Prentice Hall, 1999.

CONTENT

Chapter 1	An Introduction to Computers and Visual Basic	1.1 – 1.4
Chapter 2	Problem Solving	2.1 – 2.2
Chapter 3	Fundamentals of Programming in Visual Basic	3.1 – 3.6
Chapter 4	General Procedures	4.1 – 4.4
Chapter 5	Decisions	5.1 – 5.3
Chapter 6	Repetition	6.1 – 6.3
Chapter 7	Arrays	7.1 – 7.5
Chapter 8	Sequential Files	8.1 – 8.2
Chapter 9	Random-Access Files	9.1 – 9.2
Chapter 10	The Graphical Display of Data	10.1 – 10.4
Chapter 13	Object Oriented programming (If time permits)	

CPSC 200 Object Oriented Programming 4.0 units

Course Description: Introduction to programming and software engineering based on object oriented analysis. Structured programming techniques using C++, elementary algorithms and data structures, focusing on ADTs throughout. Discussion of procedural problem solving, program design and development, control structures and functions, arrays and pointers, introduction to classes for programmer-defined data types. Additional topics include modular development, namespaces, friend functions, operator overloading, dynamic arrays, recursion, and random number generation.

Prerequisites: Math 126 or Math 130, and CPSC 150 or CPSC 244,
or consent of instructor

Text: Walter Savitch, Problem Solving with C++: The Object of Programming
Visual C++ 6.0 Edition, Fourth Edition
Addison Wesley, ©2003

Content

Chapter/Sections	Topics
1.1–1.4	Introduction to Computers and C++ Programming
2.1–2.5	C++ Basics
3.1–3.6	Procedural Abstraction and Functions That Return a Value
4.1–4.4	Functions for All Subtasks
5.1–5.4	I/O Streams as an Introduction to Objects and Classes
6.1–6.3	Defining Classes
7.1–7.4	More Flow of Control
8.1–8.2	Friends and Overloaded Operators
9.1–9.2	Separate Compilation and Namespaces
10.1–10.5	Arrays
11.1–11.3	Strings and Vectors
12.1–12.3	Pointers and Dynamic Arrays
13.1–13.3	Recursion
14.1–14.2	Templates

L. Mukundan
Winter 2005

Course Content

CPSC 244 **Scientific Programming in Fortran** **3 Credits**

Coding Mathematical Problems in Fortran 90. Documentation, flow charts, arithmetic statements, formatted input/output statements, control statements, arrays, functions, recursion, decision structures, subprograms, and file processing. Mathematical applications include numerical methods of solving equations, numerical integration, and optimization problems.

Prerequisite: Math 216 or Math 220 or Equivalent.

Text: Introduction to Fortran 90 for Engineers and Scientists, by Larry Nyhoff and Sanford Leestma, 1997, Prentice Hall, ISBN 0 -13 -505215 – 7.

Content

Chapter 1. Introduction to Computing.

- 1.1 Computer Organization
- 1.2 Programming and Problem Solving

Chapter 2. Basic Fortran

- 2.1 Data Types, Constants, and Variables
- 2.2 Operations and Functions
- 2.3 The Assignment Statements
- 2.4 Input/Output
- 2.5 Program Composition and Format
- 2.6 Application: Temperature Conversion

Chapter 3. Selective Execution

- 3.1 Logical Expressions
- 3.2 IF Constructs
- 3.3 Application: Pollution Index
- 3.4 IF – ELSE IF Constructs
- 3.5 The CASE Construct
- 3.6 The Logical Data Type

Chapter 4. Repetitive Execution

4.1 Counter – Controlled Do Loops
4.2 Application: Depreciation Tables
4.3 General Do Loops
4.4 Application: Mean Time

Chapter 5. INPUT / OUTPUT

5.1 Formatted Output
5.2 Formatted Input
5.3 The WRITE Statement and the General READ Statement
5.4 File Processing
5.5 Application: Temperature and Volume Readings

Chapter 6. Programming with FUNCTIONS

6.1 Functions
6.2 Application: Numerical Integration
6.3 Application: Road Construction
6.4 Introduction to Modules
6.5 External Functions
6.6 Introduction to Recursion

Chapter 7. Programming with SUBROUTINES

7.1 Subroutine Subprograms
7.2 Application: Shielding a Nuclear Reactor
7.3 Subprogram as Arguments

Chapter 8. ARRAYS

8.1 Processing a List of Failure Times
8.2 Compile-Time Arrays and Run-Time Arrays
8.3 Array Processing
8.4 Sorting and Searching
8.5 Application: Quality Control
8.6 Introduction to Multidimensional arrays and Multiply Subscripted Variables

Chapter 9. OTHER DATA TYPES

9.1 Parameterized Data Type
9.2 The Complex Data Type

Chapter 10. Pointers and Linked Structures (If Time Permits)

CPSC 300 Data Structures and Algorithms 4.0 units

Course Description: Abstract data types and their implementation using the C++ class mechanism; dynamic data structures, including linked lists, stacks, queues, trees, and hash tables; applications; object-oriented programming and software reuse; recursion; algorithms for searching and sorting, derived classes and inheritance.

Prerequisites: CPSC 200 or equivalent

Text: Main/Savitch, Data Structures and Other Objects Using C++,
Second Edition, © 2001 Addison Wesley

CONTENT

CHAPTER/SECTIONS	TOPICS
1.1–1.3	The Phases of Software Development
2.1–2.5	Abstract Data Types and C++ Classes
3.1–3.3	Container Classes
4.1–4.6	Pointers and Dynamic Arrays
5.1–5.5	Linked Lists
6.1–6.6	Templates, Iterators, and the Standard Library
7.1–7.4	Stacks
8.1–8.5	Queues
9.1–9.3	Recursion
10.1–10.5	Trees
11.1–11.3	Tree Projects
12.1–12.4	Searching
13.1–13.4	Sorting
14.1–14.3	Derived Classes and Inheritance

CPSC 320: Computer Simulation

Fall 2006 3.0 units Section 001 TR 12:00–1:15 Starr 203

Contact

Instructor: S. Walker
Email: `walkers@ferris.edu`
Phone: 591–2570
Office: ASC 2060

Office Hours: MW 11:00–12:00, TR 1:30–2:30, or by appointment (or just drop by—I'm generally happy to help you unless I have a pressing deadline.)

Text: Law/Kelton, *Simulation Modeling and Analysis*, 3rd Edition, McGraw-Hill

Prerequisites: MATH 216/220, MATH 251, CPSC 200

Course Website: Accessible at `http://www.ferris.edu/webct/`

Login: Use your FSU Student Computing ID and password (same as MyFSU and Novell network login).

Grading: Weekly assignments (75%), Term project (25%)

Course Description: This course provides an introduction to computer simulation and stochastic modeling. Topics covered include random number generators; techniques for generation of probability distributions and random variates; design, statistical analysis, and evaluation of computer models of queueing in inventory and scheduling; discrete-event and Monte Carlo simulation; variance reduction techniques.

References

1. Haigh, *Probability Models*, Springer
2. Leemis/Park, *Discrete-Event Simulation: A First Course*, Prentice Hall
3. Ripley, *Stochastic Simulation*, Wiley
4. Ross, *Introduction to Probability Models*, 9th Edition, Academic Press
5. Ross, *Simulation*, 4th Edition, Academic Press
6. Ross, *Stochastic Processes*, 2nd Edition, Wiley
7. Rubinstein, *Simulation and the Monte Carlo Method*, Wiley
8. Shedler, *Regenerative Stochastic Simulation*, Academic Press
9. Taylor/Karlin, *An Introduction to Stochastic Modeling*, 3rd Edition, Academic Press

CPSC 320 Fall 2006
Computer Simulation S. Walker

General Information

Simulation modeling is a powerful and widely used tool for solving problems arising in science, engineering, economics, management, and the social and behavioral sciences. This course is about modeling and simulation of systems. Both modeling and simulation techniques will be covered in detail. Simulation is a multidisciplinary field that relies heavily on subject matter from:

- Mathematics
  - Calculus
  - Probability theory
  - Statistics
  - Numerical analysis, computational mathematics
- Computer Science
- Operations Research

Topics Covered

1. General introduction and overview of modeling and simulation; key issues in simulation
2. Fundamental concepts of systems and models
3. Probability theory
4. Statistical methods
5. Monte Carlo methods
6. Discrete-event stochastic systems
7. Data collection and model validity
8. Selecting input probability distributions
9. Random number generators
10. Random variate generation
    - Discrete distributions
    - Continuous distributions
11. Output data analysis; decision making using simulation

Methodology will be illustrated using examples chosen from computer, telecommunication, manufacturing, workflow, financial, and transportation systems.

Course Goals

- Understand the basic principles and methods underlying elementary Monte Carlo methods and computer simulation of discrete-event stochastic systems
- Gain familiarity with the most commonly used stochastic models for discrete-event systems
- Become skilled at developing probabilistic models of a wide variety of real-world systems
- Become adept at designing, running, and analyzing simulations
- Appreciate the power and wide applicability of simulation techniques
- Be able to critique someone else's simulation results

MATHEMATICS COURSE CONTENT Fall, 2005
B. Siddikov

MATH – 220 ANALYTICAL GEOMETRY AND CALCULUS I 5 Credits

Topics include: the limit, continuity, the derivative, differentiation of algebraic and transcendental functions with applications, implicit differentiation, and introduction to integration with applications. Students are expected to be familiar with Derive by the end of the course.

PREREQUISITE: MATH 130 with a grade of C- or better or its equivalent

TEXT: Calculus, 8th Ed., Larson, Hostetler, and Edwards, Houghton Mifflin Company

CONTENT

CHAPTER/SECTION	TOPIC
P-1 – P-3, Appendix D, D.3	Preparation for Calculus Review of Trigonometric Functions (Optional)
1.1 – 1.5	Limits and Their Properties (omit formal definition of limit)
2.1 – 2.6	Differentiation
3.1 – 3.7, 3.9	Applications of Differentiation, Differentials (omit 3.8)
4.1 – 4.5, 4.6	Integration Trapezoidal Rule (Simpson's Rule is optional)
5.1 – 5.5	Logarithmic and Exponential Functions
6.2 – 6.3	Differential Equations: Growth and Decay, Separation of Variables.

1. **COURSE:** MATH 220 – Calculus and Analytic Geometry I.

2. **DESCRIPTION:** Topics include: the limit, continuity, the derivative, differentiation of algebraic and transcendental functions with applications, implicit differentiation, and introduction to integration with applications.

3. **PREREQUISITES:** MATH 130 with a grade of C- or better or its equivalent.

4. **TEXTBOOK:** *Calculus,* 8th ed., Larson, Hostetler, and Edwards, Heath Publishing Company.

5. **OBJECTIVES:**
   a. Functions and Rates of Change (ABET Criteria 3a & 3b).
   b. How to use DERIVE (ABET Criteria 3a & 3b).
   c. Limits and their properties (ABET Criteria 3a & 3b).
   d. Differentiation (ABET Criteria 3a & 3b).
   e. Applications of differentiation (ABET Criteria 3a & 3b).
   f. Differentials (ABET Criteria 3a & 3b).
   g. Integration (ABET Criteria 3a & 3b).
   h. Trapezoidal rule (ABET Criteria 3a & 3b).
   i. Logarithmic and exponential functions (ABET Criteria 3a & 3b).
   j. Differential equations (ABET Criteria 3a & 3b).

6. **TOPICS:** Functions and Rates of Change, limits and their properties, differentiation, applications of differentiation, integration, and logarithmic and exponential functions.

7. **CLASS/LABORATORY SCHEDULE:**

Units of Instruction

	Time Weight **Lecture Hours**
a. Functions and Rates of Change (introduce DERIVE)	3
b. Limits and their properties (omit formal definition of the limit).	6
c. Differentiation.	14
d. Applications of differentiation. Differentials. (Omit 3.8)	14
e. Integration.	12
f. Logarithmic and exponential functions (Omit 5.6, 5.7, and 5.8).	12
g. Differential Equations (6.2, 6.3 only).	3
h. Review, quizzes and exams.	9
i. Final exam.	2
TOTAL	**75**

8. **CONTRIBUTION TO MEETING THE PROFESSIONAL COMPONENT:**
   Mathematics: 4 credits

9. **RELATIONSHIP TO PROGRAM OBJECTIVES:**
   Incorporates interdisciplinary concepts and problem solving exercises in the program.

   Provide broad education experience including communication skills, mathematics, basic science preparing students for life-long learning.

10. **PREPARED BY: Roy Gifford** **DATE: APRIL 2005**

MATHEMATICS COURSE CONTENT

Winter, 2006
B. Siddikov

MATH – 230 ANALYTICAL GEOMETRY AND CALCULUS II 5 Credits

Applications of integration, inverse trigonometric functions, techniques of integration, indeterminate forms, numerical methods and approximation, infinite series, conics and polar coordinates.

PREREQUISITE: MATH 220 or its equivalent

TEXT: Calculus, 8th Ed., Larson, Hostetler, and Edwards, Houghton Mifflin Company

CONTENT

CHAPTER/SECTION	TOPIC
5.6 – 5.7	Inverse Trig Functions
7.1 – 7.7	Applications of Integration (7.5 and 7.7 are optional)
8.1 – 8.8	Integration Methods, L'Hopitals Rule, Improper Integrals
9.1 – 9.10	Sequences and Series, Polynomial Approximation (9.8 and 9.9 are optional)
10.1 – 10.5	Conics, Parametric Equations, and Polar Coordinates

COLLEGE OF ARTS AND SCIENCES COURSE ASSESSMENT
DEPARTMENT OF MATHEMATICS

COURSE PREFIX, NUMBER AND TITLE: MATH 230 ANALYTICAL GEOMETRY AND CALCULUS II

CURRENT DATE: February 15, 2008

STUDENT LEARNING OUTCOMES

Students who have completed Math-230 are expected to be able to:

1. Compute derivatives and integrals for common transcendental functions, and analyze their graphs.
2. Find indefinite and improper integrals using different integration techniques and apply L'Hopital's rule for indeterminate forms.
3. Use various tests to determine series convergence, perform standard operations with convergent power series, and find Taylor series representations.
4. Graph the curve represented by the parametric equations.
5. Analyze and write equations of conic sections using their properties.
6. Use the properties of conic sections to sketch their graphs.
7. Graph polar equations and convert between polar and rectangular coordinates.
8. Apply the methods from this course to real-world applications they may encounter in the future.

EVALUATION OF STUDENT ACHIEVEMENT

1. An item analysis of aggregate student performances on quizzes and examinations will demonstrate their understanding of the learning outcomes throughout the course.
2. Homework and/or projects may also be utilized for students to demonstrate their understanding of the learning outcomes throughout the course.

COURSE EVALUATION STRATEGIES (How will course successes be measured?)

1. An item analysis of aggregate student performances on a cumulative final exam will often be used to assure that students have accumulated the knowledge and skills necessary to be prepared for their next mathematics course and/or for further applications in their program of study.
2. Students will fill out SAI (Student Assessment of Instruction) forms and/or IDEA (Individual Development & Educational Assessment) forms towards the end of the semester to voice their assessment of the course.

H. Schalk
Fall 2005

Mathematics Course Content

Math 251: Statistics for the Life Sciences (3 Credits)

Description: A first course in statistics, including a broad range of applications from science. Topics include: Data display, descriptive statistics, probability, estimation, inference, and regression.

Text: Statistics - A First Course, 8th edition, Freund and Perles; Prentice Hall, 2004.

Prerequisite: A C- or better in Math 130

CHAPTER 1 INTRODUCTION

1.1 Numerical Data and Categorical Data
1.2 Nominal, Ordinal, Interval, and Ratio Data
1.3 Sample Data and Populations
1.4 Biased Data
1.5 Statistics, Past and Present
1.6 The Study of Statistics
1.7 Statistics: What Lies Ahead

CHAPTER 2 SUMMARIZING DATA: LISTING AND GROUPING

2.2 Stem-and-Leaf Displays
2.3 Frequency Distributions
2.4 Graphical Presentations-Histograms and Bar Charts Only

CHAPTER 3 SUMMARIZING DATA: STATISTICAL DESCRIPTIONS

3.1 Measures of Location: The Mean
3.2 Measures of Location: The Weighted Mean
3.3 Measures of Location: The Median and Other Fractiles
3.4 Measures of Location: The Mode
3.5 Measures of Variation: The Range
3.6 Measures of Variation: The Standard Deviation
3.7 Some Applications of the Standard Deviation

CHAPTER 4 POSSIBILITIES AND PROBABILITIES

4.1 Counting
4.2 Permutations
4.3 Combinations
4.4 Probability
4.5 Mathematical Expectation
4.6 A Decision Problem (if time permits)

CHAPTER 5 SOME RULES OF PROBABILITY

5.1 The Sample Space
5.2 Events
5.3 Some Basic Rules of Probability
5.4 Probabilities and Odds
5.5 Addition Rules
5.6 Conditional Probability
5.7 Independent Events
5.8 Multiplication Rules
5.9 Bayes's Theorem

H. Schalk
Fall 2005

CHAPTER 6 PROBABILITY DISTRIBUTIONS

6.1 Probability Distributions
6.2 The Binomial Distribution
6.3 The Hypergeometric Distribution
6.4 The Poisson Distribution
6.5 The Multinomial Distribution
6.6 The Mean of a Probability Distribution
6.7 The Standard Deviation of a Probability Distribution
6.8 Chebyshev's Theorem

CHAPTER 7 THE NORMAL DISTRIBUTION

7.1 Continuous Distributions
7.2 The Normal Distribution
7.3 Some Applications
7.4 The Normal Approximation to the Binomial Distribution

CHAPTER 8 SAMPLING AND SAMPLING DISTRIBUTIONS

8.1 Random Sampling
8.2 Sampling Distributions
8.3 The Standard Error of the Mean
8.4 The Central Limit Theorem

CHAPTER 9 PROBLEMS OF ESTIMATION

9.1 The Estimation of Means
9.2 Confidence Intervals for Means
9.3 Confidence Intervals for Means (Small Samples)
9.5 The Estimation of Proportions

CHAPTER 10 TESTS CONCERNING MEANS

10.1 Tests of Hypotheses
10.2 Significance Tests
10.3 Tests Concerning Means
10.4 Tests Concerning Means (Small Samples)
10.5 Differences Between Means
10.7 Differences Between Means (Paired Data)
10.9 Analysis of Variance

CHAPTER 11 TESTS BASED ON COUNT DATA

11.1 Tests Concerning Proportions
11.2 Tests Concerning Proportions (Large Samples)
11.3 Differences Between Proportions
11.4 Differences Among Proportions
11.5 Contingency Tables

CHAPTER 12 REGRESSION AND CORRELATION

12.1 Curve Fitting
12.2 The Method of Least Squares
12.3 Regression Analysis
12.4 The Coefficient of Correlation
12.5 The Interpretation of r

MATH 310 LINEAR MODELS IN STATISTICS - 3 credit

Course Description: A second course in statistics. Linear regression, multiple regression, model building, applications. Prerequisite: A grade of C- or better in MATH 250 and MATH 230.

Course Objectives:

1. The student will understand when to apply regression analysis and when not to apply regression analysis.
2. The student will understand the underlying statistical models for both simple linear regression and multiple linear regression.
3. The student will understand how various statistical models are built and will be able to understand models her or she has not been exposed to.
4. The student will have a detailed knowledge of experimental design.
5. The student will be knowledgeable in applications having been exposed to a number of applications.
6. The student will be able to come up with appropriate applications in areas they have not been exposed to.

Course Outline:
Suggested Text: A Second Course in Statistics - Regression Analysis (5th ed.), Mendenhall and Sincich, Prentice Hall

1. A review of basic concepts (3 days)
2. Introduction to regression analysis. (4 days)
3. Simple linear regression (4 days)
4. Multiple regression (6 days)
5. Model building (6 days)
6. Principles of experimental design (8 days)
7. Advanced topics as time permits (5 days)
8. Applications as time permits (5 days)
9. Evaluation (Exams, Quizzes, etc.) (4 days)

Math 314: Probability (3 Credits)

Description: Discrete Probability Theory, including: Combinatorial analysis, properties of probability, conditional probability, random variables, expectation, and limit theorems.

Text: A First Course in Probability, Seventh Edition, by Sheldon Ross.
ISBN: 0-13-185662-6

Prerequisite: Math 220

CHAPTER 1 COMBINATORIAL ANALYSIS
- 1.1 Introduction
- 1.2 The Basic Principle of Counting
- 1.3 Permutations
- 1.4 Combinations
- 1.5 Multinomial Coefficients

CHAPTER 2 AXIOMS OF PROBABILITY
- 2.1 Introduction
- 2.2 Sample Spaces and Events
- 2.3 Axioms of Probability
- 2.4 Some Simple Propositions
- 2.5 Sample Spaces Having Equally Likely Outcomes
- 2.7 Probability as a Measure of Belief

CHAPTER 3 CONDITIONAL PROBABILITY AND INDEPENDENCE
- 3.1 Introduction
- 3.2 Conditional Probabilities
- 3.3 Bayes' Formula
- 3.4 Independent Events
- 3.5 P(.|F) is a Probability

CHAPTER 4 RANDOM VARIABLES
- 4.1 Random Variables
- 4.2 Discrete Random Variables
- 4.3 Expected Value
- 4.4 Expectation of a Function of a Random Variable
- 4.5 Variance
- 4.6 The Bernoulli and Binomial Random Variables
- 4.7 The Poisson Random Variable
- 4.8 Other Discrete Probability Distributions
- 4.9 Properties of the Cumulative Distribution Function

continued…

CHAPTER 5 CONTINUOUS RANDOM VARIABLES

5.1 Introduction
5.2 Expectation and Variance of Continuous Random Variables
5.3 The Uniform Random Variable
5.4 Normal Random Variables
5.5 Exponential Random Variables
5.6 Other Continuous Distributions
5.7 The Distribution of a Function of a Random Variable

CHAPTER 6 JOINTLY DISTRIBUTED RANDOM VARIABLES

6.1 Joint Distribution Functions
6.2 Independent Random Variables
6.3 Sums of Independent Random Variables
6.4 Conditional Distributions: Discrete Case
6.5 Conditional Distributions: Continuous Case
6.6 Joint Probability Distributions of Functions of Random Variables

CHAPTER 7 PROPERTIES OF EXPECTATION

7.1 Introduction
7.2 Expectation of Sums of Random Variables
7.3 Covariance, Variance of Sums, and Correlation
7.4 Conditional Expectation
7.5 Conditional Expectation and Prediction
7.6 Moment Generating Functions
7.7 Additional Properties of Normal Random Variables
7.8 General Definition of Expectation (if time permits)

CHAPTER 8 LIMIT THEOREMS

8.1 Introduction
8.2 Chebyshev's Inequality and the Weak Law of Large Numbers
8.3 The Central Limit Theorem
8.4 The Strong Law of Large Numbers
8.5 Other Inequalities
8.6 Bounding the Error Probability when Approximating a Sum of Independent Bernoulli Random Variables by Poisson (if time permits)

MATHEMATICS COURSE CONTENT Fall, 2008
B. Siddikov

MATH – 320 ANALYTICAL GEOMETRY AND CALCULUS III 3 Credits

The third of a three-semester sequence in analytic geometry and calculus. Topics include: vector valued functions, functions of several variables, and multiple integrals.

PREREQUISITE: C- or better in MATH 230 or its equivalent

TEXT: Calculus, 8th Ed., Larson, Hostetler, and Edwards, Houghton Mifflin Company

CONTENT

CHAPTER/SECTION	TOPIC
11.1 – 11.7	Vectors and the Geometry of Space
12.1 – 12.5	Vector – Valued Functions
13.1 – 13.8	Functions of Several Variables
14.1 – 14.8	Multiple Integration
15.1 – 15.7	Vector Analysis (if time permits)

COLLEGE OF ARTS AND SCIENCES COURSE ASSESSMENT
DEPARTMENT OF MATHEMATICS

COURSE PREFIX, NUMBER AND TITLE: MATH 320 ANALYTICAL GEOMETRY AND CALCULUS III

CURRENT DATE: February 15, 2008

STUDENT LEARNING OUTCOMES

Students who have completed Math-320 are expected to be able to:

1. Analyze vectors in plane and space using the rectangular, cylindrical, and spherical coordinate systems.
2. Find the dot product, cross product, and triple scalar product of vectors in space.
3. Write and sketch the equations of line and plane in space and find the distance between points, lines, and planes in space.
4. Use cylindrical and spherical coordinates to represent surfaces in space.
5. Evaluate a limit of vector valued functions and functions of several variables.
6. Determine the continuity of vector valued functions and functions of several variables.
7. Differentiate and integrate vector values functions and describe velocity and acceleration in terms of vector valued functions.
8. Find unit tangent vector at a point n a space curve and find tangent and normal components of acceleration.
9. Find the arc length of a space curve and curvature of a space curve at a point.
10. Sketch the graph of functions of two variables and their level curves and level surfaces.
11. Find and use the partial derivatives functions of several variables.
12. Determine the differentiability of functions of several variables.
13. Find and use the directional derivative and gradient of a function of two or three variables.
14. Find the equation of tangent planes and normal lines to surfaces.
15. Find absolute and relative extrema of functions of two variables.
16. Evaluate double and triple integrals in rectangular and polar coordinates, as well as in cylindrical and spherical coordinates.
17. Use multiple integrals to find the center of mass and moments of inertia.
18. Use double and triple integrals to find the surface area and volume of solid regions.
19. Use Jacobians to change variables in a double integral.

EVALUATION OF STUDENT ACHIEVEMENT

1. An item analysis of aggregate student performances on quizzes and examinations will demonstrate their understanding of the learning outcomes throughout the course.
2. Homework and/or projects may also be utilized for students to demonstrate their understanding of the learning outcomes throughout the course.

COURSE EVALUATION STRATEGIES (How will course successes be measured?)

1. An item analysis of aggregate student performances on a cumulative final exam will often be used to assure that students have accumulated the knowledge and skills necessary to be prepared for their next mathematics course and/or for further applications in their program of study.
2. Students will fill out SAI (Student Assessment of Instruction) forms and/or IDEA (Individual Development & Educational Assessment) forms towards the end of the semester to voice their assessment of the course.

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MATHEMATICS COURSE CONTENT

Fall 2005
M. Dekker

MATH 322 - LINEAR ALGEBRA
An introduction to the theory of vector spaces with emphasis on matrix algebra. Topics included are linear transformation, independence, rank, and inverses. (3+0)
PREREQUISITE: MATH 220
TEXT: Introductory Linear Algebra, 8th edition, by Kolman-Hill.

COURSE CONTENT

	Approximate Class Time
Chapter 1 Linear Equations and Matrices	4 weeks
1.1 Linear Systems	
1.2 Matrices	
1.3 Dot Product and Matrix Multiplication	
1.4 Properties of Matrix Operations	
1.5 Matrix Transformations (optional, also covered in chapter 4)	
1.6 Solutions of Linear Systems of Equations	
1.7 The Inverse of a Matrix	
Chapter 3 Determinants	1 week
3.1 Definition and Properties	
3.2 Cofactor Expansion and Applications	
3.3 Determinants from a Computational Point of View (very briefly)	
Chapter 4 Vectors in $\mathbb{R}^n$	2 weeks
4.2 n-vectors	
4.3 Linear Transformations	
Chapter 6 Real Vector Spaces	6 weeks
6.1 Vector Spaces	
6.2 Subspaces	
6.3 Linear Independence	
6.4 Basis and Dimension	
6.5 Homogeneous Systems	
6.6 The Rank of a Matrix and Applications	
6.7 Coordinates and Change of Basis (optional)	
6.8 Orthonormal Bases in $\mathbb{R}^n$ (optional, can do instead of 6.7)	
Chapter 8 Eigenvalues, Eigenvectors, and Diagonalization	2 weeks
8.1 Eigenvalues and Eigenvectors	
8.2 Diagonalization	
8.3 Diagonalization of Symmetric Matrices (optional)	

MATH 324 - FUNDAMENTAL CONCEPTS IN MATHEMATICS

An introduction to mathematical structure and deductive logic through the study of fundamental systems. Topics include logic, sets, groups, relations, and functions. Fundamental methods of mathematical proof are emphasized throughout the course.

PREREQUISITE: MATH 220

TEXT: A Transition to Advanced Mathematics, 6th edition, by Smith-Eggen-St.Andre

COURSE CONTENT

	Hours
Chapter 1 Logic and Proofs	
1.1 Propositions and Connectives	2
1.2 Conditionals and Biconditionals	2
1.3 Quantifiers	1
1.4 Basic Proof Methods I	2
1.5 Basic Proof Methods II	2
1.6 Proofs Involving Quantifiers	2
1.7 Additional Examples of Proofs	1
Chapter 2 Set Theory	
2.1 Basic Concepts of Set Theory	3
2.2 Set Operations	3
2.4 Induction	3
Chapter 3 Relations	
3.1 Cartesian Products and Relations	3
3.2 Equivalence Relations	3
Chapter 4 Functions	
4.1 Functions as Relations	3
4.2 Constructions of Functions	3
Chapter 6 Concepts of Algebra	
6.1 Algebraic Structures	3
6.2 Groups	2
6.3 Subgroups	1
6.4 Operation Preserving Maps	1
Tests	3
Final Exam	2
TOTAL	45 hours

- The proofs in exercise set 1.7 can be used with short answer type exercises in sections 2.1, 2.2, and 3.1.
- If time permits, optional sections 2.5 or 3.5 may be pursued.

MATHEMATICS COURSE CONTENT

Winter 2005
F. Allegretto

MATH 325 College Geometry

Related topics in the first five chapters are covered. The goal in this class is twofold. First, the student must be able to handle all proofs found in a high school geometry class. Secondly the student must be able to show how to do these proofs to others. Proofs include Eu lidean proofs done in a statement-reason format, coordinate geometry proofs, and proofs associated with constructions.

Text: Roads to Geometry, third edition, by Wallace and West

Chapter / Section	Hours
Chapter 1	
1.1 Historical Background 1.2 Axiomatic Method and Properties of Systems (only)	2
Chapter 2	
2.1 Introduction 2.2 Euclid's Geometry and Elements 2.3 Modern Euclidean Geometries 2.6 SMSG Postulates foe Euclidean Geometry	2
Chapter 3	
3.1 Introduction	
3.2 Preliminary Notions	3
3.3 Congruence Conditions	3
3.4 The Place of Parallels	1
Chapter 4	
4.1 Introduction	
4.2 The Parallel Postulate and Some Implications	3
4.3 Congruence and Area	3
4.4 Similarity	3
4.5 Some Euclidean Results Concerning Circles	5
4.6 Some Euclidean Results Concerning Triangles	2
4.7 More Euclidean Results Concerning Triangles	2
4.8 The Nine Point Circle	1
4.9 Euclidean Constructions (with proofs)	3
Chapter 5	
5.1 Introduction	
5.2 Analytical Geometry	6
Tests	4
Final Exam	2
Total	45

NOTE: A high school geometry text should be used to supplement this text.
This is most necessary for Sections 3.2, 3.3, 4.9 and 5.2.

MATHEMATICS COURSE CONTENT

Spring 1997
Robert McCullough

MATH 328 DISCRETE STRUCTURES 3 CREDITS

Discrete mathematics topics for Applied Mathematics and Computer Science, including: logic, sets, algorithms, recursion, combinatorics, graph theory and boolean algebra. Students cannot receive credit for both CPSC 328 and MATH 328.

Prerequisite: MATH 220, Analtical Geometry and Calculus I

Text: Discrete Mathematics by Richard Johnsonbaugh, 4th edition, Prentice Hall Publishing Co., 1997

CONTENT

CHAPTER/SECTION	TOPIC	DAYS
Chapter 1	**LOGIC AND PROOFS**	**6**
1.1	Propositions	
1.2	Conditional Propositions and Logical Equivalence	
1.3	Quantifiers	
1.4	Proofs	
1.6	Mathematical Induction	
Chapter 2	**THE LANGUAGE OF MATHEMATICS**	**7**
2.1	Sets	
2.2	Sequences and Strings	
2.3	Number Systems	
2.4	Relations	
2.5	Equivalence Relations	
2.6	Matrices of Relations	
2.8	Functions	
Chapter 3	**ALGORITHMS**	**7**
3.1	Introduction	
3.2	Notation for Algorithms	
3.3	The Euclidean Algorithm	
3.4	Recursive Algorithms	
3.5	Complexity Algorithms	
3.6	Analysis of the Euclidean Algorithm	
Chapter 4	**COUNTING METHODS**	**7**
4.1	Basic Principles	
4.2	Permutations and Combinations	
4.3	Algorithms	
4.4	Generalized Permutations and Combinations	
4.5	Binomial Coefficients	
4.6	The Pigeonhole Principle	
Chapter 5	**RECURRENCE RELATIONS**	**4**
5.1	Introduction	
5.2	Solving Recurrence Relations	
5.3	Applications	
Chapter 6	**GRAPH THEORY**	**3**
6.1	Introduction	
6.2	Paths and Cycles	
Chapter 9	**Boolean Algebras**	**6**
9.1	Combinatorial Circuits	
9.2	Properties of Combinatorial C Circuits	
9.3	Boolean Algebras	
9.4	Boolean Functions	
9.5	Applications	
Review and Tests		**5**
TOTAL DAYS		**45**

R. Gifford
Winter 2002

MATHEMATICS COURSE CONTENT

MATH 330 DIFFERENTIAL EQUATIONS 3 Credits

Ordinary linear differential equations and classical solutions to special types of non-linear equations. Numerous applications of first order differential equations. Series solution, systems of lineal differential equations, and applications of second order differential equations as time permits.

