MEMORANDUM

DATE: November 25 2003

TO: Academic Senate

FROM: Academic Program Review Council

RE: Recommendations for:

Bachelor of Science Degree in Applied Mathematics

CC: Robert McCullough, David Frank, Matthew Klein, Laurie Chesley, Thomas Oldfield

RECOMMENDATION OF ACADEMIC PROGRAM REVIEW COUNCIL:

We recommend that this program be continued.

DESCRIPTION OF PROGRAM:

CATALOG DESCRIPTION:

Choose Applied Mathematics?

The Mathematics Department at Ferris State lets you choose from five different application concentrations for your Bachelor of Science degree in Applied Mathematics: Actuarial Science, Applied Mathematics, Computer Science, Operations Research and Statistics. Each concentration requires that you satisfy the General Education requirements of the University plus the Applied Mathematics core courses and the required courses for your chosen concentration.

The Applied Mathematics 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.

Admission Requirements

First year student admission is open to high school graduates (or equivalent) who demonstrate academic preparedness, maturity and seriousness of purpose with educational backgrounds appropriate to their chosen program of study. High school courses and grade point average, ACT composite score, and ACT reading and mathematics sub-scores will be considered in the admission and placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course, or they must provide their high school records and ACT scores for admission review.

Graduation Requirements

The applied mathematics program leads to a bachelor of science degree. Graduation requires a minimum 2.0 overall GPA and a minimum of 120 credits including completion of all general education requirements as outlined in the general education section of the University catalog. Additionally, a minimum 2.5 GPA in all math and computer science course work is required.

BACKGROUND INFORMATION OBTAINED DURING THE REVIEW PROCESS:

The Applied Mathematics Program is housed in the Department of Mathematics of College of Arts and Sciences. Departments in the College of Arts and Sciences have a major responsibility of providing general education courses for students enrolled in programs in other colleges in the University. As a consequence, faculty in this department not only teach courses that are a part of the Applied Mathematics program but also general education service courses. Not all mathematics department faculty teach courses in the Applied Mathematics program. Many of the courses taken by Applied Mathematics majors also service students from other programs such as Mathematics Education, Pre-Pharmacy, Pre-Optometry and students enrolled in programs in the College of Technology.

Thirteen surveys were sent to recent graduates. Of these, 5 (38%) completed surveys were returned. The questionnaire consisted of 7 questions and the opportunity to write comments. The composite responses were reported on the seven questions along with a representative sample of comments.

Employers of recent graduates were surveyed and 4 (30%) responses were returned. The questionnaire consisted of 7 questions and the opportunity to write comments. The composite responses were reported on the seven questions along with a representative sample of comments.

Students in the Applied Mathematics program were surveyed. Of the 28 students in the program, 9 (32%) completed surveys. The questionnaire consisted of 6 questions and the opportunity to write comments. The composite responses were reported on the six questions along with a representative sample of comments.

COST INFORMATION:

According to the 2000-2001 report from Institutional Research:

	Total cost per SCH
Applied Mathematics BS	$157.18
Applied Mathematics (Actuarial Science) BS	$163.37
Applied Mathematics (Computer Science Track) BS	$157.12
Applied Mathematics (Operations Research Track) BS	$152.26
Applied Mathematics (Statistics Track) BS	$163.53

Total program cost

Applied Mathematics BS	$18,861.63
Applied Mathematics (Actuarial Science) BS	$19,604.13
Applied Mathematics (Computer Science Track) BS	$18,854.17
Applied Mathematics (Operations Research Track) BS	$18,271.76
Applied Mathematics (Statistics Track) BS	$19,624.01

ASSESSMENT OF THE APPLIED MATHEMATICS PROGRAM:

(1) The program has a number of important strengths:

- The purpose of this program is to prepare students for employment upon graduation in a mathematics related field. This program is directly related to the mission of Ferris State University.
- The students in this program are high quality. A significant number of them participate in the Midwest MATH Challenge competition.
- Recent graduates are now working in numerous different fields or pursuing graduate studies throughout the Midwest while others have acquired good jobs working in business and industry.
- The placement rate for graduates is 100%.
  - Many students have jobs lined up before they graduate.
  - The labor market analysis suggests that there is a high demand for graduates of this program.
- Graduates in mathematical sciences can expect a salary of approximately $30,000.
- Survey data from graduates and current students suggests that most students are satisfied with the mathematics education that they receive at Ferris State University.
- There are currently sixteen full-time tenured and tenure track Mathematics Department faculty who teach one or more courses that are a part of the Applied Mathematics curriculum. Three of these individual are new to the University this year. Several others have been at Ferris State University three years or less.
  - Ten of these have at least one PhD degree.
  - Six other faculty have at least one MS (3) or MA (3) degree.
  - There are professors with specific expertise in the fields of study related to each of the tracks in the degree.
  - No part-time or one year temporary faculty teach courses that are a part of the Applied Mathematics curriculum.

- Several faculty volunteer their time in community activities and recruitment activities like middle school and high school mathematics competitions.

- During the last 5 years:
  - Four of these sixteen tenured or tenure track faculty have received a promotion or merit award.
  - Fourteen of the sixteen have attended a regional or national professional meeting.
  - Seven of the sixteen have had a paper published and/or given a presentation/poster session at a professional meeting.
  - One of the sixteen tenured or tenure track faculty has taken a sabbatical leave.
- The Interim Dean of the College of Arts and Sciences has expressed strong support for this program.

(2) The Academic Program Review Council has the following concerns:

- While enrollment in the program has risen from 10 in 1998 to 27 in the fall of 2002, this is still a low enrollment program. At the present time there are:
  - 7 students in the Actuarial Science track,
  - 3 in the Applied Mathematics track,
  - 12 in the Computer Science track,
  - 4 in the Operations Research track,
  - 1 in the Statistics track, and
  - 4 in the newly created BA in Mathematics degree program.
- In an era of financial duress, institutions of higher education have a tendency to target low enrollment programs. In view of the nature and difficulty of the Applied Mathematics degree, it is unlikely that this program will ever attain a large numbers of majors. That does not negate the value to the University of having a strong mathematics department that offers a BS degree in mathematics.
- In this program there is normally cancellation of at least one upper level course per semester due to low enrollment (usually classified as below 15 students).
  - This results in decreased educational opportunities for majors in this program.
  - Substitution of courses simply to meet graduation requirements results in a diminished quality of the program.
  - Repeated cancellation of upper division courses may make it difficult to attract and retain highly qualified faculty who wish to teach at least some courses in their area of expertise.

- The program developed its own survey form and the data is not as complete as it could be:
  - The survey data from alumni, employers and students involved such low numbers that it is difficulty to draw any meaningful conclusions from that information.
- The Administrative Program Review appeared to discuss the Mathematics Department as a whole and not just this program. This deprives the University Administration and the Academic Program Review Council of vital information that is necessary for making informed decisions about this program.

(3) We recommend that the following steps need to be taken to maintain the quality of these program:

- The Applied Mathematics program should be retained with the current level of staffing.
  - Dr. Matthew Klein, Interim Dean of the College of Arts and Sciences stated in a memo to the Academic Program Review Council that this program is "absolutely vital for a comprehensive university such as Ferris."
  - It is hard to imagine that a University such as Ferris with its strong science and technology offerings would not have a major in mathematics.
  - According to data obtained from Institutional Research and Testing, the Applied Mathematics program is one of the most cost effective BS programs in the University.
- The Applied Mathematics program should maintain its present configuration, in spite of the fact that some tracks have low enrollment. Very little cost saving would be realized by eliminating or combining tracks.
  - Most if not all of the courses currently taught in the Applied Mathematics program would be taught anyway since they are required by other programs such as Mathematics Education, Pre-Pharmacy, Pre-Optometry and programs in the College of Technology.
  - Almost every course in the Applied Mathematics curriculum is shared by two or more tracks.
- The University and College of Arts and Sciences should continue allow the Applied Mathematics program to teach at least some upper division courses in which the enrollment is below the normal minimum number.
  - The Applied Mathematics program schedules many of these courses in alternate year format which is cost effective but creates scheduling difficulties for students.
    - It does a disservice to the students in the program to cancel a course after the students have waited a year or more to take that course.

        - Cancellation of required courses deprives students of the educational opportunity they deserve.
    - The Applied Mathematics faculty should be allowed to teach at least some courses in their area of specialty in view of the fact that the Mathematics Department and Applied Mathematics faculty provide low cost general education instruction for