PREREQUISITE: MATH 230 or EQUIVALENT or CONSENT OF INSTRUCTOR.
TEXT: ELEMENTARY DIFFERENTIAL EQUATIONS, Rainville, Bedient, & Bedient, 8th Edition, Prentice
Hall Publishing Company.

CONTENT

Chapter 1 DEFINITIONS - FAMILIES OF CURVES
- 1.1 Examples of Differential Equations
- 1.2 Definitions
- 1.3 Families of Solutions
- 1.4 Geometric Interpretation
- 1.5 Isoclines of an Equations

Chapter 2 Equations of Order One
- 2.1 Separation of Variables
- 2.2 Homogeneous Functions
- 2.3 Equations with Homogeneous Coefficients
- 2.4 Exact Equations
- 2.5 The Linear Equation of Older One
- 2.6 The General Solution of a Linear Equation

Chapter 4 Elementary Applications
- 4.1 Velocity of Escape from the Earth
- 4.2 Newton's Law of Cooling
- 4.3 Simple Chemical Conversion
- 4.4 Logistic Growth

Chapter 5 ADDITIONAL TOPICS OF EQUATIONS OF ORDER ONE
- 5.2 The Determination of Integrating Factors
- 5.4 Bernoulli's Equations
- 5.5 Coefficients Linear in the Two Variables

Chapter 6 LINEAR DIFFERENTIAL EQUATIONS
- 6.1 The General Linear Equation
- 6.2 An Existence and Uniqueness Theorem
- 6.3 Linear Independence
- 6.4 The Wronskian
- 6.5 General Solution of a Homogeneous Equation
- 6.6 General Solution of a Non-Homogeneous Equation
- 6.7 Differential Operators
- 6.8 The fundamental Laws of Operation

Chapter 7 Linear Equations with Constant Coefficients
- 7.1 Introduction
- 7.2 The Auxiliary Equation: Distinct Roots
- 7.3 The Auxiliary Equation: Repeated Roots
- 7.4 A Definition of e^z for Imaginary ^{z}
- 7.5 The Auxiliary Equation: Imaginary Roots

Chapter 8 Non-Homogeneous Equations - Undetermined Coefficients
    8.3 The Method of Undetermined Coefficients

Chapter 9 Variation of Parameters
    9.3 Variation of Parameters

Chapter 17 Power Series Solutions
    17.1 - 17.4 Read for Background
    17.5 Solutions Near an Ordinary Point

Note: To cover more material something from above would have to be cut out. Perhaps some of Chapter 4 or 5.4, or 5.5

Chapter 11 Linear Systems of Equations
    As much of this Chapter as time permits
    And/or Chapter 10. I would like to have done at least one application of second order equations but I ran out of time.

Winter, 2006
R. McCullough

MATHEMATICS COURSE CONTENT

Math 340 NUMERICAL ANALYSIS 3 credits

This course covers the main topics of numerical analysis, including numerical algorithms for interpolation, root finding, integration, differentiation, linear algebra, differential equations, spline functions, and the method of least squares.

Learning Outcomes: At the end of this course, the student should be able to solve real-world problems in several fields of numerical analysis. In particular, students will have demonstrated abilities through special projects their competence in the following areas: Taylor's theorem, computer arithmetic, root approximations, interpolation, numerical integration and splines.

Prerequisite: MATH 320 (or corequisite)
Knowledge of a programming language

TEXT: **Numerical Analysis and Computing**, by Cheney and Kincaid
Brooks/Cole Publishing, 5th edition

CONTENT

CHAPTER/SECTION	SUGGESTED TOPIC
Chapter 1	INTRODUCTION
1.1	Preliminary Remarks
1.2	Review of Taylor Series
Chapter 2	NUMBER REPRESENTATION AND ERRORS
2.1	Representation of Numbers in Different Bases
2.2	Floating-Point Representation
2.3	Loss of Significance
Chapter 3	LOCATING ROOTS OF EQUATIONS
3.1	Bisection Method
3.2	Newton's Method
3.3	Secant Method
Chapter 4	INTERPOLATION AND NUMERICAL DIFFERENTIATION
4.1	Polynomial Interpolation
4.2	Errors in Polynomial Interpolation
4.3	Estimating Derivatives and Richardson Extrapolation

Chapter 5	NUMERICAL INTEGRATION
5.1	Definite Integral
5.2	Trapezoid Rule
5.3	Romberg Algorithm
Chapter 6	MORE ON NUMERICAL INTEGRATION
6.1	An Adaptive Simpson's Scheme
Chapter 7	SYSTEMS OF LINAR EQUATIONS
7.1	Naïve Gaussian Elimination
7.2	Gaussian Elimination With Scaled Partial Pivoting
7.3	Tridiagonal and Banded Systems
Chapter 9	APPROXIMATION BY SPLINE FUNCTIONS
9.1	First-Degree and Second-Degree Splines
9.2	Natural Cubic Splines
Chapter 10	ORDINARY DIFFERENTIAL EQUATIONS
10.1	Initial-Value Problems: Analytical vs. Numerical Solution
10.2	Taylor Series Methods
Chapter 12	SMOOTHING OF DATA AND THE METHOD OF LEAST SQUARES
12.1	Method of Least Squares
Chapter 13	MONTE CARLO METHODS AND SIMULATION
13.1	Random Numbers
13.2	Estimation of Areas and Volumes by Monte Carlo Techniques

Winter, 2006
R. McCullough

MATHEMATICS COURSE CONTENT

Math 360 **OPERATIONS RESEARCH** 3 credits

This course covers the main topics of operations research, including linear programming, integer programming, nonlinear programming, network analysis, deterministic and stochastic programming, game theory and decision theory.

Prerequisite: MATH 322

TEXT: **Schaum's Outlines Operations Research**, by Bronson and Naadimuthu
McGraw-Hill, 2^{nd} edition

CONTENT

CHAPTERS	TOPIC
Chapter 1	Mathematical Programming
Chapter 2	Linear Programming: Basic Concepts
Chapter 3	Linear Programming: The Simplex and Dual Simplex Methods
Chapter 4	Linear Programming: Duality and Sensitivity Analysis
Chapter 5	Linear Programming: Extensions
Chapter 6	Integer Programming: Branch-and-Bound Algorithm
Chapter 7	Integer Programming: Cut Algorithms
Chapter 8	Integer Programming: The Transportation Algorithm
Chapter 9	Integer Programming: Scheduling Models
Chapter 10	Nonlinear Programming: Single-Variable Optimization
Chapter 13	Network Analysis
Chapter 17	Game Theory
Chapter 18	Decision Theory
Chapter 19	Dynamic Programming

Fall, 1999
V. Konecny

MATHEMATICS COURSE CONTENT (temporary)

MATH 380 **APPLIED ANALYSIS** **3 Credits**

Classical Applied Mathematics and its applications. Laplace Transforms, Multiple Integrals , Fourier Series, Partial Differential Equations , Complex Functions.

Prerequisite: MATH 320 Analytic Geometry and Calculus 3.

Text : **Advanced Mathematics** for Engineers and Scientists by Murray R. Spiegel (Schaum's Outline Series) , McGraw-Hill , (1971 ?)

CONTENT

Chapter 4. Laplace Transforms :
- Definition
- Existance
- Inverse
- Derivatives
- Special Theorems
- Differential Equations

Chapter 6. Multiple, Line and Surface Integrals and Integral Theorems :
- Multiple Integrals
- Properties
- Green's Theorem
- Path Independance
- Surface Integrals
- The Divergence Theorem
- Stoke's Theorem

Chapter 7. Fourier Series :
- Periodic Functions
- Fourier Series
- Dirichlet Conditions
- Differentiation, Integration

Chapter 12. Partial Differential Equations :
- Definitions
- Linear Equations
- Important Partial Diff. Equations
- Methods

Chapter 13. Complex Variables and Conformal Mapping :
- Functions
- Limits , Derivatives
- Cauchy-Riemann Equations
- Integrals
- Cauchy's Theorem

OPTIONAL : Taylor's Series , Singular Points, Poles, Laurent's Series , Residues

H. Schalk
Fall 2005

Mathematics Course Content

Math 414: Mathematical Statistics I (3 Credits)

Description: A theoretical course in probability and statistics including distributions and densities, expectation, moment generating functions, and functions of random variables.

Text: John E. Freund's Mathematical Statistics with Applications by Miller and Miller; Prentice Hall, 7^{th} edition.

Prerequisite: Math 230 and either Math 251 or Math 314

CHAPTER 1 INTRODUCTION

1.1 Introduction
1.2 Combinatorial Methods
1.3 Binomial Coefficients
1.4 The Theory in Practice

CHAPTER 2 PROBABILITY

2.1 Introduction
2.2 Sample Spaces
2.3 Events
2.4 The Probability of an Event
2.5 Some Rules of Probability
2.6 Conditional Probability
2.7 Independent Events
2.8 Bayes' Theorem
2.9 The Theory in Practice

CHAPTER 3 PROBABILITY DISTRIBUTIONS AND PROBABILITY DENSITIES

3.1 Random Variables
3.2 Probability Distributions
3.3 Continuous Random Variables
3.4 Probability Density Functions
3.5 Multivariate Distributions
3.6 Marginal Distributions
3.7 Conditional Distributions
3.8 The Theory in Practice

(continued...)

H. Schalk
Fall 2005

Mathematics Course Content

Math 416: Mathematical Statistics II (3 Credits)

Description: A continuation of MATH 414, including sampling distributions, estimation, hypothesis testing, regression and ANOVA.

Text: <u>John E. Freund's Mathematical Statistics with Applications</u> by Miller and Miller; Prentice Hall, 7th edition.

Prerequisite: Math 414

CHAPTER 8 SAMPLING DISTRIBUTIONS

8.1 Introduction
8.2 The Distribution of the Mean
8.3 The Distribution of the Mean: Finite Populations
8.4 The Chi-Square Distribution
8.5 The *t* Distribution
8.6 The *F* Distribution
8.7 Order Statistics
8.8 The Theory in Practice

CHAPTER 10 POINT ESTIMATION

10.1 Introduction
10.2 Unbiased Estimators
10.3 Efficiency
10.4 Consistency
10.5 Sufficiency
10.6 Robustness
10.7 The Method of Moments
10.8 The Method of Maximum Likelihood
10.9 Bayesian Estimation
10.10 The Theory in Practice

CHAPTER 11 INTERVAL ESTIMATION

11.1 Introduction
11.2 The Estimation of Means
11.3 The Estimation of Differences Between Means
11.4 The Estimation of Proportions
11.5 The Estimation of Differences Between Proportions
11.6 The Estimation of Variances
11.7 The Estimation of the Ratio of Two Variances
11.8 The Theory in Practice

(continued...)

CHAPTER 12 HYPOTHESIS TESTING

12.1 Introduction
12.2 Testing a Statistical Hypothesis
12.3 Losses and Risks
12.4 The Neyman-Pearson Lemma
12.5 The Power Function of a Test
12.6 Likelihood Ratio Tests
12.7 The Theory in Practice

CHAPTER 13 TESTS OF HYPOTHESIS INVOLVING MEANS, VARIANCES, AND PROPORTIONS

13.1 Introduction
13.2 Tests Concerning Means
13.3 Tests Concerning Differences Between Means
13.4 Tests Concerning Variances
13.5 Tests Concerning Proportions
13.6 Tests Concerning Differences Among k Proportions
13.7 The Analysis of an $r \times c$ Table
13.8 Goodness of Fit
13.9 The Theory in Practice

CHAPTER 14 REGRESSION AND CORRELATION

14.1 Introduction
14.2 Linear Regression
14.3 The Method of Least Squares
14.4 Normal Regression Analysis
14.5 Normal Correlation Analysis
14.6 Multiple Linear Regression
14.7 Multiple Linear Regression (Matrix Notation)
14.8 The Theory in Practice

CHAPTER 15 DESIGN AND ANALYSIS OF EXPERIMENTS

15.1 Introduction
15.2 One-Way Designs
15.3 Randomized Block Designs
15.4 Factorial Experiments
15.5 Multiple Comparisons
15.6 Other Experimental Designs
15.7 The Theory in Practice

Winter 2003
G. N. McTume

MATHEMATICS COURSE CONTENT

MATH 420 AN INTRODUCTION TO ABSTRACT ALGEBRA 3 Credits

Groups, rings, integral domains, fields and their elementary properties. Equivalence relations, congruence, homomorphisms, and isomorphisms.

Prerequisite: MATH 230 and either MATH 324, MATH 322 or MATH 328

Text: A FIRST COURSE IN ABSTRACT ALGEBRA, 7th edition, by John B. Fraleigh, Addison-Wesley Publishing Company.

CONTENT

Chapter/Section	Topic
0	Sets and Relations
Chapter 1	
1	Introduction and Examples
2	Binary Operations
3	Isomorphic Binary Structures
4	Groups
5	Subgroups
6	Cyclic Groups
7	Generating Sets and Cayley Diagraphs
Chapter 2	
8	Group Permutations
9	Orbits, Cycles, and the Alternating Groups
10	Cosets and the Theorem of Lagrange
11	Direct Products and Finitely Generated Abelian Groups
Chapter 3	
13	Homomorphisms
14	Factor Groups
15	Factor-Group Computations and Simple Groups
Chapter 4	
18	Rings and Fields
19	Integral Domains
20	Fermat's and Euler's Theorems
21	The field of Quotients of an Integral Domain
Chapter 5	
*26	Homomorphisms and Factor Rings
*27	Prime and Maximal Ideals

* AS TIME PERMITS

Winter Semester 2003
G. McTume and D. Burns

MATHEMATICS COURSE CONTENT SHEET

MATH 430 ADVANCED CALCULUS 3 Credits
A more rigorous approach to limits, sequences, continuity, and differentiation
Prerequisite: MATH 320 Analytical Geometry and Calculus 3
Semester Offered: WE
Textbook: "Advanced Calculus A Friendly Approach" By W. Kosmala Pearson Education Division
Prentice Hall Publishing Co. (1999) ISBN: 0-13-737925-0

CONTENT

Chapter 1	INRODUCTION
1.1*	Algebra of sets
1.2*	Relations and functions
1.3*	Mathematical induction
1.4*	Equivalent and countable sets
1.5*	Proof techniques
1.6*	Ordered field and real number system
1.7*	Basic properties of the real number system
1.8*	Inverse functions
Chapter 2	SEQUENCES
2.1	Convergence
2.2	Limit theorems
2.3	Infinite limits
2.4	Monotone sequences
2.5	Cauchy sequences
2.6	Subsequences
Chapter 3	LIMITS OF FUNCTIONS
3.1	Limit at infinity
3.2	Limit at a real number
3.3	Sided limits
Chapter 4	CONTINUITY
4.1	Continuity of a function
4.2	Discontinuity of a function
4.3	Properties of continuous functions
4.4	Uniform continuity
Chapter 5	DIFFERENTIATION
5.1	Derivative of a function
5.2	Properties of differentiable functions
5.3	Higher order derivatives
5.4	L'Hopital's rules
Chapter 7	INFINITE SERIES
7.1*	Convergence
7.2*	Tests for Convergence
7.3*	Ratio and root tests
7.4*	Absolute and conditional convergence

Note: Sections marked with an asterisk are optional depending on student backgrounds and available time

Spring 2008

MATH 435 (Introduction to Complex Variables)
3 credits

Course Material

Chapter 1	Complex Numbers
Chapter 2	Analytic Functions
Chapter 3	Elementary Functions
Chapter 4	Complex Integration
Chapter 5	Series Representations for Analytic Functions (If time permits)
Chapter 6	Residue Theory (If time permits)
Chapter 7	Conformal Mapping (If time permits)

Prerequisite

Math 320 and 322 or by permission of the instructor.

Textbooks

Fundamentals of Complex Analysis: with Applications to Engineering and Science, 3rd edition, Saff and Snider.

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Fall, 2007
R. McCullough

MATHEMATICS COURSE CONTENT

Math 440 MATHEMATICS MODELING 3 credits

This course covers applications of mathematical modeling, where mathematics is used to model a wide range of real-world applications. These applications include models involving population, finances, astronomy, business applications, Markov chains and inventory control.

Learning Outcomes: At the end of this course, students should be able to formulate models for a wide range of situations. In particular, students will have demonstrated abilities through special projects and assignments to model the following types of problems: population growth, finances, predator-prey relationships, the solar system, numerous business applications, inventory control, generics, variable stars, heat flow, urban growth and pollution. The students should then be able to apply the methods from this course to other real-world applications they may encounter in the future.

Prerequisite: MATH 220; MATH 322 or MATH 328 or co-requisite

TEXT: none

CONTENT	TOPIC
Week 1	Population models
Week 2	Finance models
Week 3	Cooling models
Week 4	Pollution models
Week 5	Predator-prey models
Week 6	Space exploration models
Week 7	Variable star models
Week 8	Heat flow models
Week 9	Genetics models
Week 11	Markov chains
Week 12	Markov chains
Week 13	Aeronautics

Two weeks for testing

Spring, 2009
R. McCullough

MATHEMATICS COURSE CONTENT

Math 385/485 Actuarial Science Professional Exam Preparation 1 credit

These courses will help prepare students to take the Society of Actuaries' Professional Exam, #100. Emphasis will be given to analysis of previous exams, study of sample questions, and general test taking techniques. Grading will be credit/no credit only.

Appendix D: Curriculum Vitae for Mathematics Faculty

Curriculum vitae for tenured and tenure-track faculty of the mathematics department at Ferris State University

Ram Agrawal, Ph.D.
Professor of Mathematics
Ferris State University
Big Rapids, Michigan
Appointed 1970

1. Academic Degrees

Ph.D.	Michigan State University	1974	Mathematics (Finite Groups)
M.S.	Agra University, India	1959	Mathematics
B.S.	Agra University, India	1957	Mathematics, Physics & Chemistry

2. Professional Experience

1970-Present	Ferris State University
1965-1970	Graduate Teaching Assistant, Michigan State University
1959-1965	Assistant Professor of Mathematics in India

3. Teaching Assignments

In the past thirty-eight years, I have taught a large number of courses ranging from Math 010 to Math 420.

4. Current Non-Teaching Assignments

Member of Math 135 & Math 420 Committees
Advisor to Pre-Pharmacy Students

5. Past Non-Teaching Assignments

First chairperson of the College of Arts and Sciences Pre-Engineering Curriculum Committee from 1984 to 1990
Member of various departmental committees including Tenure, Applied Mathematics Program, and Departmental Planning Committees

Active involvement in the mathematics department's faculty searches, semester conversion, and Actuarial Science degree program development

6. Current Professional and Academic Association Memberships

Ferris Faculty Association
Michigan Education Association

7. Publications

Generalized Center and Hypercenter of a Finite Group, Proc. Amer. Math. Soc. 58 (1976), pp. 13-21

Finite Groups Whose Subnormal Subgroups Permute With All Sylow Subgroups, Proc. Amer. Math. Soc. 47 (1975), pp. 77-83

The Influence on a Finite Group of its Permutable Subgroups, Canad. Math. Bull. 17 (1974), pp. 159-165

Fran Allegretto
Box 184
Brohman, MI 49312
phone: (231) 591-5630

Education:

University of Buffalo, Buffalo, NY	9-57 to 5-59
SUNY at Geneseo, Geneseo, NY	9-72 to 5-74
BS in Education with a concentration in secondary mathematics	5-74
Arizona State University, Tempe, AZ	summers 78 to 82
18 credits in graduate education courses	
Northern Arizona University, Flagstaff, AZ	9-84 to 5-87
MS in Mathematics	5-87

Teaching:

Substitute teaching in NY and AZ	11-69 to 5-76
Shadow Mountain High School, Phoenix, AZ	9-76 to 5-84
Ferris State University	9-88 to present

National and local memberships:

National Education Association
Michigan Education Association
Ferris Faculty Association

Nature Conservancy
Humane Society of the United States
Arbor Day Foundation
Center for Science in the Public Interest

Big Rapids Library
summer volunteer and lifetime member of the Friends of the Library
Big Rapids Recycling Center

407 N. Dartmouth #1
Kalamazoo, MI 49006
Phone (616) 345-8074

Sandra Kay Brigance

Objective

To obtain a full-time tenure-track position teaching mathematics at the community college level.

Professional experience

08/00 - present Kalamazoo Valley Community College MI

Part-time Mathematics Instructor

- Taught Finite Math, Algebra Fundamentals, Pre-Algebra, & Basic Math

08/00 - present Western Michigan University Kalamazoo, MI

Part-time Mathematics Instructor

- Teaching Pre-Calculus

06/00 - 08/00 Lansing Community College Lansing, MI

Adjunct Mathematics Instructor

- Taught Calculus with Applications
- Tutored at mathematics help desk.

08/98–04/00 Western Michigan University Kalamazoo, MI

Graduate Assistant

- 1st year: Conducted Pre-Calculus recitations.
- 2nd year: Taught Pre-Calculus course.
- Both years: Tutored in mathematics lab.

08/95–06/98 Kern High School District Bakersfield, CA

High School Mathematics Teacher

- Taught Integrated Mathematics I and II (equivalent to Algebra I & II, Geometry, and beginning Probability) to grades nine through twelve.
- Coached Academic Decathlon team.
- Served on revision committee for Foothill High School's Integrated Mathematics I course of study and Kern High School District's course of study for Algebra 9 and its equivalents.

Education

08/98–04/00 Western Michigan University Kalamazoo, MI

M.A., Pure Mathematics

08/90-04/95 Western Michigan University Kalamazoo, MI

B.S., Secondary Mathematics Education

Certification

Michigan Professional Education Certificate

- Secondary Level with EX and FF endorsements.

RESUME

Basic Personal Data

David Burns
610 Cypress Street
Big Rapids, Michigan 49307
Home phone 796-0042
Office phone 591-2302

Education

PhD in Mathematics, 1979
Western Michigan University
Kalamazoo, Michigan

SpA in Mathematics, 1976
Western Michigan University
Kalamazoo, Michigan

MA in Mathematics, 1972
Western Michigan University
Kalamazoo, Michigan

BS in Mathematics, 1970
University of Michigan
Ann Arbor, Michigan

Doctoral Preliminary Exams completed in Algebra, Analysis, and Graph Theory

Specialist in Arts Preliminary Exams completed in Algebra, Analysis, and Graph Theory

Employment

1989-present:
Professor of Mathematics
Ferris State University
1984-1988:
Associate Professor of Mathematics
Ferris State University
1980-1983:
Assistant Professor of Mathematics
Ferris State University
1977-1979:
Graduate Student - PhD Program
Western Michigan University
1975-1976:
Graduate Student - SpA Program
Western Michigan University
1973-1974:
Computer programmer specializing in computer support of bank trust departments
1970-1972:
Graduate Student - MA Program
Western Michigan University
1970-1977:
Commissioned Officer, U.S. Army Reserve
Field Artillery and Medical Service

University Service

Mathematics Department Level

1. 12 quarters of service as Co-ordinator of the Applied Mathematics Degree Program and Chairman of the Applied Mathematics Committee. Half of this work done without released time.
2. 23 quarters and 11 semesters of service as a member of the Applied Mathematics Committee. No overlap with number 1 above. This Committee has not been very active in recent years because of low enrollment in the program.
3. 20 quarters of service as a member of the Faculty Development Committee.
4. 6 quarters of service as Chairman of the Computer Science Committee.
5. 5 quarters of service as a member of the Computer Science Committee. No overlap with number 4 above.
6. 15 quarters of service as a member of the Faculty Search Committee.
7. 5 quarters of service as a member of the Planning Committee.
8. 7 quarters of service as a member of the Department Head Search Committee.
9. 6 quarters and 5 semesters of service as a member of the Tenure Review Committee for Arthur Sherwood.
10. 1 quarter of service as the Chairman of the Master of Science in Applied Mathematics degree Study Committee.
11. Participated in Parent's Day weekend for 7 years.
12. Participated in Michigan Mathematics Prize exam grading for 4 years.
13. Team taught a 5 day summer computer science seminar for public school teachers.
14. Team taught a 5 day summer computer science seminar for people from business and industry.
15. Taught a one day computer science class for elementary school age students.
16. Presented a brief lecture on careers in mathematics during career day at Big Rapids High School.
17. Testified to the Academic Senate regarding our proposed minor in mathematics.
18. Presented a one hour lecture/demonstration with Bob Boufford to the Big Rapids Lions Club regarding the uses of computers in business.
20. Presented a one hour lecture to FSU faculty regarding an application of graph theory within computer science.
21. Presented a brief lecture to the FSU Board of Control regarding possible new degrees to be offered by our Department.
22. Volunteered 8 times to teach Math 499 Independent Study in Mathematics. No compensation received for this work.
23. Volunteered 4 times to teach Math 450 Math Internship. No compensation received for this work.
24. Worked with a student to prepare an FSU student research grant which was successful. I then supervised the work done on this project.

25. Volunteered to teach a special six week math class for students working for the Hayworth Corporation.
26. Volunteered for approximately two hours per day for two weeks to demonstrate computer science programs and techniques to a group of engineers visiting FSU from the Philippine Islands.
27. Volunteered to participate in a computer science demonstration as a part of orientation week.
28. Volunteered to do telephone recruiting for the Applied Mathematics Program.
29. Volunteered with others to prepare application for the C.A.U.S.E. Federal grant.
30. Volunteered for 3 semesters of work as a member of the Applied Mathematics Division. Served as Chairman for one of these semesters.
31. Volunteered for 12 semesters of work as a member of the Theoretical Division.
32. Volunteered for 9 semesters of work as a member of the Applied Division.

College of Arts and Sciences Level

1. 8 quarters of service as Chairman of the General Education Study Committee.
2. 4 quarters of service as Chairman of the Natural Sciences Area Group within the General Education Study Committee. No overlap with number 1 above.
3. 2 quarters of service as a member of the General Education Analysis Committee. This is different from numbers 1 or 2 above.
4. 7 quarters of service as a member of the Honors Program Study Committee.
5. 3 quarters of service as a member of the Science Building Reorganization Committee.
6. 1 quarter of service as Chairman of the Sabbatical Leave Committee.
7. 13 semesters and 1 quarter of service as a member of the Sabbatical Leave Committee. No overlap with number 6 above.
8. 7 quarters of service as a member of the Academic Standards and Policies Committee.
9. 9 semesters and 3 quarters of service as a member of the Faculty Support Committee.

University Level

1. 2 semesters and 3 quarters of service as a member of the Faculty Research Committee.
2. 3 quarters of service as a member of the Historical Archival Committee.
3. 1 quarter of service as a member of the Sabbatical Leave Committee.
4. 8 semesters of service as a member of the Professional Development Committee.
5. 2 semesters of service as a member of the Distinguished Teacher Award Committee.
6. Volunteered for service on the Student Life Committee
7. Volunteered for service on the Graduate and Professional Council Committee.
8. Volunteered for service on any University level committee needing an Arts and Sciences member.

It should be noted that no work has been done at this time on any of the Committees listed in numbers 6, 7, and 8 above.

Courses taught at Ferris State University, including both our old quarter and our newer semester course designations

Math 110 Fundamentals of Algebra (large sized)
Math 110 Fundamentals of Algebra (small sized)
Math 111 Fundamentals of Algebra (large sized)
Math 111 Fundamentals of Algebra (small sized)
Math 115 Intermediate Algebra (large sized)
Math 115 Intermediate Algebra (small sized)
Math 116 Data Processing Mathematics
Math 121 Intermediate Algebra (large sized)
Math 121 Intermediate Algebra (small sized)
Math 124 Numerical Trigonometry
Math 125 Advanced Algebra and Analytical Trigonometry
Math 128 Mathematical Analysis for Business I
Math 132 Calculus for Business
Computer Science 140 Introduction to Basic and the Microcomputer
Computer Science 150 Introduction to Computer Science
Math 230 Analytical Geometry and Calculus 2
Math 231 Analytic Geometry and Calculus 1
Math 232 Analytic Geometry and Calculus 2
Math 233 Analytic Geometry and Calculus 3
Math 234 Analytic Geometry and Calculus 4
Math 241 Numerical Methods
Math 322 Linear Algebra
Math 324 Fundamental Concepts in Mathematics
(I taught discrete structures under this title)
Math 400 Operations Research
Math 401 Mathematical Modeling
Math 450 Applied Mathematics Internship
Math 499 Special Studies in Mathematics

In addition, I have taught college algebra, introductory calculus, third semester calculus, linear algebra, and graph theory (this last at both undergraduate and graduate levels) at Western Michigan University as a Graduate Teaching Assistant, Doctoral Associate, Doctoral Fellow, and Instructor at that institution.

Graduate Coursework at Western Michigan University
Graduate grade point average 3.97 on a 4.0 scale

Course number and title	Grade
Math 550 Teaching of Secondary Mathematics	B
Math 572 Mathematical Analysis	A
Math 520 Topology I	A
Math 625 Theory of Graphs	A
Math 630 Abstract Algebra I	B
Math 530 Linear Algebra	A
Math 629 Studies in Topology	A
Math 629 Studies in Topology continued	A
Math 580 Number Theory	A
Math 676 Complex Analysis I	A
Math 645 Studies in Graph Theory	A
Math 620 General Topology	A
Math 645 Studies in Graph Theory continued	A
Math 506 Programming Computers	A
Math 621 Algebraic Topology	A
Math 609 Applied Math Models	A
Math 645 Studies in Graph Theory continued	A
Math 656 Teaching College Mathematics	A
Math 632 Field Theory	A
Math 694 Seminar in Graph Theory	A
Math 599 Independent Study in Mathematics	A
Math 694 Seminar in Graph Theory	A
Math 720 Specialist Project	Credit
Math 631 Abstract Algebra II	A
Math 730 Doctoral Dissertation	Credit
Math 730 Doctoral Dissertation	Credit
Math 699 Reading and Research	A
Math 694 Seminar in Graph Theory	A
Math 699 Reading and Research	A
Math 730 Doctoral Dissertation	Credit
Math 599 Independent Study in Mathematics	A
Math 694 Seminar in Graph Theory	A
Math 730 Doctoral Dissertation	Credit
Math 641 Graph Theory II	A
Math 694 Seminar in Graph Theory	A
Math 642 Graph Theory III	A
Math 699 Reading and Research	A
Math 508 Assembly Language	A
Math 730 Doctoral Dissertation	Credit
Math 509 Data Structures	A
Math 699 Reading and Research	A

D. Burns   Writings

1. D. Burns and S. Schuster "Every (p,p-2) graph is contained in its complement", Journal of Graph Theory, 1(1977) 277-279.
2. D. Burns and S. Schuster "Embedding (p,p-1) graphs in their complements", Israel Journal of Mathematics, 30(1978) 313-320.
3. D. Burns, "Uniform factorizations of graphs", Doctoral dissertation, Western Michigan University, 1979.
4. D. Burns and S.F. Kapoor, "A procedure to determine connectedness in orientations of graphs". Research report, Mathematics Department, Western Michigan University, July 1979.
5. A review of "A new definition for the eulericity of a graph". Review completed in June 1980 for the Journal of Graph Theory.
6. A review of "A note on path and cycle decompositions of graphs". Review completed in April 1980 for the Journal of Graph Theory.
7. D. Burns, S.F. Kapoor, and P.A. Ostrand "Edge Cosymmetric Graphs", Discrete Mathematics, 32(1980) 99-103.
8. D. Burns and S.F. Kapoor, "One way orientations of graphs", Pi Mu Epsilon, 7(1980) 176-179.
9. D. Burns, G. Chartrand, S.F. Kapoor, and F. Saba "Randomly k-axial graphs" Bulletin of the Australian Mathematical Society, 23(1981) 143-156.
10. D. Burns, "Graph Theory", Encyclopedia of Statistical Sciences, Volume 3 (1983) 517-522.
11. D. Burns, S.F. Kapoor, and P.A. Ostrand, "On line-symmetric graphs", Fundamenta Mathematicae, CXXII(1984) 1-21.
12. D. Burns, "Biregular edge-symmetric graphs", Colloquium Mathematicum, XLIX(1984) 137-140.
13. D. Burns, "The n-minimal chromatic multiplicity of a graph", Colloquium Mathematicum, XLIX(1984) 131-135.
14. D, Burns, S.F. Kapoor, and P.A. Ostrand, "Uniquely edge extendible graphs", Fundamenta Mathematicae, CXXV(1985) 125-131.
15. A review of "On cliques in uniform intersection graphs" by T. Galliguez. Review completed in September 1987 for Mathematical Reviews, AMS.
16. A review of "Two theorems on packings of graphs" by S.K. Teo and H.P. Yap, Review completed in October 1987 for Mathematical Reviews, AMS.
17. A review of "Clique partitions of triangulated graphs" by M. Shaoan and W.D. Wallis. Review completed in October 1987 for Mathematical Reviews, AMS.
18. A review of "Intermediate Algebra" by Welch and Peter. Review completed in December 1989 for Scott Foresman Co.
19. D. Burns "Graph Multiplicities". Research project funded by a faculty research grant from Ferris State University in April 1990.
20. A review of a revision of "Intermediate Algebra" by Welch and Peter. Review completed in November 1990 for Scott Foresman Co.
21. A review of "Clique-transversal sets of line graphs and complements of line graphs" by T. Andreae , M. Schughart, and Z. Tuza. Review completed in July 1991 for Mathematical Reviews, AMS.

22. A review of "Graphs with k odd cycle lengths" by A. Gyarfas. Review completed in September 1992 for Mathematical Reviews, AMS.
23. A review of "Covering the cliques of a graph with vertices" by P. Erdos, T. Gallai, and Z. Tuza. Review completed in January 1993 for Mathematical Reviews, AMS.
24. A review of "The sum number of complete bipartite graphs" by N. Hartsfield and W. F. Smyth. Review completed in May 1993 for Mathematical Reviews, AMS.
25. A review of "Triple placement of graphs" by M. Wozniak and A.P. Wojda. Review completed in July 1993 for Mathematical Reviews, AMS.
26. A review of "Unboundedness for generalized odd cycle transversality" by I.J.Dejter and L.V. Neumann. Review completed in August 1993 for Mathematical Reviews, AMS.
27. A review of "Most unbreakable murky graphs are bull-free" by A. Hertz. Review completed in September 1993 for Mathematical Reviews, AMS.
28. D. Burns, "Packing n-chromatic graphs". Research project supported by a sabbatical leave from Ferris State University. Project completed in May 1994.
29. A review of "Embedding graphs of small size" by M. Wozniak. Review completed in August 1994 for Mathematical Reviews, AMS.
30. A review of "A note on colouring of complete graphs" by L. Sun. Review completed in August 1995 for Mathematical Reviews, AMS.
31. A review of "A min-max relation for K(3)-covers in graphs noncontractible to K(5)-e" by A.R. Mahjoub. Review completed in December 1995 for Mathematical Reviews, AMS.
32. A review of "The number of labeled graphs placeable by a given permutation" by T. Hasunuma and Y. Shibata. Review completed in February 1996 for Mathematical Reviews, AMS.
33. A review of "Generalized list colourings of graphs" by M. Borowiecki and E. Drgas-Burchardt. Review completed in May 1996 for Mathematical Reviews, AMS.
34. A review of "Packing three trees" by M. Wozniak. Review completed in September 1996 for Mathematical Reviews, AMS.
35. A review of "Subpath Acyclic Digraphs" by F.R. McMorris and H.M. Mulder. Review completed in September 1996 for Mathematical Reviews, AMS.
36. A review of "Edge-disjoint placement of trees" by M. Maheo, J. Sacle, and M. Wozniak. Review completed in October 1996 for Mathematical Reviews, AMS.
37. A review of "Graphs with given odd sets" by G. Chan, R.H. Shelp, and L. Soltes. Review completed in March 1997 for Mathematical Reviews, AMS.
38. A review of "The chromatic number of the two-packing of a forest" by H. Wang and N. Sauer. Review completed in March 1997 for Mathematical Reviews, AMS.
39. A review of "A note on packing of three forests" by J.F. Sacle and M. Wozniak. Review completed in April 1997 for Mathematical Reviews, AMS.
40. A review of "The maximum induced circumference of a graph" by C. Campbell, E. DeLaVina, and F. Harary. Review completed in June 1997 for Mathematical Reviews, AMS.

41. A review of "Knapsack graphs" by T. Robinson. Review completed in August 1997 for Mathematical Reviews, AMS.
42. A review of "Graphs related to diameter and center" by F. Gliviak and P. Kys. Review completed in January 1998 for Mathematical Reviews, AMS.
43. A review of "Minimum weight (T,d)-joins and multi-joins" by M. Burlet and V. Karzanov. Review completed in May 1998 for Mathematical Reviews, AMS.
44. A review of "Edge-irreducible quartic graphs" by Y. Tsukui. Review completed in September 1998 for Mathematical Reviews, AMS.
45. A review of "A note on the tree decompositions of graphs" by S. Minyong. Review completed in November 1998 for Mathematical Reviews, AMS.
46. A review of "A note on uniquely embeddable graphs" by M. Wozniak. Review completed in December 1998 for Mathematical Reviews, AMS.
47. A review of "Hajos constructions of critical graphs" by T. Jensen and G. Royle. Review completed in February 1999 for Mathematical Reviews, AMS.
48. A review of "Some results on packing graphs in their complements" by T. Gangopadhyay. Review completed in May 1999 for Mathematical Reviews, AMS.
49. A review of "The search for symmetric Venn diagrams" by B. Grunbaum. Review completed in July 1999 for Mathematical Reviews, AMS.
50. A review of "On vertex-disjoint complete bipartite subgraphs in a bipartite graph" by H. Wang. Review completed in February 2000 for Mathematical Reviews, AMS.
51. A review of "Triangle-free graphs that are signable without even holes" by M. Conforti, G. Cornuejols, and K. Vuskovic. Review completed in August 2000 for Mathematical Reviews, AMS.
52. A review of "Analysis of Venn diagrams using cycles in graphs" by K. Chilakamarri, P. Hamburger, and R. Pippert. Review completed in February 2001 for Mathematical Reviews, AMS.
53. A review of "F-continuous graphs" by G. Chartrand, E. Jarrett, F. Saba, E. Salehi, and P. Zhang. Review completed in September 2001 for Mathematical Reviews, AMS.
54. A review of "Odd wheels in graphs" by Xu, Jin, and Lin. Review completed in June 2002 for Mathematical Reviews, AMS.
55. A review of "Bipartite graphs without a skew star" by V. Lozin. Review completed in January 2003 for Mathematical Reviews, AMS.
56. A review of "Self-complementary graphs with minimum degree two" by K. Ando and A. Nakamoto. Review completed in January 2003 for Mathematical Reviews, AMS.
57. A review of "Classification of certain subgraphs of the 3-dimensional grid" by J. Haugland. Review completed in February 2003 for Mathematical Reviews, AMS.
58. A review of "Slice two-colorings that forbid monochromatic translates of many doubletons" by P. Johnson. Review completed in July of 2003 for Mathematical Reviews, AMS.
59. A review of "On the largest eigenvalue of a tree with perfect matchings" by A. Chang. Review completed in September 2003.

60. A review of "On rs(k)-perfect graphs" by D. Rantenbach. Review completed in November of 2003 for Mathematical Reviews, AMS.
61. A review of "Stratification and domination in graphs" by G. Chartrand, T. Hayes, M. Henning, and P. Zhang. Review completed in January of 2004 for Mathematical Reviews, AMS.
62. A review of "Semi-regular graphs of minimum independence number" by P. Nelson and A. Radcliff. Review completed in March 2004 for Mathematical Reviews, AMS.
63. A review of "Stratification and domination in graphs" by M. Henning and J. Maritz. Review completed in November 2004 for Mathematical Reviews, AMS.
64. A review of "On self-complementary supergraphs of (n,n)-graphs" by P. Wojda, M. Wozniak, and I. Zioto. Review completed in June of 2005 for Mathematical Reviews, AMS.
65. A review of "On the Boolean function graph of a graph and its complement" by T. Janakiraman and S. Muthammai. Review completed in September of 2005 for Mathematical Reviews, AMS.
66. A review of "Domination numbers on the Boolean function graph of a graph" by T. Janakiraman, S. Muthammai, and M. Bhanumathi. Review completed in September of 2005 for Mathematical Reviews, AMS.
67. A review of "Remarks on spectral radius and lapacian eigenvalues of a graph" by B. Zhou and H. Cho. Review completed in September 2005 for Mathematical Reviews, AMS.
68. A review of "On simply structured bases of tree kernels" by J. Sander and T. Sander. Review completed in December of 2005 for Mathematical Reviews, AMS.
69. A review of "Cycle embedding in star graphs with edge faults" by T. Li. Review completed in December of 2005 for Mathematical Reviews, AMS.
70. A review of "Two new classes of trees embeddable in hypercubes" by M. Nekri and A. Berrachedi. Review completed in January of 2006 for Mathematical Reviews, AMS.
71. A review of "Face antimagic labelings for a special class of plane graphs" by M. Baca, E. Baskoro, and Y. Cholily. Review completed in March of 2006 for Mathematical Reviews, AMS.
72. A review of "On almost self-complementary graphs" by P. Potocnik and M. Sajna. Review completed in April 2006 for Mathematical Reviews, AMS.
73. A review of "Automated conjectures on upper bounds for the largest Laplacian eigenvalue of graphs" by Brankov, Hansen, and Stevanovic. Review completed in June 2006 for Mathematical Reviews, AMS.
74. A review of "Weak embedding of planar graphs" by W. Erling and L. Yanpei. Review completed in July of 2006 for Mathematical Reviews, AMS.
75. A review of "More fun with symmetric Venn diagrams" by F. Ruskey and M. Weston. Review completed in August of 2006 for Mathematical Reviews, AMS.
75. A review of "Profile minimization on products of graphs" by Y. Tsao and G. Chang. Review completed in September of 2006 for Mathematical Reviews, AMS.
76. A review of "Connected geodomination in graphs" by D. Mojeh and N. Rad. Review completed in September of 2006 for Mathematical Reviews, AMS.
77. A review of "The average degree in a vertex-magic graph" by A. Beardon. Review completed in October of 2006 for Mathematical Reviews, AMS.

78. A review of "Hamiltonian connectedness and the partially square graphs" by A. Ainouche and S. Lapiqnonne. Review completed in October 2006 for Mathematical Reviews, AMS.
79. A review of "Some bounds on the p-domination number in trees" by M. Blidia, M. Chellali, and L. Volkmann. Review completed in November 2006 for Mathematical Reviews, AMS.
80. A review of "Algorithmic aspects of minus total k-subdomination in graphs" by L. Harris, J. Hattingh, and M. Henning. Review completed in January of 2007 for Mathematical Reviews, AMS.
81. A review of "Constrained switchings in cubic graphs" by A. Chantasartrassmee and N. Punnim. Review completed in February of 2007 for Mathematical Reviews, AMS.
82. A review of "Extremal cut-width problem for graphs" by J. Hao and A. Yang. Review completed in March of 2007 for Mathematical Reviews, AMS.
83. A review of "More about singular line graphs" by M. Marino, I. Sciriha, S. Simic, and D. Tosic. Review completed in March 2007 for Mathematical Reviews, AMS.
84. A review of "Symmetrical path-cycle covers and polygonal graphs" by C. Li, and A. Seress. Review completed in March 2007 for Mathematical Reviews, AMS.
85. A review of "Symmetric squares of graphs" by K. Audenaert, C. Godsil, G. Roye, and T. Rudolph. Review completed in March 2007 for Mathematical Reviews, AMS.
86. A review of "Spectral radii of graphs with a given chromatic number" by L. Feng, Q. Li, and X. Zhans. Review completed in April 2007 for Mathematical Reviews, AMS.
87. A review of "On the Loebl-Komlos-Sos conjecture" by L. Sun. Review completed in April of 2007 for Mathematical Reviews, AMS.
88. A review of "Lower bound on the weakly connected domination number of a tree" by M. Lemanska. Review completed in April 2007 for Mathematical Reviews, AMS.
89. A review of "Pentagons and cycle coverings" by H. Wang. Review completed in May of 2007 for Mathematical Reviews, AMS.
90. A review of "On geometric properties of directed vertex-symmetric graphs" by V. Trofimov. Review completed in May of 2007 for Mathematical Reviews, AMS.
91. A review of "Doubly transitive 2-factorizations" by A. Bonisoli, M. Burahi, and G. Mazzuocolo. Review completed in May 2007 for Mathematical Reviews, AMS.
92. A review of "Using determining sets to distinguish Kneser graphs" by M. Albertson and D. Boutin. Review completed in June of 2007 for Mathematical Reviews, AMS.
93. A review of "Monochromatic Fibonacci numbers of graphs" by I. Wloch and A. Wloch. Review completed in June of 2007 for Mathematical Reviews, AMS.
94. A review of "On strong (weak) independent sets and vertex coverings of a graph" by S. Kmath and R. Bhart. Review completed in June of 2007 for Mathematical Reviews, AMS.
95. A review of "Ratios of some domination parameters in graphs and claw-free graphs" by M. Blindia, M. Chellali, and O. Favaron. Review completed in June of 2007 for Mathematical Reviews, AMS.
96. A review of "A new construction technique of a triangle-free 3-colored K16" by J. Jaam. Review completed in July of 2007 for Mathematical Reviews, AMS.
97. A review of "On perfect neighborhood and irredundant sets in trees" by T. Xie, B. Zhong, and T. Pend. Review completed in July 2007 for Mathematical Reviews, AMS.

98. A review of "On the maximum number of edges in quasi-planar graphs" by E. Ackerman. Review completed in July of 2007 for Mathematical Reviews, AMS.
99. A review of "On potentially Kr(1),r(2),...,r(m)-graphic sequences" by J. Yin and G. Chen. Review completed in July 2007 for Mathematical Reviews, AMS.
100. A review of "Fixed-point free embeddings of digraphs with small size" by A. Gorlich, M.Pilsniak, M.Wozniak, and I. Ziolo. Review completed in July of 2007 for Mathematical Reviews, AMS.
101. A review of "The minimal spectral radius of graphs with a given diameter" by E. VanDam. Review completed in August 2007 for Mathematical Reviews, AMS.
102. A review of "A note on packing of two copies of a hypergraph" by M. Pilsniak and M. Wozniak. Review completed in September 2007 for Mathematical Reviews, AMS.
103. A review of "On Potentially kCl-graphic sequences" by J. Yin and G. Chen. Review completed in September 2007 for Mathematical Reviews, AMS.
104. A review of "Minimax relations for cyclically ordered digraphs" by A. Sebo. Review completed in October 2007 for Mathematical Reviews, AMS.
105. A review of "On stratification and domination in graphs" by R. Gera and P. Zhang. Review completed in October 2007 for Mathematical Reviews, AMS.
106. A review of "Global alliances in planar graphs" by J. Rodriquez-Valazquez and J. Sigarreta. Review completed in October 2007 for Mathematical Reviews, AMS.
107. A review of "K-perfect geodominating sets in graphs" by D. Mojdeh and N. Rad. Review completed in November 2007 for Mathematical Reviews, AMS.
108. A review of "On friendly index sets of root-unions of stars by cycles" by Y. Ho, S. Lee, and H. Ng. Review completed in November 2007 for Mathematical Reviews, AMS.
109. A review of "Matchings of cycles and paths in directed graphs" by G. Pap and L. Szego. Review completed in December 2007 for Mathematical Reviews, AMS.
110. A review of "On directed triangles in digraphs" by P. Hamburger, P. Haxell, and A. Kostochka. Review completed in February of 2008 for Mathematical Reviews, AMS.
111. A review of "Triangular Embeddings of complete graphs from graceful labellings of paths" by L. Goddyn, R. Richter, and J. Siran. Review completed in February of 2008 for Mathematical Reviews, AMS.
112. A review of "Vertex disjoint equivalent subgraphs of order 3" by T. Nakamigawa. Review completed in February of 2008 for Mathematical Reviews, AMS.
113. A review of "Randomly C(n)UC(m) graphs" by H. Pavel and M. Pokorny. Review completed in March 2008 for Mathematical Reviews, AMS.
114. A review of "Random 2C(n) graphs" by H. Pavel and M. Pokorny. Review completed in April 2008 for Mathematical Reviews, AMS.
115. A review of "The binding number of a graph" by G. Xu, X. Li, and S. Zhang. Review completed in April 2008 for Mathematical Reviews, AMS.
116. A review of "On realizations of point determining graphs and obstructions to full homomorphisms" by T. Feder and P. Hell. Review completed in June 2008 for Mathematical Reviews, AMS.
117. A review of "A classification of regular embeddings of hypergraphs Q(2m) with m odd" by J. Xu. Review completed in July 2008 for Mathematical Reviews, AMS.
118. A review of "Degree constrained subgraphs" by L. Addario-Berry, K. Dalal, and B. Reed. Review completed in July of 2008 for Mathematical Reviews, AMS.

119. A review of "The Cycle-Complete graph Ramsey number r(C(8),K(8))" by M. Jaradat and B. Alzaleg. Review completed in August of 2008 for Mathematical Reviews, AMS.
120. A review of "On mark sequences in 2-digraphs" by S. Pirzada, A. Merajuddin, and U. Samee. Review completed in September 2008 for Mathematical Reviews, AMS.
121. A review of "Independent dominating sets and Hamiltonian cycles" by P. Haxell, B. Seamore, and J. Verstraete. Review completed in September 2008 for Mathematical Reviews, AMS.

MICHAEL J. DEKKER, Ph.D.

(231) 591-2987 (office)
(616) 452-4717 (home)
(616) 648-2015 (cell)

Department of Mathematics
Ferris State University
Big Rapids, MI 49307

dekkerm@ferris.edu

EDUCATION

Ph.D. Mathematics — 2004
University of Notre Dame

M.S. Mathematics — 2000
University of Notre Dame

B.S. Mathematics (Honors) and Physics — 1998
Calvin College
Grand Rapids, Michigan

TEACHING

Ferris State University

Associate Professor of Mathematics — 2006 - present
Assistant Professor of Mathematics — 2003 – 2006
Courses Taught:

- Math 110 – Beginning Algebra
- Math 115 – Intermediate Algebra
- Math 126 – Algebra and Analytic Trigonometry
- Math 135 – Calculus for the Life Sciences
- Math 216 – Applied Calculus
- Math 220 – Calculus and Analytic Geometry
- Math 314 – Probability (once via ITV)
- Math 322 – Linear Algebra (twice via ITV)
- Math 324 – Fundamental Concepts of Mathematics
  (in Grand Rapids, via ITV, and developed online)
- Math 325 – College Geometry
  (in Grand Rapids, via ITV, and developed online)
- Math 420 – Abstract Algebra

University of Notre Dame

Instructor and Teaching Assistant, Mathematics Department — 1999 – 2003
Instructor, Balfour-Hesburgh Scholars Program — 2001 – 2003

PRESENTATIONS (since 2003)

"Pi vs. e Debate" – Coordinator — Nov 2008
Mathematics Department Colloquium, Ferris State University

"Squaring the Square"
Michigan Section Meeting of the MAA, Grand Valley St. Univ. — May 2008
Mathematics Department End of the Year Party — April 2008

"Common Exam Experience" — Feb 2007
Mathematics Department Colloquium, Ferris State University

"College Geometry as an Online Course"
Michigan Section Meeting of the MAA, Calvin College — May 2006
Mathematics Department Colloquium, Ferris State University — Feb 2006

"A Brief Tour of Topology"
Mathematics Department Colloquium, Ferris State University — Nov 2004

"Manifold Mania"
Mathematics Department Colloquium, Calvin College — Feb 2003

SERVICE ACTIVITIES

Mathematics Department:

Ad hoc Summer Course Selection Committee	2004
Scheduling Committee	2005 – present
Course Committees: Service, Theoretical, Core	2005 – present
Quantitative Skills Committee	Fall 2006
Designer of Math 317, New Elementary Ed. Geometry Course	Spring 2006
Math Secondary Education Committee	2007 – present
Mathematics Department Head Search Committee	2007 – 2008
Mathematics Faculty Search Committee	2008 – 2009
Assistant Faculty Advisor for the MATH Challenge	2003 – present
Faculty Advisor for the Lower Michigan Math Competition	2005 – present
Problem of the Week Competition Initiator and Coordinator	2005 – present
SLA Program Participant	2004 – 2006

College of Arts and Sciences

Pre-pharmacy Program Advisor	2004 – present
Faculty Steering Committee for Online Development	2005 – 2006
Faculty Support and Development Committee	2007 – present

Mecosta-Osceloa ISD Math-Science-Technology Center

Research Project Mentor	2008 – 2009

PROFESSIONAL MEMBERSHIPS

Mathematical Association of America	2004 - present

PROFESSIONAL ACTIVITIES (since 2003)

MathFest 2008, Madison, WI	July 2008
Meeting of the Michigan Section of the MAA, Grand Valley St. Univ.	May 2008
FerrisConnect Training	Feb 2008
Meeting of the Michigan Section of the MAA, UM-Dearborn	May 2007
Meeting of the Michigan Section of the MAA, Calvin College	May 2006
Learning Outcomes Assessment Workshop	Spring 2006
Meeting of the Michigan Section of the MAA, Alma College	Apr 2005
Best Practices in Online Delivery of Instruction, Ferris State University	Spring 2005
Getting Up To Speed with WebCT, Ferris State University	Jan 2005
Conversations Among Colleagues, Grand Valley State University	Mar 2004
New Faculty Transition Program, Ferris State University	2003-2004

RESEARCH

Dissertation: "A New Proof of the Bordism Invariance of the Index". Directed by Dr. Stephan Stolz. Completed in 2003.

HONORS AND AWARDS

Semi-Finalist for the Distinguished Teacher Award	Spring 2009
Awarded Tenure	Fall 2008
Certified Online Instructor – Level 3	Spring 2007
Honors Senior Sendoff Banquet (invited by a student as their most influential professor)	Spring 2007
Outstanding Graduate Student Teacher Award for Excellence in Teaching, Kaneb Center for Teaching and Learning, University of Notre Dame	2001
William J. Rinck Memorial Prize in Mathematics, Calvin College	1998

Curriculum Vitae

Mary Rose Forintos
Department of Mathematics
Ferris State University

Academic and ProfessionalTraining:

M.A. Secondary Level Mathematics Education, December 1979
The University of Michigan, Ann Arbor, MI.

B.S. (Major: Mathematics Minor: Art) 1971
Mercy College of Detroit, Detroit, MI.

Additional Academic and Professional Training:

Pre-Engineering Program, Henry Ford Community College, Dearborn, MI.1983-1985. Twenty-three semester hours in Physics, Chemistry, Materials Science and Engineering Drawing.

Educational Leadership, University of Dayton Graduate School, Dayton, OH. Eleven semester hours in Education Leadership/Administration. 1985-1986.

Education of Exceptional Persons, University of Northern Iowa, 1995

Professional Certification:

State of Michigan Continuing Certificate
385-52-8347 T8938
Grades K-8: All Subjects
Grades 9-12: Mathematics

State of Iowa Board of Educational Examiners
Professional Teacher's License
Grades K-6: All subjects
Grades 7-12: Mathematics

Teaching Experience:

2000- present

Ferris State University, Big Rapids, MI 49307
2006-Present Associate Professor, Mathematics Department
2000-2006 Assistant Professor, Mathematics Department
Tenured 2005

Courses Taught:

Fundamentals of Mathematics	Math 010
Fundamentals of Algebra	Math 110
Intermediate Algebra	Math 115
Mathematics for Elementary Teachers I	Math 218
Mathematics for Elementary Teachers II	Math 219
Algebra and Analytic Trigonometry	Math 126
Advanced Algebra and Trigonometry	Math 130
Analytical Geometry and Calculus I	Math 220
Statistics for the Life Sciences	Math 251
Probability	Math 314

Distance Learning via Television to Traverse City
Elementary Methods for

CURRENT VITA

GIFFORD, ROY M.

ASSISTANT PROFESSOR, MATHEMATICS

FERRIS STATE UNIVERSITY

2034 ASC

(231-591-5862---Office), (231-796-5251---Home)

ACADEMIC BACKGROUND

Michigan State University	1978	Mathematics	
University of Michigan	1964, 1965	Mathematics	MA
Kent State University	1961-1964	Mathematics	BS

PROFESSIONAL EXPERIENCE

1970-present	Ferris State University	Assistant Professor, Mathematics
1965-1970	Kent State University	Instructor, Mathematics

SIGNIFICANT OTHER EXPERIENCES

Kent State University—Taught Honors College students mathematics in six different mathematics courses from Pre-Calculus through Calculus IV, admitted to the graduate faculty (in Mathematics) for one semester in order to be able to teach graduate students (in Math Education) Differential Equations, and taught an Introductory Surveying course for five years. I also taught a few Mathematics Education during the last two years at Kent State University.

Ferris State University---I've earned three Merit raises, was the first Acting Department Head (for two years) our department ever had (we hired five tenure track faculty and converted from the quarter system to the semester system during these two years)(also at this time our department was 27 full-time faculty and from 3-6 part-time faculty), and I've been assistant to the department head for two other years, helped write the original General Education requirements for our institution and lead the United Way effort in the Mathematics Department for many, many years.

Gifford, Suellen, M.A.
Assistant Professor of Mathematics
Ferris State University
Big Rapids, Michigan 49307

1. Academic Degrees

M.A.	Michigan State University	1990	Curriculum Development
B.S.	Kent State University	1963	Mathematics Education

2. Professional Experience

1997-present	Tenured faculty at Ferris State University
1993-1997	Working towards tenure at Ferris State University
1980-1993	Part-time faculty member at Ferris State University
1967-1968	Junior High Mathematics Teacher
1965-1967	Elementary Teacher

3. Faculty Load

Fall Semester, 2008

Math 010	Prealgebra	8 semester hours
Math 110	Beginning Algebra	4 semester hours

Spring Semester 2009

Math 010	Prealgebra	4 semester hours
Math 110	Beginning Algebra	8 semester hours

4. Other Collegiate Assignments, 1999-2009

Tenure committee member for three new faculty members
Member of Math 010, 110, and 115 Committee
Member of Elementary Education Committee
Member of the Quantitative Skills Committee
Member of Search Committee for new faculty member.
Advising of Pre-Pharmacy students

5. Current Professional and Academic Association Memberships

National Association of Developmental Education
Michigan Developmental Education Consortium

JAMES HOWARD

18120 Woodland Road, Big Rapids, Michigan 49307 | (231) 796-0318 | howardj@ferris.edu

EDUCATION

Kalamazoo College
B.S. Mathematics **1966**
Phi Beta Kappa Society, magna cum laude

University of Michigan
M.S. Mathematics **1967**

AWARDS

National Science Foundation summer Institute, Ferris State University
Faculty Fellowship Grant from National Science Foundation, Ferris State University 1971
Solutions to several problems presented in various mathematics journals

TEACHING EXPERIENCE

Ferris State university
Associate Professor **1967-Present**
Presented at several colloquiums and at Michigan math Association of America conventions

MEMBERSHIPS

Mathematical Association of America

Hengli Jiao **Curriculum Vitae**

Department of Mathematics
Ferris State University
Big Rapids, MI 49307
jiaoh@ferris.edu
(231) 591-2825

EDUCATION

Ph. D., Applied Mathematics, August 1996, Michigan State University, East Lansing, MI
M. S., Computational Mathematics, July 1988, Dalian University of Technology, Dalian, China
B. S., Applied Mathematics, 1985, Dalian University of Technology, Dalian, China

TEACHING EXPERIENCE

August 2005-present
Associate Professor of Mathematics, Ferris State University, Big Rapids, MI
August 2001- August 2005
Assistant Professor of Mathematics, Ferris State University, Big Rapids, MI

Utilized creative teaching strategies

- Develop online course for off-campus students
- Encourage collaborative teaching and learning.
- Implement instruction in a way to balance traditional and technological methods.

Strengthened the Existing Courses

- Utilized technology to enhance students' learning.
- Developed supplemental material for students.

Courses Taught

- Fundamental of Algebra, Analytic Geometry and Calculus II, and Linear Algebra, Fall 2007
- Contemporary Mathematics Online, and Analytic Geometry and Calculus II (two sections) Spring 2007.
- Pre-Algebra, Contemporary Mathematics Online, and Analytic Geometry and Calculus I, Fall 2006
- Fundamental of Algebra, Contemporary Mathematics, Calculus for Business, and Analytic Geometry and Calculus II, Winter 2006
- Contemporary Mathematics, Analytic Geometry and Calculus I, and Analytic Geometry and Calculus III, Fall 2005
- Fundamental of Algebra, Contemporary Mathematics, and Analytic Geometry and Calculus II, Winter 2005.
- Calculus for Life Sciences (Math135) and Analytic Geometry and Calculus II (Math 230), Fall 2004.
- Intermediate Algebra and Numerical Trigonometry and Pre-calculus (Math130), Fall 2003. Intermediate Algebra, Analytical Geometry and Calculus I, and Fourier Series and Applied Differential Equations. Winter 2003

- Intermediate Algebra and Numerical Trigonometry (math116), Analytical Geometry and Calculus I (math220), and Statistics for Life Science (math251), Fall 2002
- Fundamentals of Algebra, Contemporary Mathematics (math117), and Fourier Series and Applied Differential Equations (math226), Winter 2002.
- Fundamentals of Algebra (math110), Intermediate Algebra (math115), Trigonometry (math120), and Mathematical Analysis for Business (math122), Fall 2001.

August 1996 – July 2001

Assistant /Associate Professor of Mathematics, Jackson State University, Jackson, MS

January 1991 – August 1996

Teaching Assistant, Department of Mathematics, Michigan State University, E. Lansing, MI

RESEARCH

Publications and Presentations

- Liberal Arts Mathematics Online, Mathematics Colloquium, Ferris State University, September 21, 2006.
- The WebWork Homework System, Mathematics Colloquium, Ferris State University, April 21, 2005.
- An Elementary Proof of Blow-up of Solutions for Semilinear Wave Equations in High Space Dimensions, Journal of Differential Equations 189 (2003) 355-365.
- Existence of a Global Solution to Semilinear Wave Equations in Five Space Dimensions, J. Math. Res. Exposition, Vol 22, (2002) No. 3, 351-367.
- Global Existence and Blow-up for Semilinear Wave Equations in High Space Dimensions, Mathematics Colloquium, Ferris State University, November 27, 2001
- Enhancing College Algebra Instruction, 962nd AMS, New Orleans, Louisiana, January 10-13, 2001.
- Blow-up of Solutions for Semilinear Wave Equations in Higher Dimensional Spaces, 935th American Mathematical Society, DePaul University, September 12-13, 1998.
- Blow Up of Solutions for Nonlinear Wave Equations in High Dimensions, 926th American Mathematical Society, Georgia Institute of Technology, October 17-19, 1997.
- Several Proximinal Problems in Banach Spaces, J. Math. Res. Exposition 10 (1990) No.1 221-226.
- Approximation in Linear Topological Spaces, J. Dalian Univ. Tech.28 (1988) No. 1, 107-110.
- Best approximation in C(X, Y), Proceedings of the Fourth Conference in Theory of Approximation, Zhengzhou, 1987, 50-55.

GRANTS

Funded Grants

- National Science Foundation: **Scholarships in Science, Technology, Engineering, and Mathematic at Ferris State University,** $499,968 funded by the National Science Foundation, December, 2006.
- Ferris Exceptional Merit Grants Program: **Web Homework Assessment System,** $2,500 funded by the Ferris Foundation, May 2005.

- Faculty Research Grant: **Existence of Periodic Solutions for Nonlinear Wave Equations,** $4,890 funded by the Office of Academic Senate, Ferris State University, April 2005.
- Dean's Initiative Grant: **Improving Mathematics Learning for STEM Disciplines**, $1,000 funded by the Dean of College of Arts and Science, Ferris State University, October 2004.
- Faculty Professional Development Grant: **Pioneering the Computer Homework Assessment System**, funded by the Office of Academic Senate, Ferris State University, April 2004.
- Dean's Initiative Grant: **A Proposal on Course, Curriculum, and Laboratory Improvement to the National Science Foundation**, $1,000 funded by the Dean of College of Arts and Science, Ferris State University, June 2003.
- Faculty Grant Development Fund, $600 funded by the Office of the Vice President for Academic Affairs, Ferris State University, May 2003.
- Faculty Professional Development Grant: **Promoting Mathematics Teaching and Research through Faculty Development Activities**, $1,500 funded by the Office of Academic Senate, Ferris State University, April 2003.
- Faculty Research Grant: **Asymptotic Behavior and Global Existence of Nonlinear Wave Equations**, $1,980 funded by the Office of Academic Senate, Ferris State University, April 2003.
- Dean's Initiative Grant: **Developing a Proposal to Seek CSEM Scholarships from the National Science Foundation**, $1,000 funded by the Dean of College of Arts and Science, Ferris State University May 2002.
- Mathematics Instructions Using Dynamic Computer Technology, $148,000 funded by the Department of Education, July 2000
- A Study on On-line Testing Using Internet Technology for Teaching and Learning Statistics, $10,000 funded by Mississippi Urban Research Center, May 2000.

SERVICE

- Serve as a member of department head search committee, 2007
- Serve as the chair of departmental planning committee 2006-present
- Serve as a member of College Planning Committee 2006-present
- Serve as a member of faculty search committee two times, 2006 and 2007
- Participate in the First Impression to help new students learn the campus, 2006 Fall
- Participate in General Dawg Days to serve prospective students, 2006-present
- Faculty Support Committee of the College of Arts and Sciences, 2004-present.
- Serve as a member of placement test committee, 2003-present.
- Serve as an advisor for Pre-Engineering students, 2003-present.
- Serve as an advisor for Pre-Pharmacy Students, 2002-present.
- Applied Mathematics Committee for 2002- 2003 Academic year.
- Beginning Algebra/Intermediate Algebra Committee for 2001-2002 Academic year.
- Math 380 Committee for 2001-2002 Academic year.

PROFESSIONAL MEETINGS AND WORKSHOPS

- 33rd American Mathematical Association of Two-Year College, November 1-4, 2007, Minneapolis, MN
- FerrisConnect A Two-Day intensive workshop, Faculty Development Workshop held by Faculty Center for Teaching & Learning May 10-11, 2007
- 32nd American Mathematical Association of Two-Year College, November 1-4, 2006, Cincinnati, OH
- Delivering Video and Audio with Flash, Faculty Development Workshop held by Faculty Center for Teaching & Learning , December 6, 2006
- American Mathematical Society Spring Central Sectional Meeting, Notre Dame, IN, April 8-9, 2006
- Learner-Centered Teaching A Three-day workshop, Faculty Development Workshop held by Faculty Center for Teaching & Learning , May 16-18, 2006.
- Respondus 3.5 Training Workshop, May 9, 2006.
- Designing and Developing Courses for Online Delivery, Faculty Development Workshop held by Faculty Center for Teaching & Learning, January 3-5, 2006 , Ferris State University.
- 31st American Mathematical Association of Two-Year College, November 10-13, 2005, San Diego, CA.
- American Mathematical Society Regional Conference, October 23-24, 2005 at Northwestern University, Evanston, IL.
- Mathematical Association of America Michigan Sectional Annual Meeting, May 1-2, 2004, at Oakland University
- Michigan Mathematical Association of Two Year Colleges Conference, October 10-11, 2003.
- The 3rd Annual Lilly-North Conference, September 19-21, 2003
- The 2003 Joint Annual Meeting of the Michigan Section of the Mathematical Association of America and MichMATYC, the Michigan Mathematical Association of Two Year Colleges, May 2–3, 2003, at Saginaw Valley State University.
- The 2nd Annual Lilly-North Conference, September 20-21, 2002 at Ferris State University.
- Ferris Faculty Transition Workshops, Fall 2001.

PAPER AND BOOK REVIEWED

- Technical Mathematics, by Franz Helfenstein, Prentice Hall, July 2003.
- Lambert Universal Variable Algorithm, Arabian Journal for Science and Engineering, Jan. 2002.
- Basic Mathematical Skills with Geometry, 5/e by Streeter, et al, McGraw Hill, November 2001.
- Beginning Algebra, 5/e by Streeter, et al, McGraw Hill, November 2001.
- Intermediate Algebra, 4/e by Streeter, et al, McGraw Hill, November 2001.

RESUME

John Linnen
Assistant Professor, Mathematics Department
Ferris State University

EDUCATION: B.S. (Mathematics), Wisconsin State University, Oshkosh (1965)
M.S. (Mathematics), University of Notre Dame (1968)

Graduate Education Courses, WSU- Oshkosh (1966-1967)
Institute for college math teachers, Rutgers (1971)
Graduate courses, Michigan State University (1975-1977)
NSF short course in modeling and simulations, Miami (1977)
Graduate courses, Michigan State University (full time 1978)

EMPLOYMENT: Omro High School, Omro, WI. Math teacher (1965-1967)
Ripon High School, Ripon, WI. Math teacher (1967-1968)
University of Notre Dame, Math instructor (1969-1970)
Ferris State University, Assistant Professor (1970-present)

PROFESSIONAL MEMBERSHIP: Michigan Education Association
National Education Association

Current Vita

McCullough, Robert N.

Associate Professor, Mathematics

Ferris State University

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(231)-591-5876 (office) Robert_Mccullough@ferris.edu

(231)-796-3986 (home) bulldogs@netonecom.net

Academic Background

-	WV College of Graduate Studies	1978-1979	Industrial Engineering
-	Michigan State University	1972, 1974	Mathematics/Comp Sci
M.S.	Michigan State University	1971	Mathematics
B. S. (highest honors)	Michigan State University	1970	Mathematics

Professional Experience

1981-present	Ferris State University	Associate Professor, Mathematics
1980-1981	WV College of Graduate Studies	Assistant Professor, Computer Science
1974-1981	West Virginia State College	Assistant Professor, Mathematics
1973-1974	Oldsmobile – Main Plant	Computer Operator
1972-1973	Jackson Community College	Part-time instructor
1972	Le Conte Lodge	Bookkeeper and Treasurer
1970-1972	Michigan State University	Graduate Assistant

Current Professional and Academic Association Memberships

Member, Phi Beta Kappa

Member, Pi Mu Epsilon

Current Assignments and Activities

Advisor, Applied Mathematics students, 1997 - present

Chair, Applied Mathematics Committee, 1997 - present

Chair, Program Review Panel (Applied Mathematics/Mathematics), 2002 – present

Coordinator, Applied Mathematics program, 1997 – present

Coordinator, Mathematics (B.A.), 2002 – present

Member, Department Faculty Scheduling Committee (Group Chairperson), 1990 - present

Member, Department Tenure Review Committee, 1994 – present

Mentor, Math Science Technology Students, 1998 – 2000, 2003-present

Advisor, Ferris State University MATH Challenge teams, 2003-present

Regional Resource Person, National Air and Space Museum, 1981 – present (130 talks given)

Reviewer, *Science Books & Films*, 1986 - present

Moderator, Chapter MATHCOUNTS competition, 1996 – present

Publications

New Horizons Time Capsule, photo and article on Launch Complex 39B, March 2007, Planetary Society website: http://www.planetary.org/explore/topics/time_capsule/selections.html

Mathematics for Computer Technology, 3rd edition, Morton Publishing Company, 2006

Instructor's Manual for *Mathematics for Computer Technology*, 3rd edition, Morton Publishing Company, 2006

"Space Exploration is the Essence of the Human Spirit", *Petoskey News*, August 24, 2005

"My Experiences as a Regional Resource Person for the National Air and Space Museum", Proceedings of the International Space Development Conference 2005, June, 2005

"Calculating Coefficients", *Mechanical Engineering*, April 2004, pp. 36-38

"Growing Twelve Generations of Space Tomatoes ", *Crimson and Gold*, Fall, 2002: 16-17

51 reviews of astronomy and mathematics books published in *Science Books and Films* from May, 1987 to October, 2008

"Growing Eleven Generations of Space Tomatoes", *The Insider*, May, 2002: 47-50

"The Wright Stuff: The Mathematics of the Wright Brothers", Wright Brothers – Their Sites and Stories Conference Proceedings, September, 2001

"Growing Eleven Generations of Space Tomatoes ", Proceedings of the ISDC 2001, June, 2001

Mathematics for Data Processing, 2nd edition, Morton Publishing Company, April, 2001

Instructor's Manual for *Mathematics for Data Processing*, 2nd edition, Morton Publishing Company, April, 2001

"Space Program Helps Mankind" *Grand Rapids Press* Nov 1996

"The Wright Stuff", *UMAP Journal*, Summer, 1992: 113-132 and cover

"Wright On", *Science News,* December 14, 1991: 387

Mathematics for Data Processing, William C. Brown Publishers, 1988

Instructor's Manual for *Mathematics for Data Processing*, William C. Brown Publishers, 1988

"At-Home Play for Preschoolers" Photo *Offspring* 1988 No2: 9

"The Basics: Wonder, Discovery and Experience" Photo *Offspring,* 1987: No 1: 6

"NASA Paid to Save Satellite" *Detroit Free Press,* Sep 13, 1985

"Russians Not First" *Astronomy* Sep 1983: 33

"Starlight", weekly column on astronomy and space exploration, *Cross Lanes Record*, 43 articles: 1975

"Awe-Inspiring Sight", *Charleston Daily Mail* Jul 16, 1975

Papers Presented

"Sputnik - 50 Years Later", Mathematics Colloquium, October 4, 2007

"Going to the Edge of the Solar System to Keep my Students' Interest", FSU Distinguished Teacher Lecture Series, April 11, 2006

"My Experiences as a Regional Resource Person for the National Air and Space Museum", ISDC 2005 Conference, Washington, D.C, May, 2005

"Space and the Imagination", Humanities Colloquium, October 21, 2004

"An Investigation into the Mathematics Underlying Hypersonic Velocity and Ion Propulsion", Mathematics Colloquium, November 13, 2003

"The Wright Stuff: The Mathematics of the Wright Brothers", Mathematics Colloquium, February 14, 2002

"The Wright Stuff: The Mathematics of the Wright Brothers", The Wright Brothers: Their Sites and Stories Conference, 2001, Dayton, Ohio

"Growing Eleven Generations of Space Tomatoes", International Space Development Conference, 2001, Albuquerque, New Mexico

"The Wright Stuff", International Conference on Industrial and Applied Mathematics, 1991, Washington, D.C.

"Polar Coordinates: Did Peary Reach the Pole?", Annual Meeting of the Michigan Section of the MAA, 1991, Grand Rapids, Michigan

"The Wright Stuff", Annual Meeting of the Michigan Section of the MAA, 1990, Dearborn, Michigan

"Space Exploration in Education", Annual Meeting of the Michigan Association of Computer Users in Learning, 1991, Grand Rapids, Michigan

"Space Exploration in Education", Annual Meeting of the Michigan Association of Computer Users in Learning, 1990, Detroit, Michigan

"Space Exploration in Education", Annual Meeting of the Michigan Association of Computer Users in Learning, 1989, Grand Rapids, Michigan

"Simulation of Variable Star Behavior", Annual Meeting of the Michigan Association of Computer Educators, 1988, Shanty Creek, Michigan

"Simulation of Variable Star Behavior", Annual Meeting of the Michigan Association of Computer Users in Learning, 1988, Detroit, Michigan

"Amicable Numbers", Annual Meeting of the Michigan Association of Computer Users in Learning, 1987, Grand Rapids, Michigan

Research

"Hypersonic Velocity and Ion Propulsion", FSU Sabbatical, 2002-2003

"The Mathematics of Space Exploration", FSU Professional Development Grant, 2000

"Some Mathematics and Computer Science Applications from the *Galileo* and *Magellan* Interplanetary Flights", FSU Sabbatical, 1994-1995

"An Investigation into the Wright Brother's Determination of the Smeaton Coefficient and the Mathematical Role Played by Katherine Wright in the Achievements of her Brothers", FSU Research Grant, 1994

"A Mathematical Determination of Robert Peary's Claim to Have Reached the North Pole in 1909", 1992

"Software and Development of a Manual for Karmarker's Algorithm", FSU Faculty Development Grant, 1992

"A Study of Second-Generation Tomato Plants from Space-exposed Seeds", FSU Research Grant, 1991

"The Wright Stuff: The Mathematics Used by the Wright Brothers to Prove that Flight was Possible", 1991

"Simulation of Variable Star Behavior", FSU Sabbatical, 1988-1989

"A Comparison of Russian and American Space Shuttle Programs, 1984

Workshops Conducted

"Space Exploration", 1997 Summer Institute for gifted/talented high school students in Michigan

Honors

Merit Award, 2008

Invited to Math-Science-Technology Center Mentor Dinner, 2008

Nominated for Ferris Award for Academic Excellence, 2007

Invited to the Honors College Senior Send-Off, 2007

Nominated for Ferris Award for Academic Excellence, 2006

Nominated for *Who's Who Among America's Teachers*, 2005-2006

Commencement Speaker at Ferris State University graduation, December 17, 2005

Distinguished Teacher Award, 2004-2005

Invited to the Honors College Senior Send-Off, 2005

Invited to the Student-Athlete Advisory Council Faculty Appreciation Night, 2005

Invited participant, Calculus Teaching Focus Group, AMS/MAA Meeting, January, 2005

Finalist for Distinguished Teacher Award, 2003-2004

Invited to the Student-Athlete Advisory Council Faculty Appreciation Night, 2004

Invited to the Honors College Senior Send-Off, 2004

Merit Award, 2003

Nominated for the Ferris Award for Academic Excellence, 2002

Nominated for *Who's Who Among America's Teachers*, 2002

Nominated for Distinguished Teacher Award, 2002-2003

Merit Award, 1998

Invited to Math-Science-Technology Center Mentor Dinner, 1998

Invited to Math Science Technology Center Mentorr Dinner, 1997

Nominated for MAGB Teaching Award, 1993

Merit Award, 1993

Nominated for MAGB Teaching Award, 1992

Promotion to Associate Professor, 1988

Finalist for Distinguished Teacher Award, 1983-1984

CURRICULUM VITAE

Personal: **Dr. Lakshmi Mukundan**
Professor of Mathematics
Ferris State University
Big Rapids, MI 49307
Phone: Home: (231) 796 – 2703
Office: (231) 591 – 2567

Education:

Ph.D. (1991) North Carolina State University, Raleigh, NC.
Applied Mathematics with minor in Electrical Engineering.

M.Phil. (1982-84, Part-Time) Madras University, India.
Mathematics with Dissertation on Monotone Approximation.

M. Sc. (1968) Madras University, India.
Mathematics. Optional Subjects: Complex Variables & Topology.

B. Sc. (1966) Madras University, India.
Mathematics with Ancillary subjects: Statistics & Physics.

Employment:

2001- Present: Professor of Mathematics
Ferris State University, Big Rapids, MI.

1996- 2000: Associate Professor of Mathematics
Ferris State University, Big Rapids, MI.

1991-1995: Assistant Professor of Mathematics
Ferris State University, Big Rapids, MI.

1986-1991: Teaching / Research Assistant
North Carolina State University, Raleigh, NC.

1980-1985: Professor of Mathematics
Queen Mary's College, Madras, India.

1972-1980: Assistant Professor of Mathematics
Queen Mary's College, Madras, India.

1970-1972: Assistant Professor of Mathematics
Govt. Arts College for Women, Kumbakonam, Madras, India.

Computing Experience: Languages: Basic, Visual Basic, Pascal, Fortran 90, Visual C++.
Computer Algebra Systems: Derive, Maple, and Matlab.

Publications: C.T. Kelley and L. Mukundan: Convergence Analysis for the Harmonic Balance method, Journal of Nonlinear Analysis, Theory, Methods & Applications, Vol. 20, No. 4, pp. 365-380, 1993.

D. E. Stoneking, R. J Trew, and L.Mukundan: Simulation of the Variation and Sensitivity of GaAs MESFET Large-Signal Figures of Merit Due to Process and Bias Parameters, Proceedings IEEE/ Cornel Conference on Advanced Concepts in High Speed Semiconductor Devices and Circuits, 1989, pp 228-236.

Professional Memberships: Society of Industrial and Applied Mathematics.
Mathematical Association of America.
Member NCTM(National Council of Teachers of Mathematics).
Michigan Section of Mathematical Association of America.
Michigan Education Association.

Conferences & Workshops:

Presented Critical Thinking Elements and Standards along with Prof. Mark DeKoster to the group of tutors on Dec. 1, 2008.

Presented Critical Thinking Elements and Standards to a group of Students of Prof. Donna Smith's class on Nov 21, 2008 and Dec. 5, 2008.

Attended 2008 Fall Central Section Meeting of the American Mathematical Society Special Session on Mathematical Knowledge for Teaching at Western Michigan University, Kalamazoo, Michigan from October 17 – 18, 2008.

Attended Accelerated Learning Workshop from August 12 – 14 at Ferris State University, Big Rapids, MI 49307.

Attended Conversation among Colleagues Conference at Kalamazoo, Michigan, on March 14 – 15 , 2008 organized by Western Michigan University.

Attended Critical Thinking Weekly Workshop(Level II) in Spring 2008, facilitated by George Nagel and Donna Smith, organized by Faculty Center of Teaching and Learning.

Attended a PREP (Professional Enhancement Program of the Mathematical association of America) Online Workshop on Exploring Multivariable Calculus using Maple from June 25 – June 29, 2007.

Attended Critical Thinking Weekly Workshop: " A Dynamite Classroom and a Delightful Teaching Experience" from January 22 – April 23, 2007, Facilitated by George Nagel and Donna Smith, organized by Faculty Center for Teaching and Learning.

Attended Annual Spring Learning Institute on April 7, 2006 at Ferris State University, organized by CTLFD, Ferris State University.

Attended Conversations among Colleagues Conference at Ann Arbor, Michigan on March 24, 2006 organized by University of Michigan.

Attended and participated Faculty Learning Community- Learner- Centered Teaching, January 23, 2006 – April 17, 2006.

Attended Conversations among Colleagues Conference at East Lansing on March 19, 2005, organized by Michigan State University.

Attended Flash MX training from March 15 – April 26, 2005, conducted by William Knapp, organized by Faculty Center for Teaching & Learning.

Attended Annual Spring Learning Institute on April 2, 2004 at Ferris State University, organized by CTLFD, Ferris State University.

Attended Conversations among Colleagues Conference at Grand Rapids on March 20, 2004, organized by Grand Valley State University.

Attended Martin Luther King, Jr., Faculty-Staff In-Service, January 19, 2004 at Ferris State University, sponsored by the Diversity Counts! Committee.

Attended Mich MATYC conference at Lansing Community College on October 11, 2003.

Attended 79^{th} Annual Meeting of The Michigan Section of the Mathematical Association of America and MichMATYC at Saginaw Valley State University, MI during May 2- 3, 2003.

Attended Second Annual Spring Learning Institute on March 28, 2003 at Ferris State University, organized by CTLFD, Ferris State University.

Attended Lilly North Conference at the Holiday Inn, Big Rapids on September 20 and 21 , 2002.

Presented the Topic: "Frechet Differentiability of the Substitution Operator" on Math Colloquium on April 25, 2002.

Attended Equity in the Classroom XII conference on April 12, 2002 at Soaring Eagle Casino & Resort in Mount Pleasant, MI, organized by Central Michigan University, MI.

Attended Annual Spring Learning Institute on March 22, 2002 at Ferris State University, organized by CTLFD, Ferris State University.

Attended live satellite teleconference on " Teaching and Assessing for Critical Thinking and Deep Learning" featuring Tom Angelo, sponsored by Academic Affairs, Ferris State University, Feb. 22, 2002.

Attended "Test What You Teach – Teach What You Test " Workshop organized by Center for Teaching, Learning & Faculty Development, Ferris State University, Big Rapids, MI. It was facilitated by Terry Doyle on Monday afternoons, 12:00 – 2:15p.m. from February 25 to April 29, 2002. Awarded $400 as S & E award.

Attended Martin Luther King, Jr., Faculty-Staff In-Service, January 21, 2002 at Ferris State University, sponsored by the Diversity Counts! Committee.

Participated in the panel for " Contemporary Issues In Substance Abuse Prevention" on Faculty Development day on August 22, 2001.

Attended Equity in the Classroom XI Conference- Teaching and Learning in a Diverse Classroom: "Let America be America …", March 22- 23, 2001, Ferris State University, Big Rapids, MI.

Attended International Conference on Technology in Collegiate Mathematics, November 16-19, 2000, Atlanta, Georgia.

Helped in organizing annual Mathematics Education Seminar, April 2000- 2004.

The Indian and Comparative Studies conference, April 2-3, 2000, organized by The Society of Indian Philosophy & Religion and Ferris State University Arts and Lectures Committee.

Equity Within the Classroom X – Graduating Minority students Conference, March 16 – 17, 2000, Ypsilanti Marriott, Eastern Michigan University.

Revitalize Lectures with Power Point: Workshop offered by The Center For Teaching , Learning, & Faculty Development, Feb. 8, 2000.

Joint Mathematical Meetings(MAA, AMS, & SIAM), Jan. 19 –22, 2000, Washington D.C.
Web CT Module 4: Student management - Workshop offered by The Center For Teaching , Learning, & Faculty Development, Dec 3, 1999.

Grant Workshop: Developing Fundable Ideas, Oct. 20, 1999, Offered by Dr.Tamsey Andrews, Director of Grants.
Harassment/Sensitivity Training sponsored by the Office of Affirmative Action of Ferris State University on Sept. 30, 1999.

Faculty Show and Tell - Workshop offered by The Center For Teaching , Learning, & Faculty Development, Sept. 23, 1999.
Communication Club Events, Fall 1999, organized by the Center for Teaching, Learning, & Faculty Development.

Helped in organizing annual Mathematics Education Seminar, April 1999.

Connections Training Program: Feb. 15, Feb. 22, and Mar. 1, 1999, Organized by Ferris State University's Human Resource Development Department in coordination with the Center for Teaching, Learning, & Faculty Development.

Faculty Winter Institute, Jan. 4 – 8, 1999, "The Development of Web-based Instruction Using WebCT", organized by the Center for Teaching, Learning, & Faculty Development.

Attended the presentation on consulting opportunities by Jeff Specht of the Performance Place on April 17, 1998, organized by the Center for Teaching, Learning, & Faculty Development.

Helped in organizing annual Mathematics Education Seminar, April 1998.

Participated in the "Food & Thought " luncheon discussion series Discussing pedagogical topics during Fall 1997. This series is organized by the Center for Teaching, Learning, & Faculty Development.

Helped in organizing annual Mathematics Education Seminar, April 1997.

Participated in Program Assessment workshop on Mar. 15, 1997, Presented by Douglas J. Eder, Southern Illinois University, Edwardsville.

Presented Hands-on Sessions on Probability on March 11, 1995 At " Math, Science, Technology Access for All " Conference Organized by Mecosta Osceola Intermediate School District.

Equity Within the Classroom V – Graduating Minority Students Conference, March 24-25, 1995, Lansing.

Equity Within the Classroom IV – Graduating Minority Students Conference, March 25-26, 1994, Lansing.

Presented a talk on " Women and their Issues – Around World- With reference to India", March 3, 1994, under the auspices of Forum for the Healing Racism, Big Rapids.

Equity Within the Classroom III – Graduating Minority Students Conference, March 26-27, 1993, Lansing.

Fourth Annual Michigan Conference on College Mathematics: Calculus in Transition, March 23, 1993, at University of Michigan, Dearborn, MI.

Given a contributed talk in the Tenth Annual South Eastern Atlantic Regional Conference on Differential Equations, Nov. 17, 1990 at Virginia Polytechnic Institute and State University, Blacksburg, VA.

Assignments At Ferris:

Teaching

Mathematics 110	Fundamentals of Algebra
Mathematics 110	Fundamentals of Algebra(CMI) (Computer Mediated Instruction)
Mathematics 115	Intermediate Algebra
Mathematics 116	Intermediate Algebra & Numerical Trig.
Mathematics 117	Contemporary Mathematics
Mathematics 120	Trigonometry
Mathematics 122	Mathematical Analysis for Business I
(Both on Campus & Off Camus in Traverse City)	
Mathematics 126	Algebra & Analytical Trig.
Mathematics 130	Adv. Algebra & Analytical Trig.
Mathematics 132	Calculus for Business
Mathematics 135	Calculus for Life Sciences
Mathematics 216	Applied Calculus
Mathematics 226	Fourier Series& Applied Diff. Equations
Mathematics 220	Analytical Geometry & Calculus I
Mathematics 230	Analytical Geometry & Calculus II
Mathematics 320	Analytical Geometry & Calculus III
Mathematics 251	Statistics for Life Sciences
Mathematics 314	Probability
Mathematics 322	Linear Algebra
(Both in Class and Distance Learning)	
Mathematics 328	Discrete Mathematics
(Both in Class and Distance Learning)	
Mathematics 340	Numerical Analysis
Mathematics 360	Operations Research
Mathematics 380	Applied Analysis
Mathematics 385	Prof. Actuarial Exam. 100
Mathematics 414	Mathematical Statistics I
Mathematics 416	Mathematical Statistics II
Computer Sci.150	Visual Basic Programming
Computer Sci. 244	Fortran Programming
Computer Sci. 200	Visual C++ Programming
FSUS100	Ferris State Univ. Seminar

Non Teaching

Judged Mathematics and Statistics related projects for Annual West Michigan Region Science and Engineering Fair May 1999, and April 2000, April 2001, March 2002, March 2003, March 2004, March 2006.

Participated in the telemarketing program through Enrollment Services for fall 1997-1998.

Participated in International Festival- April '93, '94, '95, '96, '97, and '98, organized by center for International Education, Ferris State University.

Assisted in Registration for Fall'92, Spring '93, Fall '93, Fall '94, and Fall '99, Winter 2002.

Passed the Actuarial Science Examination 100, Feb. '95 and Examination 110, May '95 conducted by the Society of Actuaries.

Recording Secretary for Department meetings during Winter '92-'93, Spring '93.

Advisor for Pre-Science students from Fall '93 to Winter 2001.

Advisor for Actuarial Science students from Fall 2001.

Advisor for Pre- Pharmacy students from Fall 2005.

Member of the team: 'Diversity Counts! Project '

Committee Service:

Department Planning Committee member.

Department Faculty Development Committee member.

Mathematics Education Committee member.

Dr. James Nystrom's Tenure Review Committee Member.

Text Book and Course outline Committee member for the Following courses: Math 130,220,230,320,and 330.

Member for the following Departmental Divisions:
Core: Math 120, 130, 220,230,320.
Statistics: Math 251, 310,314, 385,414, 416,485.
Applied: Math 328, 330, 340,360, 380,440.
Elementary Ed. Math 118, 119.
Computer Science: Cpsc 150, 200, 244, 300, 320, 326, 328, 340, 442.

Member of Department Search Committee for tenure-track faculty For Computer Science 2005-2006.

Member of College of Arts and Sciences Promotion Committee, 2001 – 2004.

Dr. Bakhodirzhon Siddikov's Tenure Review Committee Chair.

Dr. Hengli Jiao's Tenure Review Committee Member.

Member of Department Search Committee for tenure –track Faculty during 2001-2002.
University -Wide Substance Abuse Task Force Committee Member for one year term – 2000-2001.

Dr. Kent Sun's Tenure Review Committee Member.

Member of Department Search Committee for tenure-track faculty during Winter 1998.

Member of College of Arts and Sciences Promotion Committee for 1996-98.

Member of College of Arts and Sciences Sabbatical Leave Committee for 1994-95, and 1995-96.

Chair of College of Arts and Sciences Sabbatical Leave Committee for 1995-96.

Member of the Advisory Committee and Conference Hand book Committee for the " Math, Science, Technology Access For All " Conference, March 1995, organized by Mecosta Osceolo Intermediate School District.

Curriculum Vitae

J.F. (Jim) Nystrom, Ph.D.
Assistant Professor
Department of Mathematics
College of Arts & Sciences
Ferris State University
Big Rapids, MI 49307 USA

Research Interest Areas

Algorithm design for time-domain simulations and visualizations, computational science and computational physics, computational electromagnetics, electromagnetic theory, quantum mind, the simulation argument, and computational cosmography.

Professional Preparation

University of Idaho	Electrical Engineering	Ph.D.	2000
University of Idaho	Physics	M.S.	1996
University of Idaho	Computer Science	M.S.	1994
Texas A&M University	Electrical Engineering	B.S.	1986.

Appointments

Assistant Professor	Ferris State University (CS & Math)	2007 -
Visiting Assistant Professor	Shepherd University (CS & Math)	2006 - 2007
Assistant Professor	University of Akureyri, Iceland (CS)	2004 - 2006
Assistant Professor	Texas A&M University - Corpus Christi (CS)	2001 - 2004
Visiting Assistant Professor	Adams State College (CS & Math)	2000 - 2001
Lecturer	University of Idaho (Physics)	2000
Lecturer	University of Idaho (Electrical Engineering)	1998 - 1999
Research Assistant	University of Idaho (Electrical Engineering)	1997 - 1999
Teaching Assistant	University of Idaho (Physics)	1994 - 1996
Teaching Assistant	University of Idaho (Computer Science)	1993 - 1994
Sr. Systems Engineer	3M Company (Austin, TX)	1987 - 1993.

Journal Publications

J.F. Nystrom, "High-Order Time-Stable Numerical Boundary Scheme for the Temporally Dependent Maxwell Equations in Two-Dimensions," *Journal of Computational Physics* **178**, 290-306 (2002).

J.F. Nystrom, "An Exact Finite Field Renormalization Group Calculation on a Two Dimensional Fractal Lattice," *Int. Journal of Modern Physics C* **11**, 257-275 (2000).

J.F. Nystrom and J.L. Young, "k-Space Transfer Function Design of Discrete Operators: Application to Maxwell's Time-Domain Equations," *Journal of Electromagnetic Waves and Applications* **13**, 781-806 (1999).

Refereed Conference Publications and Journal Proceedings

J.F. Nystrom, "Ontological Musings Concerning How Nature Computes," (to be submitted to the) *Technical Session on Cellular and Finite Automata at CSC'09: International Conference on Scientific Computing*, Las Vegas, NV USA, July 2009.

J.F. Nystrom, "On the Random Walks of Geometrical Forms in Three-Dimensions," (to be submitted to) *Technical Session on Cellular and Finite Automata at CSC'09: International Conference on Scientific Computing*, Las Vegas, NV USA, July 2009.

J.F. Nystrom, "On the Random Walks of Geometrical Forms in Two-Dimensions," *CSC'08: International Conference on Scientific Computing*, Las Vegas, NV USA, July 2008.

J.F. Nystrom and Carryn Bellomo, "Isotropic Vector Matrix Grid and Face-Centered Cubic Lattice Data Structures," (presented as a poster) *ICCS 2005: Fifth International Conference on Computational Science*, Atlanta, GA USA, May 2005.
[Published in *Lecture Notes in Computer Science* **3516**, 1096-1099 (2004).]

J.F. Nystrom, "On the Omni-directional Emergence of Form in Computation," (presented as a poster) *ACRI 2004: Sixth International Conference on Cellular Automata for Research and Industry*, Amsterdam, The Netherlands, October 2004.
[Published in *Lecture Notes in Computer Science* **3305**, 632-641 (2004).]

J.F. Nystrom, "Grid Construction and Boundary Condition Implementation for the Isotropic Vector Field Decomposition Methodology," *ACES 2003: 19th Annual Review of Progress in Applied Computational Electromagnetics*, Monterey, CA USA, March 2003.

J.F. Nystrom, "The Isotropic Vector Field Decomposition Methodology," *ACES 2002: 18th Annual Review of Progress in Applied Computational Electromagnetics*, Monterey, CA USA, March 2002.

J.F. Nystrom, "Tensional Computation: Further Musings on the Computational Cosmography," *7th Bellman Continuum*, Santa Fe, NM USA, May 1999.
[Published in *Applied Mathematics and Computation* **120**, 211-225 (2001).]

Other Conference Presentations, Abstracts and Posters

J.F. Nystrom, "Universe as Computation, Modern Aether Theory, and the Funda-Mentalistic Mind," *Toward a Science of Consciousness 2008*, Tucson, Arizona USA, April 2008.
[Published in the Consciousness Research Abstracts of *Toward a Science of Consciousness 2008*, a service from the *Journal of Consciousness Studies.*]

J.F. Nystrom, "Teleological Mechanism for the Simulation Argument," (Abstract accepted, but not presented at) *Quantum Mind 2007*, Salzburg, Austria, July 2007.
[Published in the Consciousness Research Abstracts of *Quantum Mind 2007*, a service from the *Journal of Consciousness Studies.*]

J.F. Nystrom, "On the Design of Diffusion Constants for Random Walks of Squares, Triangles and Cubes," *SIAM Conference on Computational Science & Engineering*, Costa Mesa, CA, February 2007.

J.F. Nystrom, "Moore's Law and the Visualization of Electromagnetic Quanta," *PIERS 2003 in Hawaii: Progress in Electromagnetics Research Symposium*, Honolulu, HI, October 2003.

J.F. Nystrom and C. Bellomo, "Efficient Grid Generation for the IVMCEM Solver," (presented by C. Bellomo) *PIERS 2003 in Hawaii: Progress in Electromagnetics Research Symposium*, Honolulu, HI, October 2003.

J.F. Nystrom, "In Search of a Geometrical Basis for the Ubiquitous Electromagnetic Energy," *PIERS 2002: Progress in Electromagnetics Research Symposium*, Boston, MA, July 2002.

J.F. Nystrom and J.L. Young, "High-Order, Finite-Difference Procedure for the Temporally Dependent Maxwell's Equations," *1998 AP-S International Symposium and URSI National Radio Science Meeting*, Atlanta, GA, June 1998.

J.L. Young and J.F. Nystrom, "Designing High-Order, Time-Domain Numerical Solvers for Maxwell's Equations," *1998 AP-S International Symposium and URSI National Radio Science Meeting*, Atlanta, GA, June 1998.

J.F. Nystrom, "In Search of: Computational Cosmography," *Pions and Beyond*, Moscow, ID, April 1998.

Seminars and Colloquia

"Random Walks of Tetrahedra and Octahedra,"
Michigan MAA Spring 2008 Meeting, Grand Rapids, MI, May 2008.

"On the Design of Diffusion Constants for Random Walks of Squares, Triangles and Cubes,"
Ferris State University Math Colloquium, Big Rapids, MI, November 2007.

"Mechanism for the Simulation Argument"
Nexus of Science and Spirit Lecture, Shepherdstown, WV, December 2006.

"computational cosmography & the isotropic vector field decomposition methodology"
Icelandic Centre of Excellence in Theoretical Computer Science Research Seminar, Reykjavik, Iceland, December 2005.

"computational cosmography & the isotropic vector field decomposition methodology"
Iceland Express Seminar in Advanced Computer Science, Akureyri, Iceland, March 2005.

"computational cosmography & the isotropic vector field decomposition methodology"
Texas A&M University - Corpus Christi Computing & Mathematical Sciences Department Seminar, Corpus Christi, TX, February 2003.

"On the Modeling and Computation of Physical Phenomena"
Adams State College Mathematics, Computer Science and Physics Department Seminar, Alamosa, CO, April 2000.

"Was that an electric or magnetic force pulling on me?"
University of Idaho Department of Electrical Engineering Research Colloquium, Moscow, ID, January 2000.

"Geometry in the Afternoon"
University of Idaho Department of Electrical Engineering Research Colloquium, Moscow, ID, August 1999.

"In Search of: Computational Cosmography"
University of Idaho Department of Physics Seminar, Moscow, ID, December 1996.

Ph.D. Dissertation

J.F. Nystrom (2000), *On the design of time-stable high-order Cartesian-based FDTD CEM methods*, University of Idaho (Electrical Engineering).

M.S. Thesis

J.F. Nystrom (1996), *An exact two-dimensional finite field real-space renormalization group calculation*, University of Idaho (Physics).

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Classes Taught/Teaching

Computer Science

Concurrent Computation/SR Programming (S05, S06), Computer Organization (S01, S02-S03, S04, S09), Operating Systems (F00, S07), Compiler Construction (S02, S06), Programming Language Theory (S07), C++ Programming I (F01-F03), C++ Programming II (S04), Fortran90 Programming (F00, S08, S09), 8086 Assembly Language (F01, F02, F03-S04), Windows Programming (with Visual basic) (F06), Programming in Visual Basic (F07), Introduction to Computer Science (with Python) (F06, F08), Computer Literacy (S01, Summer04).

Mathematics

Numerical Analysis (F04, F05, Winter05 Short Course, S08), Discrete Mathematics (F06-S07, F08), Finite Mathematics (F00-S01, S07), Intermediate Algebra (Summer03), Trigonometry (F08), Algebra & Analytic Trigonometry (F07-S08,S09).

Electrical Engineering, and Physics

Electromagnetic Theory (F98-F99), Fundamentals of Physics (S00), Introduction to Electrical Engineering (F99).

Patents

J.F. Nystrom, *Isotropic vector field decomposition method for use in scientific computations*, a U.S. Patent Application. (U.S. Application Publication Number 20030046043.)

Research and Institutional Funded Grant Activity

A Ferris State University *Timme Travel Grant* of $800 for the April 2008 *Toward a Science of Consciousness 2008 Conference.*

"Computational Cosmography Initiative," a KEA University Fund 2005 grant, partially funded at $8,500 (conversion from 500,000 Icelandic krona).

"MII: Improving the Pipeline in Applied Computer Science," co-principal investigator with J.D. Fernandez, M. Garcia, D.C. Kar, and R.S. Dannelly, principal investigator. An NSF MII grant, 9/1/03 - 8/31/08, NSF MII 03-30822 for $1,350,000.

Student Research Supervision

2008 Joseph Robinson, *Random Walks of Geometrical Forms.*

2004 Patrick Wilson, *Computational Electromagnetic Visualization.*

Institutional Service

2008 – Ferris State University Mathematics Department Computer Science Division Committee Chair

2008 – Ferris State University Mathematics Department Computer Science Concentration Advisor

2008 – Ferris State University Mathematics Department Ad Hoc Student Recruitment Committee

2007 – Ferris State University Mathematics Department Mathematics Awards/Scholarships Selection Committee.

2007 Ferris State University Mathematics Department Head Search Committee.

2007 – Ferris State University Mathematics Department Computer Science Division Committee.

2004 – 2006 Director of Postgraduate Affairs for the Faculty of Information Technology at the University of Akureyri, Iceland.

2002 – 2003 TAMU-CC Undergraduate Computer Science Program Review Committee.

2002 – 2003 TAMU-CC Computer Science Introduction Sequence Committee.

2002 TAMU-CC CS Faculty Search Committee.

Professional Service

2009 Technical Session Co-Organizer and Co-Chair, *Technical Session on Cellular and Finite Automata at CSC'09: International Conference on Scientific Computing*, Las Vegas, NV USA, July 2009.

2008 Session Chair, *CSC'08: International Conference on Scientific Computing*, Las Vegas, NV USA, July 2008.

2007 Session Chair, *SIAM Conference on Computational Science & Engineering*, Costa Mesa, CA, February 2007.

1999-2000 Reviewer, *IEEE Antennas & Propagation Society Magazine.*

Miscellaneous

University of Texas Management Institute Certificate, 1991-1992.

Email: `nystroj@ferris.edu`

Web site: `http://myhomepage.ferris.edu/~nystroj/`

Holly Schalk

820 Campus Drive -ASC 2046
Big Rapids, MI 49346
(231) 591-3884 • priceh@ferris.edu

Education

Marketing Research Certificate
FERRIS STATE UNIVERSITY — EXPECTED 5/2009

M.A. Applied Statistics (Industrial Statistics Concentration)
UNIVERSITY OF MICHIGAN — 4/2002

Achievements:
- Dept. of Statistics "Outstanding First Year Applied Master's Student"(2000 - 01)
- Dept. of Statistics "Outstanding Teaching Award" (2000 - 01)
- GPA: 7.9 of 8.0

B.S. Applied Mathematics (Statistics Concentration)
FERRIS STATE UNIVERSITY — 5/2000

Achievements:
- Applied Math/Actuarial Science Scholarship
- Outstanding Student in Applied Mathematics (1999 - 2000)
- USAA All-American Scholar Collegiate Award
- Who's Who Among Students in American Universities and Colleges Award
- GPA: 3.9 of 4.0

Experience

Adjunct then Assistant and now Associate Mathematics Professor
FERRIS STATE UNIVERSITY — 8/2002 - PRESENT

I teach algebra, trigonometry, calculus, probability, and statistics at the undergraduate level. In addition, I am an advisor to Pre-Science students as well as to the Alpha Xi Delta sorority and I served as the advisor to the Math Club. I was originally hired as an adjunct professor; I became an assistant professor in 2003 and associate professor in 2007. I received tenure in 2008.

Statistical Consultant
VISTEON — 8/2001 - 8/2002

I performed statistical analyses and experiments including Gage R & R studies, uncertainty calculations, ANOVA, regression analyses, and DOE's. I also was responsible for creating educational resources used to train Six Sigma candidates on the purpose and procedure of statistical tools as well as the use of Minitab.

Summer Research Fellow
GREAT LAKES ENVIRONMENTAL RESEARCH LAB (NOAA) — *5/2001 - 8/2001*

I used regression and principal component analysis to establish a relationship between water temperature and commercial whitefish abundance in Eastern Lake Michigan. The end product of my fellowship resulted in an article published by the Journal of Great Lakes Research 29(2).

Graduate Student Instructor
UNIVERSITY OF MICHIGAN — *8/2000 - 8/2001*

I taught introductory statistics to non-majors with the use of the TI-83 calculator; this allowed for more material to be covered than in typical introductory statistics courses.

Math Facilitator
FERRIS STATE UNIVERSITY — *8/1999 - 5/2000*

I facilitated math workshops for intermediate algebra and pre-algebra in the Structured Learning Assistance program.

Accomplishments

- *Six Sigma Greenbelt Certification (October 2005)*
- *Ferris State University Pat-On-The-Back Award (June 2005)*
- *Advisor to team receiving the Honorable Mention Award in the COMAP Modeling Competition (2005)*
- *Published: Temperature Influence on Commercial Lake Whitefish Harvest in Eastern Lake Michigan published in the Journal of Great Lakes Research 29(2) : 296-300. (2003)*

Professional Development

- *American Statistical Association Statistics Career Day (hosted by GVSU October 2008)*
- *MichMATYC Conference: Collaborating for Student Success (October 2008)*
- *FerrisConnect Training (October 2008)*
- *AP Statistics Reader (June 2008)*
- *FSUS 100 Training (May 2007)*
- *Learner Centered Teaching Workshop (May 2007)*
- *50 Ways to Assess Students Learning Workshop (May 2007)*
- *Completed FSU Marketing Research Certificate*
- *Learner Centered Teaching Colloquium (November 2006)*
- *Lilly North Conference (September 2006)*
- *Six Sigma Training and Greenbelt Certification (Ocober 2005)*
- *American Statistical Association Statistics Career Day (hosted by GVSU October 2005)*
- *15th Annual Equity in the Classroom Conference (April 2005)*
- *SLA Training (January 2005)*
- *WEBCT Training (January 2005)*
- *Mathematics in Action: Data Analysis Throughout the Mathematics Curriculum (February 2004)*
- *Conversations Among Colleagues: Collaborating to Improve the Mathematical Education of Our Students (March 2004)*
- *Lilly West Conference: The Arts and Crafts of Teaching (March 2003)*
- *Completed the one-year New Faculty Training provided by the CTLFD (2002-03)*

Service

- *Promotion and Merit Committee (2008-10)*
- *Math Faculty Search Committee (2007-08)*
- *Math Department Faculty Development Fund Committee, Chair (2007 - present)*
- *Elementary Education Department Division Committee (2007- present)*
- *Math 110: Introductory Algebra Learning Outcomes Committee (2007 - present)*
- *Quantitative Skills Statement Committee (2006 - present)*
- *Math 318: Probability and Statistics for Teachers Committee (2006 - present)*
- *VPAA Faculty Award Selection Committee (2006-08)*
- *SLA Coordinator Search Committee (Summer 2006)*
- *Math Department Head Search Committee (2005-06)*
- *Health Care Committee for FFA (2005-present)*
- *Faculty Advisor for the 2005 COMAP Mathematical Contest in Modeling*
- *Judge at the Math/Science Center 2005 Science Fair*
- *Mentor to Jon Oaks Honors Program Project (Spring 2005)*
- *Secretary to Department Meetings (2004-05)*
- *Faculty Advisor to the Math Club (2004-05)*
- *Faculty Advisor to Alpha Xi Delta (2004-present)*
- *Dawg Days Volunteer (2004-05, 2007-08)*
- *Presidential Task Force on Communication participant (2004)*
- *Algebra Placement Exam Committee (2003 - present)*
- *Statistics Department Division Committee (2002 - present)*
- *Applied Math Program Review Committee (2002, 2008 - present)*

Courses Taught

• *Math 110:*	*Introduction to Algebra*
• *Math 115:*	*Intermediate Algebra*
• *Math 116:*	*Introduction to Algebra and Trigonometry*
• *Math 117:*	*Contemporary Mathematics*
• *Math 120:*	*Trigonometry*
• *Math 126:*	*Algebra and Analytic Trigonometry*
• *Math 135:*	*Calculus for the Life Sciences*
• *Math 251:*	*Statistics for the Life Sciences*
• *Math 314:*	*Probability*
• *Math 414:*	*Mathematical Statistics I*
• *Math 416:*	*Mathematical Statistics II*
• *Statistics Workshop:*	*Introductory Statistics Workshop for the Math Science Center*

RESUME for Dr. Ronald Shepler

SHEPLER, RONALD, Ph.D.
Professor of Mathematics
Appointed 1978

1. EDUCATION

University of Maryland
College Park, MD

1972	Ph.D.	Mathematics (Modern PDE, Singular Integral Operators)
1969	M.A.	Mathematics (Analyses)
1957	B.S.	Physics (with minor in chemistry)

2. EMPLOYMENT

1957 - 1959	Technical Trainee, Bethlehem Steel Corp.
1959 - 1966	Captain, USAF (research and design - crypto systems)
1966 - 1972	Teaching Assistant, University of Maryland
1972 - 1977	Associate Professor, Alderson-Broaddus College
1977 - 1999	Professor, Ferris State University

3. Faculty and Administrative Load

Teaching load – 24 semester credit hours per year.

Other Collegiate Assignments

Arts and Sciences Planning Committee
Mathematics Department Planning Committee (chair)
Mathematics Department Recruitment Committee
Mathematics Department Statistics Committee
Mathematics Department Calculus Course Committee
Individual Course Committees for Math 314, Math 320 and Math 324

4. Current Professional and Academic Association Memberships

Mathematical Association of America
Michigan Education Association

5. Current Professional Assignments and Activities

Treasurer of the Ferris Faculty Association

CURRICULUM VITAE

Bakhodirzhon M. Siddikov, Ph.D., Associate Professor

Contact Information

Office:
Ferris State University
Mathematics Department
820 Campus Drive, ASC 2030
Big Rapids, MI 49307-2225
Phone: (231) 591 – 5913
Fax: (231) 591 – 2627
E-mail: SiddikoB@ferris.edu

Home:
14030 Wildwood Drive
Big Rapids, MI 49307
Phone: (231) 796 – 0468

Education

Ph.D. in Mathematics, May 2001	University of Wisconsin-Milwaukee, WI, U.S.A.
Ph.D. in Applied Mathematics, 1989	Kiev State University, Kiev, Ukraine
M.S. and B.S. in Applied Mathematics, 1983	Kiev State University, Kiev, Ukraine

Research

1. Area of research: numerical analysis
2. Ph.D. thesis titles:
   - Numerical Simulation of the Active Magnetic Regenerative Refrigerator (May, 2001);
   - Numerical Solution of the Problem of Parametric Identification of Hydroacoustic Signal Characteristics (1989).
3. Current research interests: numerical analysis, in particular, finite difference methods for solving linear and nonlinear PDEs; industrial and applied mathematics

Work Experience

1. Associate Professor	2004 – Present	Ferris State University, Mathematics Department, Big Rapids, MI, U.S.A.
2. Assistant Professor	2001 – 2004	Ferris State University, Mathematics Department, Big Rapids, MI, U.S.A.
3. Teaching Assistant and Graduate Student	1996 – 2001	University of Wisconsin-Milwaukee, Department of Mathematical Sciences, Milwaukee, WI, U.S.A.
4. Assistant Professor	1994 – 1995 1992 – 1993	Tashkent State Polytechnic University at Ferghana, Department of Mathematics, Ferghana, Uzbekistan.
5. Fellow of Fellowship Program	1993 – 1994	Marquette University, Department of Economics, Milwaukee, WI, U.S.A.
6. Student	1991 – 1992	Moscow State Linguistic University, Department of English for Academic Teachers, Moscow, Russia.
7. Assistant Professor	1990 – 1991	Ferghana Polytechnic Institute, Department of Applied Mathematics and Computer Science.
8. Graduate Student	1986 – 1989	Kiev State University, Department of Cybernetics, Division of Applied Mathematics, Kiev, Ukraine.
9. Research-Mathematician	1985 – 1986	Kiev State University, Department of Cybernetics, Division of Applied Mathematics.
10. Programmer	1983 – 1985	Ferghana Polytechnic Institute, Computing Center.

Courses Taught (Most are for multiple semesters)

1. 330 – Differential Equations	at Ferris State University
2. 325 – College Geometry	at Ferris State University
3. 324 – Fundamental Concepts in Mathematics	at Ferris State University
4. 230 – Analytical Geometry and Calculus II	at Ferris State University
5. 226 – Fourier Series & Applied Differential Equations	at Ferris State University
6. 220 – Analytical Geometry and Calculus I	at Ferris State University
7. 216 – Applied Calculus	at Ferris State University
8. 135 – Calculus for the Life Sciences	at Ferris State University
9. 130 – Advanced Algebra and Analytical Trigonometry	at Ferris State University
10. 120 – Trigonometry	at Ferris State University
11. 116 – Intermediate Algebra and Numerical Trigonometry	at Ferris State University
12. 115 – Intermediate Algebra	at Ferris State University
13. 110 – Fundamentals of Algebra	at Ferris State University
14. 231 – Calculus and Analytic Geometry	at University of Wisconsin-Milwaukee
15. 226 – Calculus with Precalculus II	at University of Wisconsin-Milwaukee
16. 225 – Calculus with Precalculus I	at University of Wisconsin-Milwaukee
17. 211 – Survey in Calculus and Analytic Geometry	at University of Wisconsin-Milwaukee
18. 105 – Intermediate Algebra	at University of Wisconsin-Milwaukee
19. High Mathematics (=Complete sequence of Calculus in the U.S.)	at Tashkent State Polytechnic University
20. Numerical Analysis	at Ferghana Polytechnic Institute
21. Linear Programming and Optimization	at Ferghana Polytechnic Institute
22. Programming Languages (FORTRAN and BASIC)	at Ferghana Polytechnic Institute

Publications

1. Numerical Simulation of the Active Magnetic Regenerator (with D. Schultz and B. Wade), *International Journal of Computers and Mathematics with Applications*, Vol. 49, Numbers 9 – 10, pp. 1525 – 1538 (2005).

2. Numerical Simulation of the Passive Regenerator (with D. Schultz and B. Wade), *International Journal of Applied Science & Computations*, Vol. 9, pp. 89 – 97 (2002).

3. Numerical Simulation of the Active Magnetic Regenerative Refrigerator, *Second Ph.D. thesis*, University of Wisconsin – Milwaukee, May, 2001, 140 pages.

4. Modeling the Active Magnetic Regenerator (with D. Schultz and B. Wade), *Proceedings of Inter. Confer. on Scientific Computing and Mathematical Modeling*, Milwaukee, U.S.A., pp. 55-59 (2000).

5. Inverse Problems in Underwater Acoustics and Approximation of the Velocity Field for Signal Propagation (with B. N. Bublik), *Journal of Mathematical Sciences*, Vol. 67, Number 3, pp. 3113 – 3115 (1993).

6. Numerical Solution of the Problem of Parametric Identification of Hydroacoustic Signal Characteristics, *First Ph.D. thesis*, Kiev State University, Kiev, Ukraine, November, 1989, 154 pages.

7. A Modified Descent – Lift – Transfer Method for Global Optimization of Multiextremal Functions (with B. Bublik), *Journal Reports of Ukrainian Academy of Science*, Vol. 7, pp. 77-80 (1989).

8. Inverse Problems of Hydroacoustics and Approximation of Velocity of Propagation of Hydroacoustic Signals (with B. Bublik), *Journal of Scientific Computing and Applied Mathematics*, Vol. 69, pp. 102-105 (1989).

9. Identification of Velocity of Hydroacoustic Signals, *Journal of Modeling and Optimization of Complex Systems*, Vol. 8, pp. 6-8 (1989).

Invited Speaker

1. Invited Speaker for the conference "*Development of the Computerized Teaching Software in Mathematics*" organized by Edward Waters College, Jacksonville, Florida (March 30 – April 01, 2005).

Talks and Abstracts

1. Applications of the Finite Difference Methods in the Field of Magnetic Refrigeration, Abstracts of the *Fourteenth International Conference on Difference Equations and Applications (ICDEA 2008)*, Istanbul, TURKEY, pp. 86 (July 21 – 25, 2008). Chaired the session and gave a talk.

2. Development and Implementation of the Online Mathematics Course, Abstracts of the Proceedings of the *Twelfth Asian Technology Conference in Mathematics (ATCM 2007)*, Taipei, TAIWAN, pp. 21 – 22 (December 16 – 20, 2007). Chaired the session and gave a talk.

3. Development and Implementation of the Online Course for "Intermediate Algebra and Numerical Trigonometry", Abstracts of the *2007 Annual Spring Meeting of the Mathematical Association of America*, Bronxville, New York, pp. 7 (May 6, 2007). Presented a paper.

4. The New Online Courses for Math-126 "Algebra and Analytic Trigonometry" and Math-116 "Intermediate Algebra and Numerical Trigonometry" (with Arthur Sherwood), at the *Mathematics Colloquium*, Department of Mathematics, Ferris State University, Big Rapids, Michigan, October 5 (2006). Gave a talk.

5. Some Numerical Simulations in the Field of Magnetic Refrigeration, Abstracts of the *International Symposium on Recent Advances in Mathematics and Its Applications (ISRAMA 2005)*, Calcutta, INDIA, pp. 11 (December 17 – 19, 2005). Chaired the session and gave a talk.

6. Some Numerical Developments in the Field of Magnetic Refrigeration, Abstracts of the *2004 Hawaii International Conference on Statistics, Mathematics and Related Fields*, Honolulu, Hawaii, (June 9 – 12, 2004). Gave a talk.

7. Internet – Based Instruction of an Applied Calculus Course, Abstracts of the *American Mathematical Society (AMS), Society for Industrial and Applied Mathematics (SIAM), Mathematical Association of America (MAA), Association for Women in Mathematics (AWM), National Association of Mathematics (NAM), and Association for Symbolic Logic (ASL) Annual Joint Conference*, Phoenix, AZ, pp. 40 (January 7 – 10, 2004). Gave a talk.

8. The Development and Implementation of a Web – Based Method of Instruction for Applied Calculus, at the *Mathematics Colloquium*, Department of Mathematics, Ferris State University, Big Rapids, Michigan, September 18 (2003). Gave a talk.

9. Applications of Partial Differential Equations in the Field of Magnetic Refrigeration, Abstracts of the *Society for Industrial and Applied Mathematics (SIAM) 50th Anniversary Conference*, Philadelphia, PA, pp. 122 (July 8 – 12, 2002). Gave a talk.

10. Numerical Simulation of the Active Magnetic Regenerative Refrigerator, at the *Mathematics Colloquium*, Department of Mathematics, Ferris State University, Big Rapids, Michigan, October 11 (2001). Gave a talk.

11. Numerical Simulation of the Passive Regenerator, Abstracts of *Confer. Midwest Numerical Analysis and Scientific Computing Day 2000*, Indianapolis, Indiana, pp. 19-21 (March 18 – 19, 2000). Gave a talk.

12. Numerical Simulation of the Active Magnetic Regenerator, Abstracts of *Inter. Confer. Dynamical Systems, Modeling, and Stability Investigation*, Kiev, Ukraine, pp. 90-91 (May 25 – 29, 1999). Gave a talk.

13. Cubic Spline Interpolation, Abstracts of *Confer. Modern Methods of Information Technology*, Osh, Kirgizistan, p. 98 (June 29 – 30, 1995). Gave a talk.

14. A Modified Descent – Lift – Transfer Method for Global Optimization of Multiextremal Functions, *Confer. Modeling and Identification in Chemical Industry*, Alushta, Ukraine (September 28 – 30, 1990). Gave a talk.

Talks and Abstracts (with undergraduate students)

1. Solving the Problem of Flow of Heat in One Direction by the Explicit Numerical Method (with A. Jameson, P. O'Connor, and C. McElroy), Abstracts of the *American Mathematical Society(AMS), Society for Industrial and Applied Mathematics(SIAM), Mathematical Association of America(MAA), Association for Women in Mathematics(AWM), National Association of Mathematics(NAM), and Association for Symbolic Logic(ASL) Annual Joint Conference,* San Antonio, Texas, p. 27 (January 12 – 15, 2006). Presented a paper.

Conferences Attended (in addition to the above indicated conferences)

1. *AMS, SIAM, MAA, AWM, NAM, and ASL Annual Joint Conference,* Atlanta, GA, January 5 – 8 (2005).
2. *American Mathematical Society(AMS) Conference,* Baton Rouge, LA, March 14 – 16 (2003).
3. *Lilly Conference on College & University Teaching – South*, Athens, Georgia, February 8 – 9 (2002).
4. *AMS, SIAM, MAA, AWM, NAM, and ASL Annual Joint Conference,* San Diego, CA, January 6 – 9 (2002).

Grants and Awards

1. Online Course Development Grant, "Developing the Online Course for Math-116, Intermediate Algebra and Numerical Trigonometry", from the U.S. Department of Education and Labor, and Ferris State University, Big Rapids, MI (March 2006 – August 2006, $6,000).

2. Professional Development Grant, "Developing the Cooperation between Ferris State University and the Other Universities in the Field of Math Education through Invited Colloquium Guest Speakers", from Ferris State University, Big Rapids, MI (January 2006 – January 2007, $4,000).

3. Faculty Research Grant, "Applications of Nonlinear Partial Differential Equations in the Field of Refrigeration", from Ferris State University, Big Rapids, MI (May 2004 – May 2005, $3,450).

4. Ferris Foundation Exceptional Merit Grant, "The Use of the Technology to Enhance the Quality of Calculus Course Instruction at Ferris State University", from Ferris State University, Big Rapids, MI (May 2004 – December 2004, $5,000).

5. Professional Development Grant, "Developing and Implementing Internet-Based Instruction of Math 216, Applied Calculus Course", from Ferris State University, Big Rapids, MI (May 2003 – May 2004, $4,000).

6. Faculty Research Grant, "Numerical Simulation of the Active Magnetic Regenerative Refrigerator", from Ferris State University, Big Rapids, MI (May 2002 – May 2003, $2,685).

7. Award for editing the book "Essential Trigonometry and Algebra for University Students" from the McGraw-Hill Publishing Companies (2000, $400).

8. Grant for developing the computerized Gateway Exams (including Web version) for the course "Essentials of Algebra" from the University of Wisconsin-Milwaukee, Milwaukee, WI (1999, $4,000).

9. Grant for professional development in Economics at the Department of Economics, Marquette University, Milwaukee, WI, U.S.A. from the Congress of the U.S.A. (July 1993 – August 1994, $25,000).

Research Grants with Undergraduate Students

1. Ferris State University Student Research Grant (with undergraduate students: Courtney McElroy, Aaron Jameson, and Patrick O'Connor), "Solving the Problem of Flow of Heat in One Direction by the Explicit Numerical Method", from Ferris State University, Big Rapids, MI (May 2005 – May 2006, $3,000).

Teaching Awards and Certificates

1. Certified Online Instructor – Level 2, recognition of demonstrated competencies in online instructional design and delivery, Ferris State University Online Instructor Certification Program, Big Rapids, MI (March 2008).

2. Honored at the Seventh Annual Ferris State University Student – Athlete Advisory Committee Faculty Appreciation Night as a faculty who had a positive impact on students' academic careers, Big Rapids, MI (April 2008).

3. Honored at the Sixth Annual Ferris State University Student – Athlete Advisory Committee Faculty Appreciation Night as a faculty who had a positive impact on students' academic careers, Big Rapids, MI (February 2007).

Reviewer

1. External Evaluator for the Tenure Review of the faculty of the University of Pittsburgh at Titusville, Titusville, PA (September 2007 – December 2007).

Curriculum Development

1. Developed and implemented the fully online course for Math-116, "Intermediate Algebra and Numerical Trigonometry", Ferris State University, Big Rapids, MI (March 2006 – August 2006).

2. Developed the content of Math 130, "Advanced Algebra and Analytical Trigonometry" course based on the textbook by Stewart, Redlin, and Watson, Ferris State University, Big Rapids, MI (January 2006 – May 2006).

3. Developed the content of Math 220, "Calculus I", Math 230, "Calculus II", and Math 320, "Calculus III" courses based on the calculus textbook by Larson, Hostetler, and Edwards, Ferris State University, Big Rapids, MI (January 2005 – May 2005).

4. Developed the content of Math 120, "Trigonometry" course based on the textbook by Lial, Hornsby, and Schneider, Ferris State University, Big Rapids, MI (September 2004 – December 2004).

5. Developed and implemented the internet-based computerized course for Math 216, "Applied Calculus", Ferris State University, Big Rapids, MI (May 2003 – May 2004).

Committee Work

1. Member of the Ferris State University Faculty Research Committee (September 2007 – present).
2. Member of the College of Arts & Sciences Promotion/Merit Committee (September 2007 – May 2008).
3. Member of the College of Arts & Sciences Graduate Education Committee (September 2005 – present).
4. Chair of the Faculty Development Committee of the Department of Mathematics (August 2006 – August 2007).
5. Chair of the Core Division Committee of the Department of Mathematics (December 2002 – present).
6. Chair of the Mathematics Department Recording Secretary Rotation List Committee (Winter 2007 – present).
7. Coordinator of the Math Colloquium (September 2001 – present).
8. Member of the Committee for Developing a Learning Outcomes for Math-116 Course (February 2007 – present)
9. Member of the Service Division Committee of the Department of Mathematics (September 2004 – present).
10. Member of the Applied Division Committee of the Department of Mathematics (September 2002 – present).
11. Member of the Faculty Development Committee (February 2002 – August 2006, September 2007 – present).
12. Member of the Head of Mathematics Department Search Committee (September 2005 – May 2006).
13. Departmental Meeting Secretary (Fall 2003).
14. Member of the Faculty Search Committee (September 2002 – May 2003).
15. Member of the Math Advisory Board Committee (September 2002 – December 2002).
16. Member of Applied Calculus Course Textbook Selection Committee (Winter 2002).

Academic Advising

1. Academic Advisor for thirteen Pre – Pharmacy students.

Computer Skills

Operational Systems: MS – DOS and WINDOWS

Educational and Research Software: MAPLE, DERIVE, MATLAB, and WebCT

Programming Languages: FORTRAN, PL – 1, BASIC, and HTML

References

1. Professor Robert McCullough, Robert_Mccullough@ferris.edu
2. Professor Roy Gifford, Roy_Gifford@ferris.edu

    They are members of the Department of Mathematics of Ferris State University and can be contacted by e-mail or at the following address:

    Ferris State University, Mathematics Department
    820 Campus Drive, ASC 2021
    Big Rapids, MI 49307 – 2225.
    Phone: (231) 591 – 2565
    Fax: (231) 591 – 2627

3. Professor David H. Schultz (thesis advisor), schultz@uwm.edu
4. Professor Bruce A. Wade, wade@uwm.edu

    They are members of the Department of Mathematical Sciences of the University of Wisconsin-Milwaukee and can be contacted by e-mail or at the following address:

    University of Wisconsin-Milwaukee, Department of Mathematical Sciences
    P.O. Box 413
    Milwaukee, WI 53201
    Phone: (414) 229 – 4836
    Fax: (414) 229 – 4907

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Big Rapids, MI 49307

Ferris State University
ASC 2031 Dept. of Math
HFE 105 Honors Program
(231) 591-2579
kentsun@ferris.edu

PERSONAL: Natural-born United States citizen

EDUCATION:

Post-Doctoral Training in Biostatistics UNC at Chapel Hill
Training in biostatistics with an emphasis in clinical trials studies and recursive partitioning

Ph.D. Applied Mathematics & Statistics SUNY at Stony Brook
Dissertation Topic: Diffusion Problems in Fluid Flow Models
Advisor: Professor Reginald P. Tewarson

M.S. Applied Mathematics & Statistics SUNY at Stony Brook

M.S. Electrical Engineering Polytechnic University

B.S. Electrical Engineering Cornell University

TEACHING EXPERIENCE:

At SUNY at Stony Brook
- Introduction to Statistics
- Introduction to Finite Mathematics
- Fundamentals of Computing

At Ferris State University
- Supervised independent Study in Linear Algebra (for Alex Capaldi)
- Intermediate Algebra (Math 115)
- Algebra and Analytic Trigonometry (Math 126)
- Calculus for Business (Math 132)
- Calculus for the Life Sciences (Math 135)
- Analytical Geometry and Calculus I (Math 220)
- Statistics for the Life Sciences (Math 251)
- Linear Models in Statistics (Math 310)
- Differential Equations (Math 330)
- Actuarial Science Professional Exam Preparation I (Math 385)
- Mathematical Statistics I (Math 414)
- Mathematical Statistics II (Math 416)

Introduction to Complex Variables (Math 435)
Orientation to Honors (HNRS 100)

PUBLICATIONS:

KU Aziz, B. Dennis, CE Davis, K Sun, G. Burke, T. Manolio, AMA Faruqui, H. Chagani, T. Ashraf, N. Patel, H. Jafery, S Ghauri, M. Faisal, AK Tareen. **Efficacy of CVD Risk Factors Modification in a Lower-Middle Class Community in Pakistan: The Metroville Health Study - A USA-Pakistan Cooperative Study**
Asia Pacific Journal of Public Health 15(1): 30-36, 2003

K. Sun, I.H. Moon, R.P. Tewarson, and J.L. Stephenson. **Parallel algorithms for multinephron renal medullary models.** *Computers math. with Applic., 33(6):37-45, 1997*

K. Sun, R.P. Tewarson, A.M. Weinstein, and J.L. Stephenson. **Numerical solution of differential and algebraic equations for a flow model with diffusion.** *Appl. Math. Letters, 8(4): 79-82, 1995*

HONOR:

Promotion to Full Professor (2008, FSU)
(Honors) Senior Sendoff Banquet (chosen by 3 students as their most influential professor) (One in the Spring 2005, two in the Spring 2007, FSU)
Honorary Member of the Golden Key International Honour Society (2004, FSU)
Promotion to Associate Professor (2003, FSU)
Invited Speaker for Alexander Capaldi who won the Outstanding Scholar Award (Fall 2003, FSU)
Invited faculty member at the Second Student Athlete Advisory Council's Faculty Appreciation Night. (Spring 2003, FSU)
Outstanding Faculty Award
(Spring 2003, Presented at the Honors Awards Night, FSU)
Invited faculty member at a Faculty Appreciation Night by the women's volleyball team (Fall 2002, FSU)
Invited faculty member at the First Student Athlete Advisory Council's Faculty Appreciation Night. (Spring 2002, FSU)
Memorandum acknowledging a positive student impact (Winter 2001, FSU)
Outstanding Teaching Award (Spring 1997, SUNY at Stony Brook)

COMMITTEE WORK:

Departmental:
Chair of the Math Scheduling Committee
Chair of the Statistics Curriculum Committee
Statistics Advisor
Actuarial Science Co-Advisor
Member of the Math Advisory Board Committee
Member of the Applied Math Departmental Division

Chair of the Statistics Departmental Division
Faculty Search Committees (fall 00 – spring 01, fall 01 - spring 02,
fall 02- spring 03, fall 05 – spring 06, fall 06 - spring 07)
Department Meeting Secretary (spring 01)
Member of the Math 110/115 course curriculum Committee (spring 02)

College:
Advising Group Chair for Pre-Pharmacy (fall 04 to the present)
Member of the Promotion/Merit Committee (fall 06-spring 07)
Member of the Arts and Science Dean's Search Committee (fall 02)
Member of the committee for revising the promotion/merit policy

University:
Honors Program Assistant Coordinator (fall 07 to the present)
Member of the Honors Council (fall 07 to the present)
Member of the Academic Senate (fall 05 to the present)
Member of the Student Fees Committee (spring 05, 06, 07, 08)
Member of the President's Advising Task Force (fall 06 - spring 07)
Member of the Diversity Planning Committee (spring 07 to the present)
Administrative Assistant for the Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) Program at FSU (spring 07 to the present)

SEMINARS and WORKSHOPS ATTENDED:
Honors Program Conference, Central Michigan University (11/21/08)
AMS Conference on Mathematical Knowledge for Teaching, Western Michigan University (10/18/08)
NACADA (National Academic Advising Association) 2008 Conference, Chicago (10/1/08)
LILLY North, Traverse City (9/18/08-9/21/08)
18th Annual Equity Conference (Inclusion, Leadership and the Classroom: Making the Connection) Big Rapids, MI 3/30/08-4/1/08
NACADA (National Academic Advising Association) 2008 Conference (4/7/08)
College of Arts and Sciences Outcomes-Assessment(11/06)
Biology of Learning (9/06 – 12/06)
Critical Thinking Panel, Faculty Development Day (8/06)
Teaching So Your Students Will Remember (8/06)
Spring Learning Institute 2006 (4/06)
What Grades Can't Tell Us, Assessing Student Learning (11/05)
Learner-Centered Teaching (9/05 – 12/05)
Making Course Assessment More Effective (8/05)
Utilizing Lotus Notes to the Max (5/05)
Topics in Teaching (10/04, 1/05, 2/05, 4/05)
Academic Advising Workshop (2/04 - 3/04)
Teaching and Student Retention (9/03)
Beginning Photoshop Elements (5/03)
Advanced Photoshop Elements (5/03)

Critical Thinking Workshop (5/03)
WebCT Workshop (5/03-6/03)
Learning and Teaching (2/02 - 4/02)
Test What You Teach, Teach What You Test (9/01 - 11/01)
Facilitating Student Learning Program (9/00 - 12/00)
New to Ferris Faculty (9/00 – 5/01) (required for all new faculty)

PRESENTATION:

Title: A Discussion on Collaborative Testing (with Michael Dekker, Harvey Hanna, Holly Schalk, Presented 2/8/07)

Title: Faculty Panel on Learner Centered Teaching (Presented 8/24/05)

Title: A Tree Grows in Big Rapids: An Introduction to the Statistical Method of Recursive Partitioning (Presented 11/21/02)

CONFERENCES:

Honors Program Conference (fall 2008)
AMS (American Mathematical Association) Mathematical Knowledge for Teaching (fall 2008)
NACADA (National Academic Advising Association) Conference (fall 2008)
Lilly North Conference (fall 2008)
Equity Conference (Inclusion, Leadership and the Classroom: Making the Connection) (spring 2008)
NACADA (National Academic Advising Association) Conference (2008)
Midwest Numerical Analysis Day Conference (spring 2007)
MIACADA (Michigan Academic Advising Association) Conference "Putting the Pieces Together: Sharing Ideas and Best Practices" (spring 2007)
NACADA (National Academic Advising Association) Assessment of Academic Advising Institute Workshop (spring 2006)
Michigan MAA(Mathematical Association of America)/MichMATYC (Michigan Association of Two Year Colleges) Joint Conference (spring 2006)
Michigan MAA(Mathematical Association of America)/MichMATYC (Michigan Association of Two Year Colleges) Joint Conference (spring 2005)
Michigan Undergraduate Mathematics Conference (fall 2005)
Michigan MATYC Faculty (Michigan Association of Two Year Colleges) Conference (fall 2003)
Michigan MATYC (Michigan Association of Two Year Colleges) Faculty Conference (fall 2002)
Lilly Conference (fall 2002)
Lilly Conference (spring 2001)
Equity Conference (spring 2001)

INDUSTRIAL EXPERIENCE:

Research Assistant

Department of Physiology and Biophysics (Summer 1993, 1994)

Cornell University Medical College

Solved mathematical models of kidney functions using numerical methods.

Microwave Engineer Level II

Government Systems Division (1985-1990)

General Instrument

Designed, built, and tested discrete microwave components and integrated systems for radar detectors.

COMPUTER SKILLS:

Computer Languages

C, Fortran, Parallel programming, SAS

Operating Systems:

UNIX, OSF/1 UNIX (for parallel machines), Microsoft systems

Curriculum Vitae

Joseph S. Tripp

Mathematics Department
Ferris State University
Big Rapids, MI 49307
(231) 591-5893
trippj@ferris.edu

17320 McKinley Road
Big Rapids, MI 49307
(231) 796-8586

Education

Doctor of Philosophy, Mathematics Education, Syracuse University, Syracuse, New York
Received August 1999
Dissertation Title: An Investigation of Changes in College Students' Conceptions of Mathematics and Mathematics Learning During Participation in a Reform-based Developmental Mathematics Course

Master of Science, Mathematics Education, Syracuse University, Syracuse, New York
Received June 1993

Bachelor of Arts, Mathematics and Secondary Math Education, State University of New York (SUNY) College of Arts and Sciences at Plattsburgh, Plattsburgh, New York
Received May 1991

Professional Experience

Associate Professor (August 2003 to Present)
Assistant Professor (August 1999 to August 2003)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Responsible for teaching primarily developmental mathematics courses to college-level students. Duties include planning for effective instruction of students, developing a syllabus for each course I teach, adapting instruction to meet student needs, designing and grading tests and homework assignments, evaluating student progress, tutoring individual students outside of regular class meetings, preparing accommodations for students with special needs, and holding office hours. Also responsible for attending department meetings, attending college meetings, writing letters of reference for students applying for on-campus jobs, completing progress reports for advisors of students enrolled in University College career exploration programs, and advising pre-pharmacy students. Responsibilities include working with structured learning assistance (SLA) program director and facilitators to enhance the learning experiences of my students, which includes meeting regularly with facilitators to discuss the best ways to help students who are struggling with their mathematics learning experiences.

Administrative Assistant (May 2006 – May 2007)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Responsibilities included preparing fall, spring and summer schedules of mathematics and computer science course offerings (including number of sections of each course to be offered, offering times and room assignments), monitoring enrollments during registration periods (opening new sections as needed and canceling sections with insufficient enrollments), working with faculty to assign teaching schedules, assisting the department head in the hiring of non-tenure track faculty to cover all sections of our courses, visiting each semester the classes of non-tenure track faculty and submitting an evaluation report to the department head for each visit, evaluating student transcripts (to determine math course equivalencies), evaluating courses from other institutions (to determine equivalencies with our courses), determining proper placement of students into math classes, exercising oversight of department committees to ensure committees are meeting as needed, working closely with constituencies across campus, and meeting regularly with the department head regarding departmental issues.

Courses Taught

Ferris State University

Prealgebra (Math 010): Winter 2003, Fall 2003, Winter 2004, Fall 2004, Fall 2007, Fall 2008
Beginning Algebra (Math 110): Winter 2003, Winter 2004, Fall 2004, Winter 2005, Summer 2005, Fall 2005, Spring 2006
Intermediate Algebra and Numerical Trigonometry (Math 116): Fall 2003
Trigonometry (Math 120): Spring 2008
Advanced Algebra and Analytical Trigonometry (Math 130): Winter 2005, Summer 2005, Fall 2005, Spring 2006, Fall 2006, Spring 2007, Fall 2007
Analytical Geometry and Calculus I (Math 220): Spring 2008, Fall 2008

Service

University-Level

Professional Development Committee (Fall 2007 - Present)
Ferris State University, Big Rapids, Michigan
Responsible for revising application guidelines, determining application deadlines, reviewing and evaluating professional development grant proposals, and determining awards.

Participated in **DAWG Days** events (Spring 2005, Spring 2006)
Involved meeting prospective students and their parents, answering questions, and providing materials. Ferris State University, Big Rapids, Michigan

Frequently write **letters of recommendation** for students, staff, and faculty
(Fall 1999 to Present) Ferris State University, Big Rapids, Michigan

College-Level

Sabbatical Leave Committee (Fall 2008)
College of Arts and Sciences, Ferris State University, Big Rapids, Michigan
Responsible for reviewing sabbatical leave application files, participating in meetings to discuss applicant files, and forwarding a rank-ordered list of recommended applications to the Dean.

Promotion/Merit Committee (Fall 2004 - Spring 2006)
College of Arts and Sciences, Ferris State University, Big Rapids, Michigan
Responsible for reviewing promotion and merit application files, participating in meetings to discuss applicant files, forwarding rank-ordered lists of granted and approved applications to the Dean, discussing changes in policies, and meeting with applicants.

Advising Pre-pharmacy Students (Fall 1999 - Present)
College of Arts and Sciences, Ferris State University, Big Rapids, Michigan
Responsibilities include attending annual meetings with College of Pharmacy Associate Dean and with CAS educational counselors to discuss issues related to effectively advising pre-pharmacy students and meeting individually with students each semester to discuss course selection for the next semester and to discuss the larger issue of fulfilling requirements. Also involves advising students who are considering applying to other pharmacy colleges or changing majors.

Advising Secondary Mathematics Education Students (Fall 2006 – Fall 2007)
School of Education, Ferris State University, Big Rapids, Michigan
Assisted students with the selection of mathematics and computer science courses and determining substitutions for courses in special cases.

Department-Level **(Committees I have Chaired)**

Faculty Development Committee, Chairperson (Fall 2002 - Spring 2006)
Mathematics Department, Ferris State University, Big Rapids, Michigan
The Faculty Development Committee is responsible for promoting involvement in professional development activities among the faculty. The committee develops guidelines and procedures for distributing faculty development funds and decides on funding of proposed faculty development activities. My responsibilities as chairperson included scheduling and calling meetings, communicating policies, deadlines and awards to faculty and coordinating with the department head and secretary. I also served as the point of contact for the faculty, department secretary and department head.

Learning Outcomes Committee, Chairperson (Spring 2007)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Developed a learning outcomes statement for Math 130 (Advanced Algebra and Analytic Trigonometry).

Quantitative Skills Committee, Chairperson (Fall 2006)

Mathematics Department, Ferris State University, Big Rapids, Michigan
Developed a learning outcomes statement for our general education mathematics classes.

Chaired a Subcommittee of the Elementary Education Committee (Fall 2005 - Spring 2006)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Charged with developing a new course (Discrete Mathematics for Teachers) as part of a newly developed Mathematics Minor for elementary education students. Involved developing course outline and sample syllabus.

Department-Level (Committees on which I have served or am serving)

Strategic Planning Committee (Fall 2008)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Responsible for creating a mission statement and goals along with action steps for our department.

Faculty Search Committee (Fall 2008)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Responsible for reviewing applications, selecting candidates for telephone interviews, conducting telephone interviews, selecting candidates for on-campus interviews, and facilitating on-campus interviews.

Faculty Development Committee (Fall 2001 - Present)
Mathematics Department, Ferris State University, Big Rapids, Michigan
The Faculty Development Committee is responsible for promoting involvement in professional development activities among the faculty. The committee develops guidelines and procedures for distributing faculty development funds and decides on funding of proposed faculty development activities.

Scheduling Committee (Fall 2002 - Present)
Mathematics Department, Ferris State University, Big Rapids, Michigan
The Scheduling Committee is responsible for addressing any concerns regarding the scheduling of courses in the Mathematics Department and participating in the resolution of any scheduling problems.

Secondary Mathematics Education Committee (Fall 2002 - Present)
Mathematics Department, Ferris State University, Big Rapids, Michigan
The Mathematics Education Committee is responsible for overseeing the curriculum of the mathematics component of the B.S. degree in Secondary Mathematics Education.

Math 010 (Prealgebra) Course Committee (Fall 99 - Present)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Responsible for updating course outline as needed, developing learning outcomes statement, maintaining a current proficiency test, and selecting new textbooks.

Tenure Committee for Mike Dekker (Fall 2004 - Fall 2007)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Involved classroom observations and writing reports.

Elementary Education Committee (Fall 2005 - Spring 2006)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Responsible for overseeing the curriculum of the mathematics courses required of all elementary education students and the Mathematics Minor for elementary education students. From Fall 2005 to Spring 2006 we developed a new Math Minor, which included the development of five new courses.

Textbook Selection Committee (Spring 2006)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Involved reviewing several textbooks and selecting one text for Math 130 (Advanced Algebra and Analytical Trigonometry).

Textbook Selection Committee (Fall 2005)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Involved reviewing several textbooks and selecting one text for Math 110 (Beginning Algebra) and 115 (Intermediate Algebra).

Textbook Selection Committee (Spring 2005)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Involved reviewing several textbooks and selecting one text for Math 130 (Advanced Algebra and Analytical Trigonometry).

Textbook Selection Committee (Spring 2005)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Involved reviewing several textbooks and selecting one text for Math 010 (Prealgebra).

Quantitative Skills Committee (Fall 2004 - Spring 2005)
Mathematics Department, Ferris State University, Big Rapids, Michigan
Involved working toward the development of a general education statement for our general education mathematics courses (i.e., a statement of how each course contributes to the fulfillment of the quantitative skills portion of the University's general education requirement).

Professional Activities

Presentations

Tripp, J. S. et al. (March 2008). Structured Learning Assistance (SLA) Faculty Panel Discussant. Several other faculty and I shared with symposium attendees our experiences working with the SLA program and our impressions of its effectiveness. SLA Symposium, Ferris State University, Big Rapids, Michigan.

Forintos, M. & Tripp, J. S. (March 2005). The Structured Learning Assistance (SLA) Program. Some reflections on our experiences working with the SLA program presented at the Conversations Among Colleagues Conference, Michigan State University, Lansing, Michigan.

Tripp, J. S. (January 2004). Served as a Guest Speaker at the SLA New Faculty and Facilitator Training Workshop. Shared with participants my perspectives of the roles of faculty and workshop facilitators. Ferris State University, Big Rapids, Michigan.

Tripp, J. S. (July 2003). Fun with Math. Conducted a workshop session for public school students in grades 8 through 12 at the College Day Summer Technology Camp, Ferris State University, Big Rapids, Michigan.

Book Reviews

Reviewed the table of contents for a 1st edition Prealgebra textbook for McGraw-Hill
Authors: Miller, O'Neil, and Hyde, Spring 2008

Reviewed a textbook draft for McGraw-Hill, Prealgebra by Bach and Leitner, 3rd ed.
Summer 2004

Meetings Attended

Attended the Special Session on Mathematical Knowledge for Teaching at the **American Mathematical Society Sectional Meeting**, Western Michigan University, Kalamazoo, Michigan, October 17-18, 2008

Attended the 18th Annual **Equity in the Classroom Conference** (Theme: Inclusion, Leadership and the Classroom: Making the Connection), Ferris State University, Big Rapids, Michigan, March 31, 2008

Attended the the 4th annual **Conversations Among Colleagues Conference** (Theme: Educating Future Teachers of Mathematics: Elementary through University), Western Michigan University, Kalamazoo, Michigan, March 15, 2008

Attend (two or three) Mathematics Department **Colloquia** each semester, Ferris State University, Big Rapids, Michigan, Fall 2002 to Present

Attended the American Educational Research Association **(AERA) 2007 Annual Meeting** (Theme: The World of Educational Quality), Chicago, Illinois, April 12 - 13, 2007

Attended a Mathematics Department **Learning Outcomes Workshop** sponsored by the Faculty Center for Teaching and Learning (The participants discussed the development of learning outcomes statements for the courses we teach.), Ferris State University, Big Rapids, Michigan, March 15, 2007

Attended the **Spring Learning Institute** sponsored by the Faculty Center for Teaching and Learning (Theme: Creating the Learning-Centered University; Keynote by John Tagg, Author of The Learning Paradigm College), Ferris State University, Big Rapids, Michigan, January 26, 2007

Attended a College of Arts and Sciences **Learning Outcomes Workshop** sponsored by the Faculty Center for Teaching and Learning (The participants discussed the development of learning outcomes statements for the courses we teach.), Ferris State University, Big Rapids, Michigan, November 16, 2006

Attended the Mathematics Department **Faculty discussion group**, (Topic: "How to create a learning atmosphere"), Ferris State University, Big Rapids, Michigan, Fall 2006

Attended the **Math Education Seminar** sponsored by the Mathematics Department, Ferris State University, Big Rapids, Michigan, April 11, 2006

Attended the **Conversations Among Colleagues Conference** (Theme: Collaborating to Improve the Mathematical Education of Our Students), University of Michigan, Ann Arbor, Michigan, March 24, 2006

Attended meetings of the Mathematics Department **Faculty discussion group**, (Topics included: "Tips for teaching" and "How to motivate students"), Ferris State University, Big Rapids, Michigan, Spring 2006

Attended a three-hour **Learner-Centered Teaching Seminar** sponsored by the Faculty Center for Teaching and Learning, Ferris State University, Big Rapids, Michigan, November 11, 2005

Attended **Teaching to Create Deep Learning Seminar** sponsored by the Faculty Center for Teaching and Learning, Ferris State University, Big Rapids, Michigan, August 24, 2005

Attended the **Math Education Seminar** sponsored by the Mathematics Department, Ferris State University, Big Rapids, Michigan, April 14, 2005

Attended the **Conversations Among Colleagues Conference** (Theme: Collaborating to Improve the Mathematical Education of Our Students), Michigan State University, Lansing, Michigan, March 19, 2005

Attended the Psychology of Mathematics Education-North American Chapter **(PME-NA) 2004 Annual Meeting** (Theme: Building Bridges Between Communities), Toronto, Ontario, Canada, October 21 - 23, 2004

Attended meetings of the Mathematics Department **Faculty discussion group**, (Topics included: "How to detect and handle cheating," How to deal with noisy, disruptive students," and "Grade inflation and how to deal with students wanting higher grades"), Ferris State University, Big Rapids, Michigan, Fall 2004

Attended the **Spring Learning Institute** sponsored by the Faculty Center for Teaching and Learning (Keynote presentation by Tisha Bender), Ferris State University, Big Rapids, Michigan, April 2, 2004

Attended the **Conversations Among Colleagues Conference** (Theme: Collaborating to Improve the Mathematical Education of Our Students) sponsored by Grand Valley State University, Grandville, Michigan, March 20, 2004

Attended the **Michigan Mathematical Association of Two-Year Colleges Fall Conference**, Lansing Community College, Lansing, Michigan, October 11, 2003

Attended the American Educational Research Association **(AERA) 2003 Annual Meeting** (Theme: Accountability for Educational Quality: Shared Responsibility), Chicago, Illinois, April 24 - 25, 2003

Attended a 7-week seminar entitled "**WebCT: Preparing for your first semester**" Sponsored by the Center for Teaching, Learning, and Faculty Development, Ferris State University, Big Rapids, Michigan, Winter 2003

Attended the **Spring Learning Institute** sponsored by the Center for Teaching, Learning, and Faculty Development, Ferris State University, Big Rapids, Michigan, March 28, 2003

Professional Memberships

National Council of Teachers of Mathematics
Mathematical Association of America

JEROME TROUBA

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Department of Mathematics
Montana State University
Bozeman, MT 59715

trouba@math.montana.edu

EDUCATION

Ph.D.	Mathematics (Education Specialization) Montana State University	B21	expected May 2009
M.S.	Mathematics Montana State University		2006
B.S.	Mathematics Teaching (Secondary) Magna Cum Laude University of Mary, Bismarck, ND	B23	2003

TEACHING EXPERIENCE

Montana State University - Graduate Teaching Assistant

B25	Math for Elementary Teachers II	Spring 07 /Fall 06, 08
	College Algebra	Spring 2008
	Math for Elementary Teachers I	Summer/Fall 2007
	Multivariable Calculus	Summer 2006/2008
B28	Calculus for Technology II	Spring 2006
	Calculus for Technology I	Fall 2005
	Calculus & Analytic Geometry II	Summer/Spring 2005
	Calculus & Analytic Geometry I	Fall 2004
	Survey of Calculus	Summer/Spring 2004
	Precalculus	Fall 2003

Bozeman Charter School - Instructor B22 — 2005 to Present
Calculus, Algebra II, Algebra I, Geometry

Great Falls College of Technology – Adjunct Instructor — Fall 2006
Pre-Algebra

Bismarck High School – Student Teacher — Spring 2003
Algebra, Discrete Math, Trigonometry, Statistics B20

GRANTS

2008 - Yopp, D., Trouba, J. *Improving the Instructional Practices of Graduate Teaching Assistants in the Mathematical Sciences.* Montana State University – Office of the Vice Provost. Awarded $9,650. B24

2007 - (Submitted, not funded). Yopp, D. (P.I.), Trouba, J. *Improving the Teaching Effectiveness of Graduate Teaching Assistants in Undergraduate Mathematics.* Montana Space Grant Consortium – Science and Engineering Education Enhancement. $34,923

B24

CURRENT RESEARCH

Dissertation: tentatively titled *Improving the Instructional Practices of Graduate Teaching Assistants in the Mathematical Sciences*. Advisor: Dr. David Yopp.

- To help train new Graduate Teaching Assistants (GTAs) to become more effective teachers, a workshop was designed based on effective teaching and professional development literature. Through the workshop, GTAs learn to reflect on their teaching, engage their students, ask good questions, and use formative classroom assessment techniques. Additionally, measures are in place to evaluate the program's effectiveness. Outcomes will be used to formulate a model of GTA teacher training that can be used by other departments and other institutions of higher education.

PRESENTATIONS

"Proving" 1=2 Mathematics Graduate Seminar, MSU, Bozeman	Spring 2008
The Three-Dimensional Heat Equation Mathematics Graduate Seminar, MSU, Bozeman	Spring 2007
Distributional Solutions to Differential Equations Mathematics Graduate Seminar, MSU, Bozeman	Fall 2006
Computing Laplace Transforms using Residues Mathematics Seminar, University of Mary, Bismarck, ND	Fall 2004
The Buckingham Pi Theorem and its Applications Mathematics Seminar, University of Mary, Bismarck, ND	Fall 2003

PROFESSIONAL DEVELOPMENT

Aug 2008-Nov 2008: Developed and Presented a GTA Professional Development Workshop for 18 new GTAs in the Mathematical Sciences

Workshop Titles:

Introductions, Concerns, and Lecturing
Reflective Teaching
Active Learning
Questioning Techniques
Formative Assessment
Philosophies of Teaching

HONORS AND AWARDS

Outstanding Graduate Teaching Assistant Award College of Letters and Science Montana State University	2006
Outstanding Graduate Teaching Assistant Award Department of Mathematical Sciences Montana State University	2005
St. Katherine's Medal for Student Leadership The highest student honor awarded at the University of Mary Bismarck, ND	2003
Outstanding Senior in Math and Science University of Mary, Bismarck, ND	2003

ABSTRACTS

Improving the Instructional Practices of Graduate Teaching Assistants in the Mathematical Sciences. To appear in *Confluence* 2008-2009, Volume 5. MSU's College of Letters and Science Publication.

PROFESSIONAL MEMBERSHIPS

American Mathematical Society
Mathematical Association of America

REFERENCES

Dr. David Yopp, Associate Professor of Mathematics Education, Montana State University
yopp@math.montana.edu 406-994-3123

Dr. Ken Bowers, Head of the Mathematics Department, Montana State University
bowers@math.montana.edu 406-994-3604

Dr. Warren Esty, Professor of Mathematics, Montana State University
westy@math.montana.edu 406-994-5354

Susan Werner, Head of School, Bozeman Charter School
susan.werner@stanfordalumni.org 406-539-0820

Shaw Walker

Contact Information

Department of Mathematics	Office: (231) 591–2570
Ferris State University	Home: (231) 527–1290
Big Rapids, Michigan 49307	Email: `walkers@ferris.edu`

Personal Data

Birth date: March 12, 1964	Citizenship: U.S.
Birthplace: Muskegon, Michigan	Married, no children

Education

M.S.	Scientific Computing and Computational Mathematics, Stanford University, Department of Computer Science, 1999
B.S.	Mathematics, *Magna Cum Laude*, Santa Clara University, Applied Mathematics concentration, 1997
B.M.	Music, *with Distinction*, University of Rochester, Eastman School of Music, 1987

Employment

2001–Present	Assistant Professor, Department of Mathematics, Ferris State University
1999–2001	Lecturer, Department of Mathematics and Computer Science, Santa Clara University
2000	Lecturer, Department of Computer Engineering, Santa Clara University
1999–2001	Unix Network/System Administrator, Department of Mathematics and Computer Science, Santa Clara University
1998	Technical Support Engineer, Hitachi Internetworking Inc.
1996–97	Mathematics/Physics Tutor, Learning Resources Center, Santa Clara University
1996	Research Assistant, Department of Mathematics and Computer Science, Santa Clara University
1992	Interlochen Arts Camp, Music Faculty
1988–92	Military service, U.S. Navy

Interests

Scientific computing, simulation and modeling, statistics and applied probability, computational statistics, numerical analysis, computer science

---

Date of CV: January 16, 2004.

Teaching Experience

Assistant Professor. Department of Mathematics, Ferris State University, 2001–Present. Complete responsibility for courses. Taught Computer Simulation, Data Structures and Algorithms, Object Oriented Programming (in C++), Fundamentals of Algebra, Intermediate Algebra, Intermediate Algebra and Trigonometry, Contemporary Mathematics.

Lecturer. Department of Mathematics and Computer Science, Department of Computer Engineering, Santa Clara University, 1999–2001. Complete responsibility for courses. Taught Introduction to Computer Science (in C++), Applied Programming (in C), Calculus and Analytic Geometry I & II, Precalculus.

Tutor. Learning Resources Center, Santa Clara University, 1996–97. Lead discussion sections for calculus, differential equations, and physics courses.

Academic Service

Chair, Computer Science Division, Department of Mathematics, 2002–Present

Academic advisor for computer science students, 2002–Present

Statistics Division member, Department of Mathematics, 2002–Present

Departmental Curriculum Committee, 2002–Present

Departmental Assessment Committee, 2002–Present

Departmental Academic Program Review Committee, 2002–03

Mathematics Advisory Board Committee, 2002–03

Departmental Meeting Secretary, 2002–03

Honors, Awards

George W. Evans Memorial Prize in Mathematics, Santa Clara University, 1997

President, California Eta chapter of Pi Mu Epsilon, national honorary mathematics society, 1996–97

Elected to Phi Beta Kappa Society, Sigma Xi Society, Pi Mu Epsilon Society

Dean's List, Santa Clara University, 1995–97

Professional Memberships

Society for Industrial and Applied Mathematics (SIAM)

Society for Computer Simulation International (SCS)

American Mathematical Society (AMS)

Association for Computing Machinery (ACM)

Institute of Electrical and Electronics Engineers (IEEE)

Activities

AMS/MAA Joint Mathematics Meetings, Baltimore, Maryland, January 2003

References

Present Employment	Former Employment
Robert N. McCullough Associate Professor Department of Mathematics Ferris State University Big Rapids, Michigan 49307 Tel. (231) 591–5876 `mccullor@ferris.edu`	Glenn D. Appleby Associate Professor Dept. of Mathematics and Computer Science Beloit University Beloit, Wisconsin 53511 Tel. (608) 363–2365 `applebyg@beloit.edu`
Lakshmi Mukundan Professor Department of Mathematics Ferris State University Big Rapids, Michigan 49307 Tel. (231) 591–2567 `mukundal@ferris.edu`	Robert A. Bekes Associate Professor and Chair Dept. of Mathematics and Computer Science Santa Clara University Santa Clara, California 95053 Tel. (408) 554–4883 `rbekes@math.scu.edu`
Bahodir Siddikov Assistant Professor Department of Mathematics Ferris State University Big Rapids, Michigan 49307 Tel. (231) 591–5913 `siddikob@ferris.edu`	Tamsen Whitehead Associate Professor Dept. of Mathematics and Computer Science Santa Clara University Santa Clara, California 95053 Tel. (408) 554–4506 `twhitehead@math.scu.edu`

Appendix E: NSF Report on Recent Graduates

Results from the National Science Foundation's 2006 report on Characteristics of Recent Science and Engineering Graduates.

An Overview of Science, Engineering, and Health Graduates: 2006

NSF 08-304 | March 2008 | PDF

by Steven Proudfoot[1]

In the 2006 National Survey of Recent College Graduates (NSRCG), the National Science Foundation collected data detailing the characteristics of individuals who received bachelor's or master's degrees in science, engineering, or health (SEH) fields[2] during the academic years 2003, 2004, and 2005. Degrees in the fields of social and related sciences, health, and psychology accounted for more than half of all those earned by this group of recent graduates (23%, 18%, and 15%, respectively) (table 1).

TABLE 1. Recent SEH graduates, by field of degree: 2006

	All SEH bachelor's and master's degrees		Bachelor's degrees		Master's degrees	
Field of degree	Number	Percent	Number	Percent	Number	Percent
All fields	1,982,400	100	1,565,500	100	416,900	100
Biological, agricultural, and environmental life sciences	259,500	13	230,100	15	29,400	7
Computer and information sciences	216,300	11	164,000	10	52,300	13
Mathematics and statistics	55,800	3	44,000	3	11,800	3
Physical and related sciences	70,500	4	55,600	4	14,900	4
Psychology	303,300	15	252,700	16	50,600	12
Social and related sciences	459,200	23	413,500	26	45,700	11
Engineering	269,600	14	183,100	12	86,500	21
Health	348,200	18	222,500	14	125,700	30

SEH = science, engineering, and health.

NOTES: Recent SEH graduates are those who earned bachelor's or master's degrees in science, engineering, or health fields between 1 July 2002 and 30 June 2005. Detail may not add to total because of rounding.

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 2006

Table 1 Source Data: Excel file

Employment

Overall, 85% of recent graduates were working in April 2006 (84% of bachelor's degree recipients and 90% of master's degree recipients). Business and industry was the largest employer of recent SEH graduates (65%), followed by educational institutions (24%) and government (11%). Recent computer and information sciences graduates—both bachelor's and master's degrees—were most likely to be employed in business and industry (82% and 76%, respectively); 77% (bachelor's) and 72% (master's) of engineering graduates were also primarily employed in business and industry. Educational institutions were the largest employers of recent graduates with master's degrees in physical and related sciences, mathematics and statistics, and psychology (59%, 55%, and 51%, respectively) (table 2).

TABLE 2. Employed recent SEH graduates, by employment sector and level and field of degree: 2006
(Percent distribution)

Degree level and field	All sectors	Educational institution	Government	Business/industry
All degrees, all fields	100	24	11	65
Biological, agricultural, and environmental life sciences	100	32	10	57
Computer and information sciences	100	12	8	80
Mathematics and statistics	100	46	6	48
Physical and related sciences	100	43	9	48
Psychology	100	34	10	57
Social and related sciences	100	19	15	66
Engineering	100	15	10	75
Health	100	24	11	65
Bachelor's, all fields	100	22	10	68
Biological, agricultural, and environmental life sciences	100	31	9	60
Computer and information sciences	100	9	9	82
Mathematics and statistics	100	46	6	48
Physical and related sciences	100	39	9	52
Psychology	100	30	9	61
Social and related sciences	100	17	14	69
Engineering	100	12	11	77
Health	100	23	10	68
Master's, all fields	100	31	12	57
Biological, agricultural, and environmental life sciences	100	41	16	42
Computer and information sciences	100	19	5	76
Mathematics and statistics	100	55	4	41
Physical and related sciences	100	59	8	33
Psychology	100	51	14	35
Social and related sciences	100	34	25	40
Engineering	100	21	7	72
Health	100	25	13	61

SEH = science, engineering, and health.

NOTES: Recent SEH graduates are those who earned bachelor's or master's degrees in science, engineering, or health fields between 1 July 2002 and 30 June 2005. Business/industry includes non-profits and self-employed. Detail may not add to total because of rounding.

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 2006.

Table 2 Source Data: Excel file

Approximately half of all employed recent bachelor's degree recipients with SEH degrees were working in non-S&E-related jobs. In contrast, only about one-fourth of employed recent SEH master's degree recipients were working in non-S&E-related jobs (table 3).

TABLE 3. Occupations of employed recent SEH graduates, by level of degree: 2006

Occupation	All degrees	Bachelor's	Master's
All occupations	1,693,400	1,319,200	374,200
Scientist	360,600	240,900	119,700
Biological, agricultural, and environmental life scientist	55,300	35,500	19,800
Computer and information scientist	186,800	135,000	51,800
Mathematical scientist	19,400	10,500	8,900
Physical scientist	39,700	28,300	11,400
Psychologist	26,100	12,000	14,100
Social scientist	33,200	19,600	13,600
Engineer	173,300	120,000	53,300
Science and engineering-related occupations	405,700	294,200	111,500
Non-science and engineering occupations	753,700	664,000	89,700

SEH = science, engineering, and health.
S&E = science and engineering

NOTES: Recent SEH graduates are those who earned bachelor's or master's degrees in science, engineering, or health fields between 1 July 2002 and 30 June 2005. Science and engineering-related occupations include health-related occupations, S&E manager, S&E precollege teacher, S&E technician/technologist, and other S&E-related occupations.

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 2006

Table 3 Source Data: Excel file

Eighty-five percent of employed recent master's degree recipients and 81% of employed recent bachelor's degree recipients had full-time principal jobs. Ninety-three percent and 91% of recent master's and bachelor's computer and information sciences graduates, respectively, held full-time principal jobs. Among engineering graduates, 90% of master's degree and 91% of bachelor's degree recipients held full-time principal jobs (table 4).

TABLE 4. Full- or part-time status of employed recent SEH graduates in principal job, by major field of degree: 2006

	Employed bachelor's degree recipients			Employed master's degree recipients		
Major field	Total	Full time	Part time	Total	Full time	Part time
All fields	1,319,200	1,073,600	245,600	374,200	317,900	56,300
Science	951,000	757,600	193,400	180,300	151,000	29,400
Biological, agricultural, and environmental life sciences	154,700	115,100	39,600	24,800	21,600	3,100
Computer and information sciences	149,000	135,700	13,300	46,100	43,100	3,100
Mathematics and statistics	37,700	30,100	7,500	10,100	7,500	2,600
Physical and related sciences	45,700	36,000	9,700	12,900	11,000	1,900
Psychology	212,700	153,500	59,200	47,400	36,900	10,500
Social and related sciences	351,200	287,100	64,100	39,100	30,900	8,200
Engineering	167,400	152,300	15,100	76,500	68,700	7,800
Health	200,800	163,700	37,100	117,300	98,200	19,100

SEH = science, engineering, and health.

NOTES: Recent SEH graduates are those who earned bachelor's or master's degrees in science, engineering, or health fields between 1 July 2002 and 30 June 2005. Employed graduates who worked 35 or more hours per week on principal job during a typical week are classified as full time and all other employed graduates are classified as part time.

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 2006

Table 4 Source Data: Excel file

Salary

Those individuals with master's degrees in engineering and those with master's degrees in computer and information sciences reported the highest median salary among recent SEH master's graduates, $65,000. Those with bachelor's degrees in engineering had the highest median salary among recent SEH bachelor's graduates, $52,000. Recent graduates holding bachelor's degrees in computer and information sciences reported a median salary of $45,000. Those with degrees in health reported median salaries of $58,000 for master's degree holders and $45,000 for those with bachelor's degrees (table 5).

TABLE 5. Median annual salary of full-time employed recent SEH graduates by major field of degree: 2006

(Dollars)

Major field	Bachelor's	Master's
All fields	39,000	56,000
Science	35,000	50,000
Biological, agricultural, and environmental life sciences	32,000	45,000
Computer and information sciences	45,000	65,000
Mathematics and statistics	37,000	60,000
Physical and related sciences	35,000	50,000
Psychology	30,000	40,000
Social and related sciences	34,000	47,000
Engineering	52,000	65,000
Health	45,000	58,000

SEH = science, engineering, and health

NOTES: Recent SEH graduates are those who earned bachelor's or master's degrees in science, engineering, or health fields between 1 July 2002 and 30 June 2005. Salary data and sector are for principal job only. Full-time employed are those working at least 35 hours per week at their principal jobs. Self-employed persons and full-time students are excluded from salary data.

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 2006

Table 5 Source Data: Excel file

Recent graduates with master's degrees working in private business and industry reported a median salary of $61,000, and those working for government agencies reported $55,000. Recent graduates with bachelor's degrees working in business and industry reported a median salary of $40,000; the median salary for their counterparts in the federal government was $37,000 (table 6).

TABLE 6. Median annual salary of full-time employed recent SEH graduates, by employment sector: 2006

(Dollars)

Employment sector	Bachelor's	Master's
All sectors	39,000	56,000
Educational institution	35,000	43,000
Business/industry	40,000	61,000
Government	37,000	55,000

SEH = science, engineering, and health

NOTES: Recent SEH graduates are those who earned bachelor's or master's degrees in science, engineering, or health fields between 1 July 2002 and 30 June 2005. Salary data and sector are for principal job only. Full-time employed are those working at least 35 hours per week at their principal jobs. Self-employed persons and full-time students are excluded from salary data. Business/industry includes non-profits and self-employed.

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 2006.

Table 6 Source Data: Excel file

Gender

Recent female SEH graduates outnumbered males 56% to 44%. The bachelor's degree-level fields of study with the highest percentage of female graduates were health (86%) and psychology (77%). The recent bachelor's degree fields of study with the highest percentage of male graduates were engineering (78%) and computer and information sciences (77%). Results at the recent master's degree-level were similar; the highest percentages of female master's degree graduates were in health (79%) and psychology (78%), while engineering, computer and related sciences, and physical and related sciences had the highest levels of male graduates (77%, 66%, and 66%, respectively) (table 7).

TABLE 7. Gender of recent SEH graduates, by level and field of degree: 2006

(Percent distribution)

Degree type and field	Female	Male
All degrees, all fields	56	44
Biological, agricultural, and environmental life sciences	61	39
Computer and information sciences	25	75
Mathematics and statistics	45	55
Physical and related sciences	42	58
Psychology	77	23
Social and related sciences	55	45
Engineering	22	78
Health	83	17
Bachelor's, all fields	56	44
Biological, agricultural, and environmental life sciences	62	38
Computer and information sciences	23	77
Mathematics and statistics	46	54
Physical and related sciences	44	56
Psychology	77	23
Social and related sciences	55	45
Engineering	22	78
Health	86	14
Master's, all fields	55	45
Biological, agricultural, and environmental life sciences	54	46
Computer and information sciences	34	66
Mathematics and statistics	39	61
Physical and related sciences	34	66
Psychology	78	22
Social and related sciences	57	43
Engineering	23	77
Health	79	21

SEH = science, engineering, and health.

NOTE: Recent SEH graduates are those who earned bachelor's or master's degrees in science, engineering, or health fields between 1 July 2002 and 30 June 2005

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 2006

Table 7 Source Data: Excel file

Data Notes

Data from the National Science Foundation's 2006 National Survey of Recent College Graduates were collected on bachelor's and master's graduates who received science, engineering, or health degrees between July 1, 2002, and June 30, 2005. Respondents were individuals who recently received bachelor's or master's degrees in a SEH field from a U.S. institution, were living in the United States during the survey reference week of April 1st, 2006, and under age 76.

The full set of detailed tables from this survey will be available in the forthcoming report *Characteristics of Recent College Graduates: 2006* at http://www.nsf.gov/statistics/recentgrads/. For more information on the data in this InfoBrief, contact the author.

Notes

[1] Steven Proudfoot, Human Resources Statistics Program, Division of Science Resources Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 (sproudfo@nsf.gov; 703-292-4434).

For further information on the National Survey of Recent College Graduates, contact

Kelly H. Kang, Human Resources Statistics Program, Division of Science Resources Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 (kkang@nsf.gov; 703-292-

7796).

[2] For more information on classification of degree fields and occupations, please see the NSRCG survey overview at http://www.nsf.gov/statistics/srvyrecentgrads/.

National Science Foundation, Division of Science Resources Statistics
An Overview of Science, Engineering, and Health Graduates: 2006
Arlington, VA (NSF 08-304, revised) [March 2008]

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Division of Science Resources Statistics (SRS)
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Text Only

E-7

Appendix F: Cost and Productivity Data for the Mathematics Department

Cost and productivity data related to the Applied Mathematics and Mathematics programs from the latest reports by the Office of Institutional Research. The cost data appears first followed by the productivity data.

Ferris State University
Degree Program Costing 2003- 2004 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Mathematics

Program Name: Applied Mathematics (Actuarial Science Track) BS

Program Credits Required (Total credits to graduate) 120

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$117.07
**Department Cost per Student Credit Hour	$21.28
***Dean's Cost per Student Credit Hour	$12.58
Total Cost per Student Credit Hour (Average for program)	**$150.93**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$14,048.76
Total Program Department Cost	$2,553.63
Total Program Dean's Cost	$1,509.03
Total Program Cost (Assumes a student will complete program in one year)	**$18,111.42**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
COMM105	L	$290,824	$48,206	$18,441	3099	$94	$16	$6	3	$282	$47	$18
CPSC150	L	$7,650	$462	$500	84	$91	$6	$6	3	$273	$17	$18
CULTELE	E	$2,095,711	$340,667	$132,576	21581	$97	$16	$6	9	$874	$142	$55
ECON221	L	$236,454	$62,206	$50,026	2889	$82	$22	$17	3	$246	$65	$52
ENGL150	L	$668,824	$93,436	$40,416	6792	$98	$14	$6	3	$295	$41	$18
ENGL250	L	$499,521	$71,315	$30,848	5184	$96	$14	$6	3	$289	$41	$18
ENGL311	U	$129,279	$14,032	$6,070	1020	$127	$14	$6	3	$380	$41	$18
FREEELE	E	$30,274,958	$7,855,641	$5,157,468	256701	$118	$31	$20	40	$4,718	$1,224	$804
INSR243	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
MATH220	L	$80,343	$3,825	$4,136	695	$116	$6	$6	5	$578	$28	$30
MATH230	L	$72,771	$2,394	$2,589	435	$167	$6	$6	5	$836	$28	$30
MATH251	L	$64,185	$3,170	$3,428	576	$111	$6	$6	3	$334	$17	$18
MATH310	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
MATH314	U	$12,009	$578	$625	105	$114	$6	$6	3	$343	$17	$18
MATH320	U	$24,980	$693	$750	126	$198	$6	$6	3	$595	$17	$18
MATH322	U	$11,901	$396	$428	72	$165	$6	$6	3	$496	$17	$18
MATH340	U	$11,173	$495	$536	90	$124	$6	$6	3	$372	$17	$18
MATH414	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
MATH416	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
SCIUELE	E	$2,943,071	$793,257	$182,284	30633	$96	$26	$6	7	$673	$181	$42
SOCAELE	E	$1,789,828	$451,271	$190,004	24281	$74	$19	$8	9	$663	$167	$70

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course

** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department

*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

F-2

Ferris State University
Degree Program Costing 2003- 2004 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Mathematics

Program Name: Applied Mathematics BS

Program Credits Required (Total credits to graduate) 120

*Instructor Cost per Student Credit Hour(SCH) (Average for program) $124.53
**Department Cost per Student Credit Hour $20.71
***Dean's Cost per Student Credit Hour $12.28

Total Cost per Student Credit Hour (Average for program) $157.52

Total Program Instructor Cost (Assumes a student will complete program in one year) $14,943.74
Total Program Department Cost $2,484.92
Total Program Dean's Cost $1,473.20

Total Program Cost (Assumes a student will complete program in one year) $18,901.85

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
COMM105	L	$290,824	$48,206	$18,441	3099	$94	$16	$6	3	$282	$47	$18
CPSC150	L	$7,650	$462	$500	84	$91	$6	$6	3	$273	$17	$18
CULTELE	E	$2,095,711	$340,667	$132,576	21581	$97	$16	$6	9	$874	$142	$55
ENGL150	L	$668,824	$93,436	$40,416	6792	$98	$14	$6	3	$295	$41	$18
ENGL250	L	$499,521	$71,315	$30,848	5184	$96	$14	$6	3	$289	$41	$18
ENGL311	U	$129,279	$14,032	$6,070	1020	$127	$14	$6	3	$380	$41	$18
FREEELE	E	$30,274,958	$7,855,641	$5,157,468	256701	$118	$31	$20	43	$5,071	$1,316	$864
MATH220	L	$80,343	$3,825	$4,136	695	$116	$6	$6	5	$578	$28	$30
MATH230	L	$72,771	$2,394	$2,589	435	$167	$6	$6	5	$836	$28	$30
MATH251	L	$64,185	$3,170	$3,428	576	$111	$6	$6	3	$334	$17	$18
MATH320	U	$24,980	$693	$750	126	$198	$6	$6	3	$595	$17	$18
MATH322	U	$11,901	$396	$428	72	$165	$6	$6	3	$496	$17	$18
MATH330	U	$7,506	$182	$196	33	$227	$6	$6	3	$682	$17	$18
MATH340	U	$11,173	$495	$536	90	$124	$6	$6	3	$372	$17	$18
MATH360	U	$12,570	$231	$250	42	$299	$6	$6	3	$898	$17	$18
MATH380	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
MATH414	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
MATH440	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
SCIUELE	E	$2,943,071	$793,257	$182,284	30633	$96	$26	$6	7	$673	$181	$42
SOCAELE	E	$1,789,828	$451,271	$190,004	24281	$74	$19	$8	9	$663	$167	$70

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

F-3

Ferris State University
Degree Program Costing 2003- 2004 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Mathematics

Program Name: Applied Mathematics (Computer Science Track) BS

Program Credits Required (Total credits to graduate) 120

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$120.69
**Department Cost per Student Credit Hour	$21.24
***Dean's Cost per Student Credit Hour	$12.52
Total Cost per Student Credit Hour (Average for program)	**$154.45**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$14,482.98
Total Program Department Cost	$2,548.87
Total Program Dean's Cost	$1,502.63
Total Program Cost (Assumes a student will complete program in one year)	**$18,534.48**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
COMM105	L	$290,824	$48,206	$18,441	3099	$94	$16	$6	3	$282	$47	$18
CPSC150	L	$7,650	$462	$500	84	$91	$6	$6	3	$273	$17	$18
CPSC200	L	$13,107	$352	$381	64	$205	$6	$6	4	$819	$22	$24
CPSC300	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	4	$600	$150	$83
CPSC340	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	4	$600	$150	$83
CULTELE	E	$2,095,711	$340,667	$132,576	21581	$97	$16	$6	9	$874	$142	$55
ENGL150	L	$668,824	$93,436	$40,416	6792	$98	$14	$6	3	$295	$41	$18
ENGL250	L	$499,521	$71,315	$30,848	5184	$96	$14	$6	3	$289	$41	$18
ENGL311	U	$129,279	$14,032	$6,070	1020	$127	$14	$6	3	$380	$41	$18
FREEELE	E	$30,274,958	$7,855,641	$5,157,468	256701	$118	$31	$20	43	$5,071	$1,316	$864
MATH220	L	$80,343	$3,825	$4,136	695	$116	$6	$6	5	$578	$28	$30
MATH230	L	$72,771	$2,394	$2,589	435	$167	$6	$6	5	$836	$28	$30
MATH251	L	$64,185	$3,170	$3,428	576	$111	$6	$6	3	$334	$17	$18
MATH320	U	$24,980	$693	$750	126	$198	$6	$6	3	$595	$17	$18
MATH322	U	$11,901	$396	$428	72	$165	$6	$6	3	$496	$17	$18
MATH340	U	$11,173	$495	$536	90	$124	$6	$6	3	$372	$17	$18
MATH420	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
SCIUELE	E	$2,943,071	$793,257	$182,284	30633	$96	$26	$6	7	$673	$181	$42
SOCAELE	E	$1,789,828	$451,271	$190,004	24281	$74	$19	$8	9	$663	$167	$70

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course

** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department

*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

F-4

Ferris State University
Degree Program Costing 2003- 2004 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Mathematics

Program Name: Applied Mathematics (Operations Research Track) BS

Program Credits Required (Total credits to graduate) 120

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$122.77
**Department Cost per Student Credit Hour	$20.99
***Dean's Cost per Student Credit Hour	$12.60
Total Cost per Student Credit Hour (Average for program)	**$156.36**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$14,732.10
Total Program Department Cost	$2,518.95
Total Program Dean's Cost	$1,512.15
Total Program Cost (Assumes a student will complete program in one year)	**$18,763.20**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
COMM105	L	$290,824	$48,206	$18,441	3099	$94	$16	$6	3	$282	$47	$18
CPSC150	L	$7,650	$462	$500	84	$91	$6	$6	3	$273	$17	$18
CULTELE	E	$2,095,711	$340,667	$132,576	21581	$97	$16	$6	9	$874	$142	$55
ENGL150	L	$668,824	$93,436	$40,416	6792	$98	$14	$6	3	$295	$41	$18
ENGL250	L	$499,521	$71,315	$30,848	5184	$96	$14	$6	3	$289	$41	$18
ENGL311	U	$129,279	$14,032	$6,070	1020	$127	$14	$6	3	$380	$41	$18
FREEELE	E	$30,274,958	$7,855,641	$5,157,468	256701	$118	$31	$20	52	$6,133	$1,591	$1,045
MATH220	L	$80,343	$3,825	$4,136	695	$116	$6	$6	5	$578	$28	$30
MATH230	L	$72,771	$2,394	$2,589	435	$167	$6	$6	5	$836	$28	$30
MATH251	L	$64,185	$3,170	$3,428	576	$111	$6	$6	3	$334	$17	$18
MATH320	U	$24,980	$693	$750	126	$198	$6	$6	3	$595	$17	$18
MATH322	U	$11,901	$396	$428	72	$165	$6	$6	3	$496	$17	$18
MATH330	U	$7,506	$182	$196	33	$227	$6	$6	3	$682	$17	$18
MATH360	U	$12,570	$231	$250	42	$299	$6	$6	3	$898	$17	$18
MATH440	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
SCIUELE	E	$2,943,071	$793,257	$182,284	30633	$96	$26	$6	7	$673	$181	$42
SOCAELE	E	$1,789,828	$451,271	$190,004	24281	$74	$19	$8	9	$663	$167	$70

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

F-5

Ferris State University
Degree Program Costing 2003- 2004 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Mathematics

Program Name: Applied Mathematics (Statistics Track) BS

Program Credits Required (Total credits to graduate) 120

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$117.02
**Department Cost per Student Credit Hour	$21.96
***Dean's Cost per Student Credit Hour	$12.98
Total Cost per Student Credit Hour (Average for program)	**$151.96**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$14,041.91
Total Program Department Cost	$2,635.51
Total Program Dean's Cost	$1,558.04
Total Program Cost (Assumes a student will complete program in one year)	**$18,235.46**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
COMM105	L	$290,824	$48,206	$18,441	3099	$94	$16	$6	3	$282	$47	$18
CPSC150	L	$7,650	$462	$500	84	$91	$6	$6	3	$273	$17	$18
CULTELE	E	$2,095,711	$340,667	$132,576	21581	$97	$16	$6	9	$874	$142	$55
ENGL150	L	$668,824	$93,436	$40,416	6792	$98	$14	$6	3	$295	$41	$18
ENGL250	L	$499,521	$71,315	$30,848	5184	$96	$14	$6	3	$289	$41	$18
ENGL311	U	$129,279	$14,032	$6,070	1020	$127	$14	$6	3	$380	$41	$18
FREEELE	E	$30,274,958	$7,855,641	$5,157,468	256701	$118	$31	$20	49	$5,779	$1,500	$984
MATH220	L	$80,343	$3,825	$4,136	695	$116	$6	$6	5	$578	$28	$30
MATH230	L	$72,771	$2,394	$2,589	435	$167	$6	$6	5	$836	$28	$30
MATH251	L	$64,185	$3,170	$3,428	576	$111	$6	$6	3	$334	$17	$18
MATH310	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
MATH314	U	$12,009	$578	$625	105	$114	$6	$6	3	$343	$17	$18
MATH320	U	$24,980	$693	$750	126	$198	$6	$6	3	$595	$17	$18
MATH322	U	$11,901	$396	$428	72	$165	$6	$6	3	$496	$17	$18
MATH414	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
MATH416	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
SCIUELE	E	$2,943,071	$793,257	$182,284	30633	$96	$26	$6	7	$673	$181	$42
SOCAELE	E	$1,789,828	$451,271	$190,004	24281	$74	$19	$8	9	$663	$167	$70

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course

** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department

*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

F-6

Ferris State University
Degree Program Costing 2002- 2003 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Mathematics

Program Name: Mathematics BA

Program Credits Required (Total credits to graduate) 126

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$133.20
**Department Cost per Student Credit Hour	$18.47
***Dean's Cost per Student Credit Hour	$9.78
Total Cost per Student Credit Hour (Average for program)	**$161.45**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$16,783.60
Total Program Department Cost	$2,326.97
Total Program Dean's Cost	$1,232.28
Total Program Cost (Assumes a student will complete program in one year)	**$20,342.86**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
COAS499	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	1	$150	$37	$21
COMM105	L	$290,824	$48,206	$18,441	3099	$94	$16	$6	3	$282	$47	$18
COMM121	L	$289,865	$55,999	$21,422	3600	$81	$16	$6	3	$242	$47	$18
COMM221	L	$134,094	$18,246	$6,980	1173	$114	$16	$6	3	$343	$47	$18
CPSC200	L	$13,107	$352	$381	64	$205	$6	$6	4	$819	$22	$24
CULTELE	E	$2,095,711	$340,667	$132,576	21581	$97	$16	$6	12	$1,165	$189	$74
ENGL150	L	$668,824	$93,436	$40,416	6792	$98	$14	$6	3	$295	$41	$18
ENGL250	L	$499,521	$71,315	$30,848	5184	$96	$14	$6	3	$289	$41	$18
ENGL311	U	$129,279	$14,032	$6,070	1020	$127	$14	$6	3	$380	$41	$18
FREEELE	E	$30,274,958	$7,855,641	$5,157,468	256701	$118	$31	$20	23	$2,713	$704	$462
FREN101	L	$28,351	$5,613	$2,428	408	$69	$14	$6	4	$278	$55	$24
FREN102	L	$24,914	$2,201	$952	160	$156	$14	$6	4	$623	$55	$24
FREN201	L	$13,590	$1,101	$476	80	$170	$14	$6	4	$679	$55	$24
MATH220	L	$80,343	$3,825	$4,136	695	$116	$6	$6	5	$578	$28	$30
MATH230	L	$72,771	$2,394	$2,589	435	$167	$6	$6	5	$836	$28	$30
MATH310	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
MATH314	U	$12,009	$578	$625	105	$114	$6	$6	3	$343	$17	$18
MATH320	U	$24,980	$693	$750	126	$198	$6	$6	3	$595	$17	$18
MATH322	U	$11,901	$396	$428	72	$165	$6	$6	3	$496	$17	$18
MATH324	U	$12,531	$561	$607	102	$123	$6	$6	3	$369	$17	$18
MATH420	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	3	$450	$112	$62
MATH430	U	$17,330	$132	$143	24	$722	$6	$6	3	$2,166	$17	$18
MATH485	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	1	$150	$37	$21
MATH491	N	$15,271,137	$3,812,904	$2,102,742	101733	$150	$37	$21	1	$150	$37	$21
SCIUELE	E	$2,943,071	$793,257	$182,284	30633	$96	$26	$6	11	$1,057	$285	$65
SOCAELE	E	$1,789,828	$451,271	$190,004	24281	$74	$19	$8	12	$885	$223	$94

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

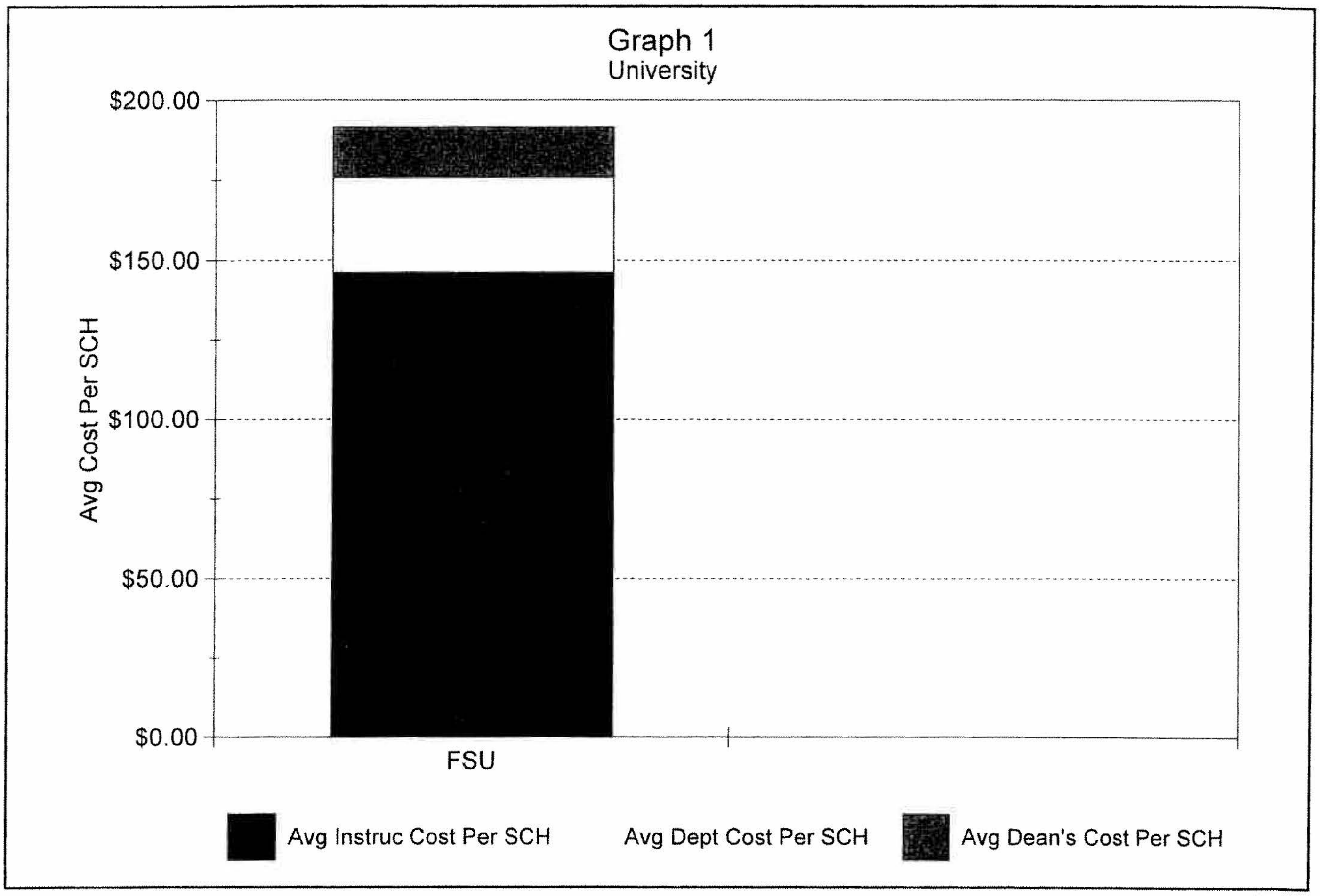
F-7

Ferris State University

Average Instructor, Department and Dean's Cost Per SCH for Degree Programs

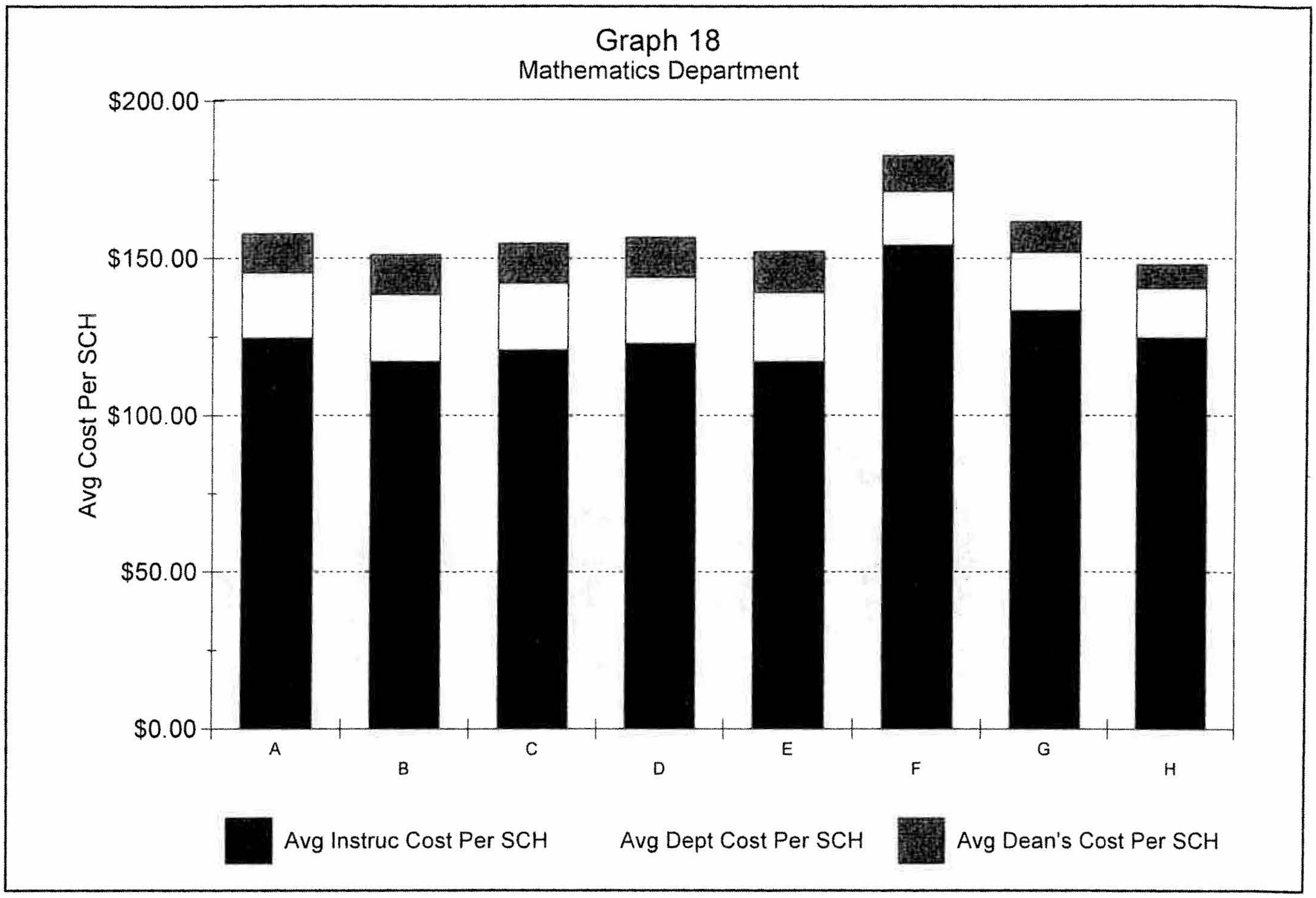
The University

2003 - 2004 Data



University	Avg Instructor Cost/SCH	Avg Dept Cost/SCH	Avg Dean's Cost/SCH	Total Avg Cost/SCH
FSU	$146.08	$29.80	$15.68	$191.56

Ferris State University
Average Instructor, Department and Dean's Cost Per SCH for Degree Programs
Mathematics Department
2003 - 2004 Data



	Programs	Avg Instructor Cost/SCH	Avg Dept Cost/SCH	Avg Dean's Cost/SCH	Total Avg Cost/SCH
A	Applied Mathematics BS	$124.53	$20.71	$12.28	$157.52
B	Applied Mathematics (Actuarial Science Track) BS	$117.07	$21.28	$12.58	$150.93
C	Applied Mathematics (Computer Science Track) BS	$120.69	$21.24	$12.52	$154.45
D	Applied Mathematics (Operations Research Track) BS	$122.77	$20.99	$12.60	$156.36
E	Applied Mathematics (Statistics Track) BS	$117.02	$21.96	$12.98	$151.96
F	Computer Science Certificate	$153.89	$17.13	$11.30	$182.33
G	Mathematics BA	$133.20	$18.47	$9.78	$161.45
H	Pre-Engineering AS	$124.61	$15.74	$7.42	$147.76

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Source: Office of Institutional Research, g:\...\progcost\0304\avgp2m.rsl

Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2003-04

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	**Total Cost per SCH**
Fine Arts/Painting MFA	60	$580.63	$30.36	$18.09	**$629.08**
Fine Arts/Dual Concentration MFA	60	$580.63	$30.36	$18.09	**$629.08**
Fine Arts/Drawing MFA	60	$580.63	$30.36	$18.09	**$629.08**
Fine Arts/Printmaking MFA	60	$580.63	$30.36	$18.09	**$629.08**
Fine Arts/Photography MFA	60	$580.63	$30.36	$18.09	**$629.08**
Curriculum and Instruction/Elementary Cert option MS	47	$480.51	$42.81	$22.31	**$545.63**
Optometry OD (Professional Yrs 1,2,3 & 4)	163	$347.89	$61.93	$83.22	**$493.04**
Information Systems Management MS	33	$309.73	$98.73	$17.93	**$426.39**
Criminal Justice Administration MS	30	$351.03	$38.26	$21.65	**$410.94**
Technical Writing Certificate	12	$356.50	$19.69	$9.63	**$385.82**
Advanced Studies in Investment Analysis Certificate	12	$343.88	$21.53	$17.32	**$382.73**
Master in Business Administration MBA	48	$249.53	$93.62	$18.15	**$361.30**
Manufacturing Tooling Technology AAS	68	$287.71	$43.51	$17.79	**$349.01**
Printing & Digital Graphic Imaging Technology AAS	62	$253.94	$66.39	$17.78	**$338.10**
Horticulture for Golf Course Managers Certificate	11	$292.13	$29.91	$5.95	**$327.99**
New Media Printing and Publishing BS (Yrs 3 & 4)	68	$262.67	$48.70	$15.27	**$326.64**
Doctor of Pharmacy Pharm.D. (Professional Yrs 1,2,3 & 4	137	$202.84	$61.38	$56.26	**$320.47**
Heavy Equipment Technology AAS	68	$185.35	$102.75	$17.46	**$305.56**
Advanced Studies in Global Logistics Certificate	12	$236.23	$41.95	$17.32	**$295.50**
Surveying Engineering BS	138	$179.90	$87.40	$15.97	**$283.27**
Facilities Management Certificate	12	$186.00	$72.61	$21.85	**$280.47**
International Business Certificate	12	$222.65	$27.63	$17.32	**$267.59**
Printing Management BS (Yrs 3 & 4)	67	$199.50	$50.20	$16.05	**$265.76**
Marketing Sales Certificate	12	$207.28	$38.93	$14.47	**$260.69**
Rubber Technology AAS	69	$204.98	$39.98	$13.62	**$258.58**
Career and Tech Edu/Postsecondary Admin option MS	33	$190.91	$42.17	$22.11	**$255.18**
Career and Tech Edu/Training & Dev option MS	33	$189.17	$42.17	$22.11	**$253.45**
Surveying Technology AAS	60	$167.11	$70.52	$15.04	**$252.68**
Rubber Engineering Technology BS (Yrs 3 & 4)	66	$179.78	$51.08	$18.19	**$249.05**
Fine Arts/Sculpture BFA	120	$207.16	$23.36	$17.95	**$248.47**
Architectural Technology AAS	66	$167.72	$61.18	$17.24	**$246.14**
Biotechnology BS	130	$215.77	$22.91	$6.66	**$245.34**
Medical Record Administration BS	124	$193.01	$28.75	$22.02	**$243.78**
Furniture Design BFA	120	$206.66	$17.95	$17.95	**$242.56**
Visual Design and Web Media BS (Yrs 3 & 4)	63	$188.76	$38.33	$14.93	**$242.03**
HVACR Engineering Technology BS (Yrs 3 & 4)	64	$167.22	$57.71	$16.82	**$241.75**
Career and Tech Edu/Instructor option MS	34	$174.90	$42.34	$22.16	**$239.40**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

Source: Office of Institutional Research, g:\...\progcost\0304\tcpschrank.rsl

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Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2003-04

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	**Total Cost per SCH**
Manufacturing Operations Management Certificate	12	$179.05	$39.41	$18.55	**$237.01**
CAD Drafting and Tool Design AAS	66	$190.50	$27.39	$16.66	**$234.55**
Manufacturing Engineering Technology BS (Yrs 3 & 4)	78	$171.46	$44.69	$18.09	**$234.24**
Advanced Studies in Total Quality Management Certificat	12	$171.17	$40.15	$21.49	**$232.80**
Automotive Service Technology AAS	68	$173.80	$36.92	$18.42	**$229.14**
Computer Networks & Systems (Info Systems Track) BS	136	$176.17	$35.47	$15.34	**$226.98**
Welding Technology AAS	66	$167.95	$40.62	$17.32	**$225.88**
Computer Networks & Systems (Indust Automation Track)	135	$172.80	$36.72	$15.54	**$225.06**
Plastics Technology AAS	69	$163.56	$45.47	$14.54	**$223.58**
Marketing Certificate	12	$159.40	$46.73	$17.32	**$223.44**
Marketing Research Certificate	12	$165.13	$40.43	$17.32	**$222.88**
Curriculum and Instruction/Subject Area option MS	32	$158.98	$40.14	$21.82	**$220.94**
Computer Networks & Systems (Embedded Systems Trac	135	$168.16	$35.64	$15.45	**$219.24**
Ornamental Horticulture Technology AAS	60	$186.11	$25.92	$6.62	**$218.66**
Restaurant and Food Industry Management AAS	69	$180.16	$24.48	$13.97	**$218.61**
Retailing Certificate	12	$152.70	$46.73	$17.32	**$216.74**
Medical Laboratory Technology AAS	79	$161.10	$34.29	$21.17	**$216.56**
Facilities Management BS (Yrs 3 & 4)	68	$149.34	$48.94	$16.99	**$215.27**
Career and Tech Edu/Educational Tech option MS	33	$153.33	$39.90	$21.41	**$214.64**
Career and Tech Edu/Administrative option MS	33	$150.01	$42.33	$22.16	**$214.49**
Industrial Electronics Technology AAS	67	$156.39	$40.49	$16.50	**$213.39**
Respiratory Care AAS	79	$151.28	$37.76	$23.84	**$212.88**
Accountancy/Finance BS	135	$176.26	$22.16	$14.09	**$212.50**
Tech & Professional Comm (Publication Mgmt Track) BS	121	$170.37	$30.64	$10.88	**$211.89**
Visual Communication - Multimedia Design Focus BFA	120	$176.47	$17.27	$17.95	**$211.69**
HVACR Technology AAS	67	$134.69	$59.67	$16.77	**$211.13**
Elect/Electron Engr Tech (Indust Auto) BS (Yrs 3 & 4)	68	$159.80	$35.69	$15.24	**$210.73**
Advertising Certificate	14	$146.48	$46.73	$17.32	**$210.52**
Finance/Investment Concentration BS	123	$173.66	$22.18	$13.83	**$209.67**
Heavy Equipment Service Eng Tech BS (Yrs 3 & 4)	70	$126.48	$65.41	$17.55	**$209.44**
Automotive Body AAS	63	$153.69	$36.90	$18.12	**$208.71**
Heavy Equipment Technology Komatsu Equip Repair Cei	18	$150.11	$37.48	$20.67	**$208.26**
Geographic Information Systems Certificate	6	$150.11	$37.48	$20.67	**$208.26**
Plastics Engineering Technology BS (Yrs 3 & 4)	63	$132.80	$56.13	$17.79	**$206.72**
Curriculum and Instruction/Administrative option MS	36	$141.90	$42.37	$22.17	**$206.44**
Fine Arts/Woodworking & Functional Art BFA	120	$161.54	$25.21	$18.09	**$204.83**
Industrial Chemistry Technology AAS	63	$176.74	$20.20	$6.59	**$203.52**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

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Source: Office of Institutional Research, g:\...\progcost\0304\tcpschrank.rsl

Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2003-04

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	**Total Cost per SCH**
Real Estate Certificate	9	$155.68	$28.88	$18.43	**$203.00**
E-Commerce Marketing Certificate	12	$138.90	$46.73	$17.32	**$202.94**
Illustration BFA	120	$164.06	$19.72	$17.95	**$201.72**
Curriculum and Instruction/Secondary Cert option MS	39	$136.18	$42.81	$22.31	**$201.30**
Performance Machining Certificate	12	$135.60	$43.08	$22.25	**$200.92**
Television and Digital Media Production BS	124	$126.90	$56.72	$16.34	**$199.96**
CJ/Law Enforcement option BS (Yrs 3 & 4)	72	$145.39	$34.81	$19.37	**$199.57**
Nuclear Medicine Technology BS	128	$142.76	$34.08	$21.71	**$198.54**
Advanced Construction Management Certificate	12	$146.10	$28.98	$21.85	**$196.93**
Direct Marketing Certificate	12	$132.48	$46.73	$17.32	**$196.53**
Accountancy/Computer Information Systems BS	144	$154.45	$26.06	$14.75	**$195.26**
Metals/Jewelry Design BFA	120	$154.44	$21.72	$18.49	**$194.65**
Elect/Electron Engr Tech (Tech Integration) BS (Yrs 3 & 4	68	$144.40	$34.13	$15.29	**$193.82**
Medical Technology BS	139	$137.71	$34.12	$21.01	**$192.83**
Ornamental Horticulture Certificate	11	$155.88	$29.91	$5.95	**$191.74**
Industrial Design BFA	120	$155.01	$18.53	$18.09	**$191.62**
Automotive and Heavy Equipment Mgmt BS (Yrs 3 & 4)	68	$138.08	$34.17	$17.16	**$189.42**
Nursing AAS	80	$109.84	$54.53	$24.35	**$188.72**
Quality Engineering Technology BS (Yrs 3 & 4)	68	$133.86	$37.91	$16.18	**$187.95**
Illustration Digital Media BFA	120	$147.85	$20.79	$17.95	**$186.59**
Accountancy (Public Accounting Track) BS	124	$149.00	$22.80	$14.34	**$186.15**
Welding Engineering Technology BS (Yrs 3 & 4)	72	$135.46	$35.23	$15.33	**$186.02**
Fine Arts/Printmaking BFA	120	$140.17	$25.26	$18.15	**$183.58**
Computer Information Systems BS	126	$142.39	$26.51	$14.23	**$183.13**
Tech & Professional Comm (Computer Info Writing Track	121	$148.74	$23.64	$10.32	**$182.69**
Environmental Hlth & Safety Tech (Occ Hlth & Safe opt) A	62	$138.68	$26.70	$17.06	**$182.45**
Computer Science Certificate	11	$153.89	$17.13	$11.30	**$182.33**
Computer Info Systems (PC/Networking Support Track) A	60	$141.15	$26.90	$14.25	**$182.30**
Automotive Engineering Technology BS (Yrs 3 & 4)	70	$124.66	$40.16	$17.32	**$182.15**
CJ/Generalist option BS (Yrs 3 & 4)	64	$126.69	$34.92	$20.01	**$181.63**
Environmental Hlth & Safety Mgmt (Indust Safety option)	124	$136.22	$27.72	$17.49	**$181.44**
Construction Administration Certificate	12	$132.88	$26.14	$22.25	**$181.27**
Computer Info Systems (WEB Development Track) AAS	60	$139.01	$26.69	$14.08	**$179.79**
Tech & Professional Comm (Multimedia Writing Track) B	121	$144.29	$24.02	$10.67	**$178.98**
Tech & Professional Comm (Automotive Writing Track) B	121	$142.96	$24.85	$10.74	**$178.56**
University College Program AA	60	$105.66	$26.48	$46.08	**$178.23**
Nursing BSN (Yrs 3 & 4)	80	$121.32	$38.09	$18.62	**$178.02**

Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

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Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2003-04

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	**Total Cost per SCH**
Accountancy (Professionally Directed Track) BS	124	$140.46	$22.85	$14.39	**$177.70**
Performance Motorsports Certificate	10	$112.00	$43.08	$22.25	**$177.33**
Dental Hygiene AAS	85	$103.37	$50.82	$22.83	**$177.02**
Diagnostic Medical Sonography AA	67	$110.92	$38.73	$26.08	**$175.72**
Accounting AAS	60	$139.70	$21.59	$14.08	**$175.37**
Civil Engineering Technology AAS	64	$137.85	$21.28	$16.23	**$175.36**
Recreation Leadership & Mgmt/Corp Fitness-Well Track	128	$125.85	$33.08	$16.27	**$175.20**
Hotel Management BS (Yrs 3 & 4)	63	$135.55	$25.60	$13.69	**$174.83**
Recreation Leadership & Mgmt/Outdoor-Adv Edu Track E	128	$126.04	$32.84	$15.95	**$174.82**
Health Care Systems Administration BS	123	$122.96	$28.61	$22.26	**$173.82**
Public Relations Certificate	13	$116.91	$38.07	$18.35	**$173.33**
Product Design Engineering Technology BS (Yrs 3 & 4)	67	$120.59	$36.38	$16.18	**$173.14**
Tech & Professional Comm (Sci & Medical Writing Track)	121	$140.44	$22.70	$9.89	**$173.03**
Fine Arts/Photography BFA	120	$131.72	$22.75	$17.95	**$172.42**
Biochemistry BA	126	$141.01	$21.62	$9.54	**$172.17**
Fine Arts/Drawing BFA	120	$130.99	$23.11	$17.95	**$172.06**
Visual Communication - Print Media Focus BFA	120	$136.88	$17.21	$17.95	**$172.03**
Environmental Hlth & Safety Mgmt (Indust Hygiene option	124	$126.70	$27.91	$16.94	**$171.55**
Medical Record Technology AAS	63	$118.06	$29.17	$23.99	**$171.22**
Business Education/Marketing BS	145	$121.76	$33.09	$16.33	**$171.18**
English Composition BA	126	$141.94	$19.26	$9.18	**$170.39**
Music Industry Management BS	124	$125.55	$30.49	$13.77	**$169.81**
Visual Design and Web Media AAS	61	$122.93	$34.11	$12.75	**$169.79**
Tech & Professional Comm (Technical Journalism Track)	121	$139.56	$21.31	$8.87	**$169.75**
Operations & Supply Management BB	124	$127.93	$26.77	$14.83	**$169.53**
Art History -Studio BS	120	$134.67	$16.52	$18.22	**$169.41**
Recreation Leadership & Mgmt/Sports Management Tracl	128	$121.10	$32.25	$15.78	**$169.13**
Construction Management (Highway/Bridge Track) BS	129	$130.41	$22.43	$16.23	**$169.07**
Fine Arts/Painting BFA	120	$127.65	$23.36	$17.95	**$168.96**
Human Resource Management BS	124	$131.98	$23.60	$13.24	**$168.81**
Advertising BS	125	$124.72	$30.24	$13.47	**$168.43**
Management BS	130	$129.78	$24.19	$13.95	**$167.92**
Environmental Health & Safety Mgmt (Env Health option)	131	$123.24	$28.62	$15.97	**$167.84**
Recreation Leadership & Mgmt/Leisure Service Track BS	128	$119.47	$32.35	$15.82	**$167.64**
Mechanical Engineering Technology BS (Yrs 3 & 4)	72	$119.04	$32.27	$16.11	**$167.42**
Applied Speech Communication BS	126	$135.95	$20.73	$10.21	**$166.89**
Construction Management (Mech/Elect/Plumbing Track)	129	$126.64	$23.85	$16.23	**$166.71**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

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Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2003-04

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	**Total Cost per SCH**
Building Const Tech - Mech/Elec/Plmb emphasis AAS	64	$126.28	$24.13	$16.23	**$166.65**
E-Commerce Marketing BS	124	$122.20	$30.21	$14.12	**$166.53**
Construction Management (Commercial/Indust Track) BS	129	$126.04	$23.85	$16.23	**$166.12**
Technical and Professional Communication BS	121	$137.21	$20.44	$8.26	**$165.91**
Small Business Management Certificate	12	$117.71	$30.88	$17.32	**$165.91**
Construction Management (from Arch Tech) BS (Yrs 3 &	81	$125.24	$23.45	$17.21	**$165.90**
Environmental Hlth & Safety Mgmt (Haz Material Mgmt op	126	$122.88	$27.22	$15.55	**$165.65**
Journalism Certificate	12	$126.71	$25.62	$13.31	**$165.63**
International Business BS	125	$127.10	$24.46	$13.93	**$165.49**
Building Construction Tech - Building emphasis AAS	64	$125.08	$24.13	$16.23	**$165.45**
Interior Design BFA	120	$129.49	$17.88	$17.95	**$165.32**
Computer Info Systems (Programming Track) AAS	57	$124.70	$26.13	$13.74	**$164.56**
Marketing BS	124	$121.43	$29.04	$13.73	**$164.20**
Resort Mgmt/Marketing Concentration BS	124	$120.20	$29.36	$14.13	**$163.69**
Business Administration w/ AAS in Legal Studies	128	$124.20	$24.27	$14.17	**$162.64**
Professional Golf Management BS	127	$116.55	$31.35	$14.09	**$161.99**
Business Education/General Business BS	152	$120.50	$27.39	$14.08	**$161.96**
Mathematics BA	126	$133.20	$18.47	$9.78	**$161.45**
Fine Arts/Art/K-12 Art Education Certification BFA	134	$115.21	$26.40	$19.14	**$160.75**
Philanthropy Education Certificate	9	$95.32	$42.81	$22.31	**$160.45**
Environmental Hlth & Safety Tech (Env Health option) AA	63	$116.71	$27.58	$15.10	**$159.39**
Business Administration BS	124	$120.33	$24.65	$14.27	**$159.25**
Public Relations BS	124	$118.44	$27.73	$13.02	**$159.18**
Communication BA	126	$130.33	$19.63	$9.07	**$159.03**
Applied Biology (Environmental Biology Track) BS	127	$128.37	$23.06	$7.02	**$158.44**
Legal Studies AAS	64	$119.60	$24.21	$14.20	**$158.01**
Applied Mathematics BS	120	$124.53	$20.71	$12.28	**$157.52**
Customer Energy Specialist Certificate	48	$114.12	$28.36	$14.94	**$157.42**
Small Business and Entrepreneurship BS	124	$117.25	$25.70	$14.35	**$157.30**
Professional Tennis Management BS	126	$111.49	$31.44	$14.11	**$157.04**
Applied Mathematics (Operations Research Track) BS	120	$122.77	$20.99	$12.60	**$156.36**
English Literature BA	126	$126.74	$19.96	$9.64	**$156.35**
Art History - Academic BS	120	$127.50	$10.62	$18.22	**$156.34**
Biology Education BS	119	$115.55	$29.03	$11.19	**$155.77**
Mathematics Education BS	142	$119.05	$23.50	$12.58	**$155.13**
Nuclear Medicine Technology AAS	69	$93.59	$37.21	$23.96	**$154.76**
Applied Mathematics (Computer Science Track) BS	120	$120.69	$21.24	$12.52	**$154.45**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2003-04

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	**Total Cost per SCH**
CJ/Corrections option BS (Yrs 3 & 4)	65	$105.61	$31.30	$16.94	**$153.85**
Applied Mathematics (Statistics Track) BS	120	$117.02	$21.96	$12.98	**$151.96**
Allied Health Education BS (Yrs 3 & 4)	89	$105.64	$31.13	$15.15	**$151.92**
Technical Education BS (Yrs 3 & 4)	89	$105.64	$31.13	$15.15	**$151.92**
Wage Earning Home Economics Education BS (Yrs 3 & 4	89	$105.64	$31.13	$15.15	**$151.92**
Applied Biology (Pre-Dentistry Track) BS	127	$120.89	$22.96	$7.32	**$151.17**
Applied Mathematics (Actuarial Science Track) BS	120	$117.07	$21.28	$12.58	**$150.93**
Mechanical Engineering Technology AAS	65	$113.21	$23.39	$14.32	**$150.91**
Applied Biology (Pre-Medicine Track) BS	127	$120.61	$22.96	$7.32	**$150.89**
Biology BA	126	$116.51	$24.00	$10.22	**$150.73**
Career Exploration AA	60	$95.47	$24.31	$30.44	**$150.22**
General Business AAS	63	$111.30	$24.85	$14.08	**$150.22**
Early Childhood Education AAS	63	$103.38	$29.76	$15.86	**$149.00**
Pre-Engineering AS	73	$124.61	$15.74	$7.42	**$147.76**
Training in Business and Industry BS (Yrs 3 & 4)	88	$109.06	$26.16	$12.45	**$147.67**
Chemistry BA	126	$115.44	$21.98	$10.00	**$147.42**
History BA	126	$116.00	$21.07	$10.01	**$147.08**
Applied Biology (Pre-Veterinary Medicine Track) BS	123	$116.49	$22.27	$8.27	**$147.03**
Applied Biology (Forensic Biology Track) BS	128	$114.48	$23.86	$7.90	**$146.25**
Public Administration BS	124	$110.52	$23.05	$11.99	**$145.56**
Directed Studies AA	60	$100.92	$22.87	$18.96	**$142.76**
Sociology BA	126	$108.22	$22.66	$11.03	**$141.92**
Psychology BS	124	$107.16	$22.44	$10.52	**$140.13**
General Studies AA	60	$98.27	$22.87	$18.96	**$140.11**
Social Studies Education BS (Yrs 3 & 4)	127	$97.55	$28.42	$13.86	**$139.83**
Radiography AAS	80	$71.28	$41.03	$27.45	**$139.76**
Pre-Optometry AS	88	$110.99	$21.13	$7.44	**$139.56**
Pre-Mortuary Science AS	60	$105.58	$22.87	$10.95	**$139.40**
Pre-Technical & Professional Communications AA	60	$102.22	$23.78	$12.92	**$138.91**
Applied Biology (Pre-Physical Therapy Track) BS	127	$109.66	$22.05	$6.94	**$138.65**
Social Work BSW	128	$111.68	$19.11	$7.03	**$137.83**
Applied Biology BS	127	$107.24	$22.85	$7.06	**$137.15**
English Education BS	140	$101.15	$23.11	$10.89	**$135.15**
Chemistry Education BS	149	$97.90	$24.96	$10.99	**$133.85**
Pre-Psychology AA	60	$97.63	$23.45	$11.86	**$132.93**
Elementary Education BS	120	$94.04	$26.33	$12.50	**$132.87**
Pre-Law AA	64	$103.63	$18.69	$10.05	**$132.37**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

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Source: Office of Institutional Research, g:\...\progcost\0304\tcpschrank.rsl

Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2003-04

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	**Total Cost per SCH**
Pre-Criminal Justice AA	64	$95.27	$24.27	$12.16	**$131.70**
Pre-Science AS	60	$97.64	$22.57	$9.32	**$129.53**
Pre-Public Administration AA	60	$90.29	$22.10	$14.54	**$126.92**
Pre-Social Work AA	60	$92.36	$23.42	$11.14	**$126.91**
Hotel Management Certificate	12	$80.35	$27.63	$17.32	**$125.30**
Pre-Arts AA	60	$101.74	$16.98	$6.27	**$124.99**
Applied Speech Communication AA	60	$93.37	$19.45	$8.05	**$120.87**
Restaurant and Food Industry Management Certificate	12	$74.18	$27.63	$17.32	**$119.13**
Liberal Arts AA	60	$91.44	$19.07	$6.61	**$117.11**
Pre-Pharmacy AS	61	$86.56	$19.39	$6.54	**$112.49**

* ...structor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

Source: Office of Institutional Research, g:\..\progcost\0304\tcpschrank.rsl

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FERRIS STATE UNIVERSITY
Productivity Report

F-17

Fall 2003 – Spring 2008

Institutional Research & Testing
FERRIS STATE UNIVERSITY

PREFACE

The Productivity Report is produced each summer by the Ferris State University Office of Institutional Research and Testing. All information provided in this publication is drawn from existing university data systems. Any person having questions, suggestions, or requests for more detailed information should contact the Office of Institutional Research and Testing at extension 3800.

Readers should note that in the tables of this report, the whole may not equal the sum of the parts because of rounding. Data has been summed and then rounded.

This report details productivity trends at FSU over the past five years. The report shows data for Fall 2003 through Winter 2008. Data is shown in detail by university (page 1), by college (pages 2 through 4), by department (pages 5 through 18), and by course prefix (pages 19 through 68). Summary information for the current year shows SCH/FTEF in ranked order by college (page 69), by department (pages 70 through 72) and by course prefix (pages 73 through 84). Graphs showing SCH and FTEF data are on pages 85 through 141.

EXPLANATION OF TERMS:

Student Credit Hours (SCH) - SCH is the product of the credit value of a course and the number of students enrolled in the course on the official seventh day of classes for that semester. For example, a 4 credit course section containing 50 students on the seventh day of classes would generate 200 student credit hours.

Full-Time Equated Faculty (FTEF) - A faculty member working full-time for fall and winter semester (fall semester 1 FTEF + winter semester 1 FTEF = Average F + W 1 FTEF). Overloads and part-time faculty produce a fraction of an FTEF. **No sabbatical or 100% release-time FTEF are included in this report.** When student credit hours are produced by administrators and/or ROTC personnel, zeros are shown in the corresponding full time equated faculty columns and are not included in the ranked listings.

SCH/FTEF - A measure of productivity. This gives the average number of student credit hours generated per full-time equated faculty member. When SCH is divided by zero FTEF (zero results from administrators and/or ROTC personnel teaching courses) the SCH/FTEF columns contain blanks. When a zero FTE occurs in Fall or Winter, the overall SCH/FTE must be recalculated.

NOTE: **If there are not SCH's and/or FTE's *in both the Fall and the Winter Term Columns*, please disregard the Annualized Productivity Figures** (listed in the last column on the page). You will need to look at the particular Fall or Winter Term to see the Correct Productivity Measure. Also note that if there is a department and/or college name change the data will appear with the correct name and correct term. Please contact the Office of Institutional Research and Testing if you have any questions.

As shown on page 1, during the Fall and Winter semester of the 2007-08 school year, Ferris State University employed 696.32 full-time equated **teaching** faculty. A total of 306,480.00 student credit hours were produced, for an average of 440.14 student credit hours produced per FTEF. The same comparisons have been made for specific terms, by college, department and course prefix.

(The SCH and FTEF FSU totals shown in this report are the same totals submitted to the State of Michigan through the HEIDI system.)

FERRIS STATE UNIVERSITY

Student Credit Hours (SCH), Full Time Equated Faculty (FTEF) and SCH/FTEF
Aggregated by University

		Student Credit Hours				Full Time Equated Faculty				SCH/FTEF			
University	**Year**	**Summer**	**Fall**	**Winter**	**F + W (a)**	**Summer**	**Fall**	**Winter**	**Avg F + W (b)**	**Summer**	**Fall**	**Winter**	**F + W (a / b)**
Ferris State University	2003-04	25,926.00	147,557.00	136,598.00	284,155.00	178.09	636.11	615.08	625.59	145.57	231.97	222.08	454.22
Ferris State University	2004-05	29,459.00	148,111.00	137,112.00	285,223.00	208.20	650.95	633.80	642.37	141.49	227.53	216.33	444.01
Ferris State University	2005-06	30,594.00	156,188.00	143,817.00	300,005.00	208.69	665.32	651.33	658.33	146.60	234.76	220.80	455.71
Ferris State University	2006-07	31,498.00	154,046.00	145,765.50	299,811.50	196.40	678.00	675.36	676.68	160.38	227.21	215.83	443.06
Ferris State University	2007-08	33,017.00	158,792.50	147,687.50	306,480.00	221.08	695.97	663.51	679.74	149.34	228.16	222.59	450.88

FERRIS STATE UNIVERSITY

Student Credit Hours (SCH), Full Time Equated Faculty (FTEF) and SCH/FTEF
Aggregated by University by Department within College

		Student Credit Hours				Full Time Equated Faculty				SCH/FTEF			
Department	**Year**	**Summer**	**Fall**	**Winter**	**F + W (a)**	**Summer**	**Fall**	**Winter**	**Avg F + W (b)**	**Summer**	**Fall**	**Winter**	**F + W (a / b)**
College of Arts and Sciences													
Clinical Lab-Resp Care-Hlth Ad	2006-07	0.00	164.00	40.00	204.00	0.00	0.53	0.33	0.43		307.50	121.21	472.59
Humanities	2003-04	1,490.00	12,123.00	11,851.00	23,974.00	6.81	40.19	37.61	38.90	218.80	301.66	315.13	616.34
Humanities	2004-05	1,951.00	13,206.00	12,342.00	25,548.00	8.00	44.06	39.86	41.96	243.88	299.71	309.66	608.87
Humanities	2005-06	1,905.00	13,128.00	12,428.00	25,556.00	9.16	42.91	37.73	40.32	207.97	305.92	329.43	633.84
Humanities	2006-07	1,933.00	12,560.00	11,888.00	24,448.00	7.13	43.04	40.48	41.76	271.11	291.82	293.66	585.42
Humanities	2007-08	1,755.00	12,435.00	11,944.00	24,379.00	8.17	40.86	39.55	40.21	214.81	304.31	302.00	606.35
Language and Literature	2003-04	2,342.00	13,291.00	11,493.00	24,784.00	11.90	53.25	47.47	50.36	196.81	249.61	242.10	492.14
Language and Literature	2004-05	2,352.00	12,349.00	10,696.00	23,045.00	11.08	52.39	48.33	50.36	212.27	235.71	221.30	457.59
Language and Literature	2005-06	2,681.00	12,904.00	11,752.00	24,656.00	13.06	54.13	50.42	52.28	205.31	238.38	233.08	471.65
Language and Literature	2006-07	2,708.00	0.00	0.00	0.00	13.83	0.00	0.00	0.00	195.81			
Languages and Literature	2006-07	0.00	12,606.00	10,866.00	23,472.00	0.00	51.74	50.16	50.95		243.62	216.63	460.67
Languages and Literature	2007-08	2,640.00	12,557.00	11,200.00	23,757.00	13.15	53.72	49.10	51.41	200.72	233.75	228.09	462.10
Mathematics	2003-04	924.00	10,976.00	7,768.00	18,744.00	5.07	32.81	25.08	28.94	182.25	334.53	309.73	647.57
Mathematics	2004-05	1,171.00	10,015.00	7,602.00	17,617.00	4.99	33.13	28.04	30.58	234.75	302.32	271.14	576.05
Mathematics	2005-06	1,076.00	10,372.00	7,627.00	17,999.00	5.24	31.44	26.47	28.95	205.24	329.90	288.14	621.62
Mathematics	2006-07	977.00	9,589.00	7,611.00	17,200.00	5.58	31.40	28.21	29.81	175.00	305.38	269.77	577.05
Mathematics	2007-08	1,023.00	10,066.00	7,497.00	17,563.00	6.75	31.04	25.09	28.07	151.65	324.26	298.82	625.78
Physical Sciences	2003-04	959.00	6,924.00	6,061.00	12,985.00	5.41	18.72	19.02	18.87	177.36	369.86	318.70	688.16
Physical Sciences	2004-05	931.00	7,262.00	6,391.00	13,653.00	3.21	19.86	19.47	19.67	289.62	365.57	328.30	694.24

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FERRIS STATE UNIVERSITY

Student Credit Hours (SCH), Full Time Equated Faculty (FTEF) and SCH/FTEF
Aggregated by Course Prefix within College and Department

		Student Credit Hours				Full Time Equated Faculty				SCH/FTEF			
Prefix	Year	Summer	Fall	Winter	F + W (a)	Summer	Fall	Winter	Avg F + W (b)	Summer	Fall	Winter	F + W (a / b)
College of Arts and Sciences													
Languages and Literature													
JRNL	2007-08	0.00	123.00	180.00	303.00	0.00	0.67	0.92	0.79		184.50	196.36	382.74
LANG	2006-07	0.00	132.00	186.00	318.00	0.00	0.75	0.75	0.75		176.00	248.00	424.00
LANG	2007-08	36.00	112.00	150.00	262.00	0.25	0.56	0.75	0.66	144.00	199.11	200.00	399.24
LITH	2006-07	0.00	0.00	231.00	231.00	0.00	0.00	1.08	0.54			213.23	426.46
LITH	2007-08	0.00	189.00	207.00	396.00	0.00	0.83	0.75	0.79		226.80	276.00	500.21
LITR	2006-07	0.00	929.00	1,084.00	2,013.00	0.00	5.96	6.54	6.25		155.76	165.88	322.10
LITR	2007-08	166.00	777.00	1,302.00	2,079.00	1.00	4.41	8.18	6.30	166.00	176.06	159.20	330.21
SPAN	2006-07	0.00	1,408.00	1,595.00	3,003.00	0.00	4.33	5.66	5.00		325.17	281.80	601.20
SPAN	2007-08	354.00	1,136.00	1,235.00	2,371.00	1.50	4.33	5.00	4.66	236.00	262.36	247.00	508.25
Mathematics													
CPSC	2003-04	0.00	166.00	63.00	229.00	0.00	0.86	0.25	0.55		193.91	252.00	414.08
CPSC	2004-05	12.00	181.00	115.00	296.00	0.25	0.80	0.86	0.83	48.00	226.93	134.34	357.99
CPSC	2005-06	18.00	180.00	36.00	216.00	0.25	0.61	0.25	0.43	72.00	297.00	144.00	504.64
CPSC	2006-07	0.00	147.00	39.00	186.00	0.00	0.89	0.58	0.73		165.85	66.86	253.11
CPSC	2007-08	15.00	125.00	33.00	158.00	0.25	0.61	0.18	0.39	60.34	206.25	187.00	403.82
MATH	2003-04	924.00	10,810.00	7,705.00	18,515.00	5.07	31.95	24.83	28.39	182.25	338.30	310.31	652.12
MATH	2004-05	1,159.00	9,834.00	7,487.00	17,321.00	4.74	32.33	27.18	29.76	244.61	304.18	275.44	582.11
MATH	2005-06	1,058.00	10,192.00	7,591.00	17,783.00	4.99	30.83	26.22	28.53	211.91	330.54	289.51	623.38
MATH	2006-07	977.00	9,442.00	7,572.00	17,014.00	5.58	30.51	27.63	29.07	175.00	309.44	274.05	585.24
MATH	2007-08	1,008.00	9,941.00	7,464.00	17,405.00	6.50	30.44	24.91	27.67	155.14	326.61	299.61	628.92
Physical Sciences													
ASTR	2003-04	66.00	292.00	309.00	601.00	0.32	0.60	0.60	0.60	206.25	486.67	515.00	1,001.67

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FERRIS STATE UNIVERSITY

Ranked Listing of Student Credit Hours (SCH) / Full Time Equated Faculty (FTEF)
Aggregated by Department
Fall + Winter Semesters 2007-2008

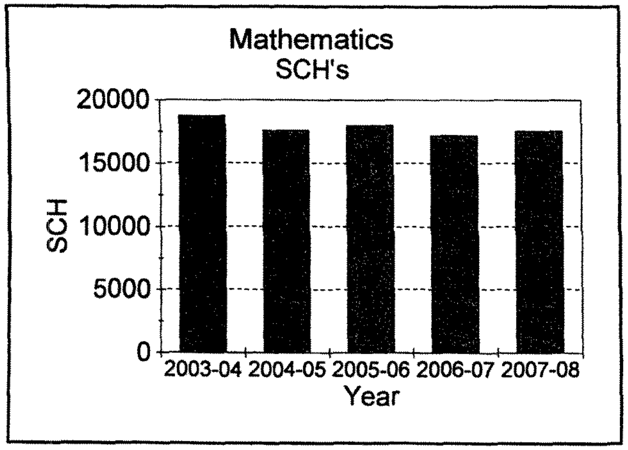
Department	Student Credit Hours/ Full Time Equated Faculty (SCH/FTEF)
Physical Sciences	714.65
Management	662.81
Social Sciences Dept	633.46
Mathematics	625.78
Humanities	606.35
Biology	601.31
Dental Hygiene-Medical Imaging	582.27
Account, Finance, Info Systems	581.43
Marketing	530.72
Sports, Entertain, Hospt. Mgmt	506.36
Clinical Lab-Resp Care-Hlth Ad	493.98
School of Nursing	482.24
Construction Tech-Mgmt	482.08

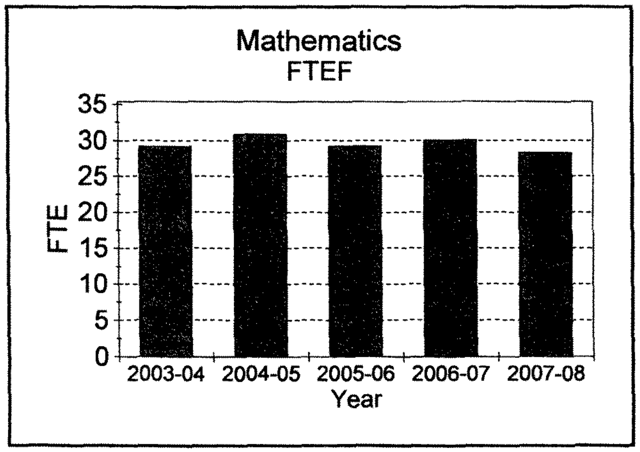
Ferris State University

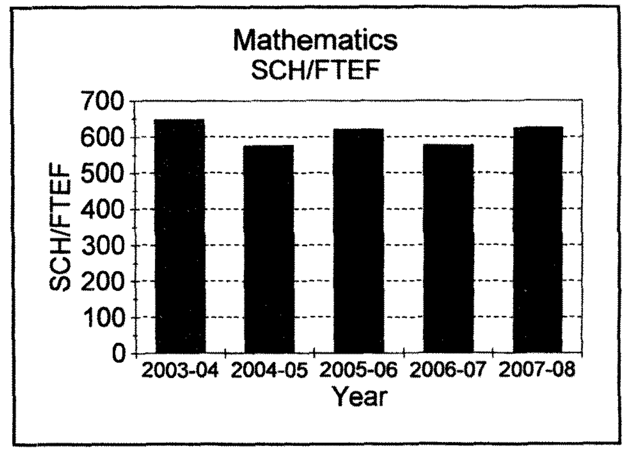
Student Credit Hours (SCH), Full Time Equated Faculty (FTEF) and SCH/FTEF
Aggregated by Department

Fall and Winter Terms Combined

Mathematics
(College of Arts & Sciences)







Year	SCH	FTEF	SCH/FTEF
2003-04	18,744.00	28.94	647.57
2004-05	17,617.00	30.58	576.05
2005-06	17,999.00	28.95	621.62
2006-07	17,200.00	29.81	577.05
2007-08	17,563.00	28.07	625.78

Caution: When viewing graphs, please note the differences in scales
Source: Office of Institutional Research, g:\...\facload\0708\prdas4g.rsl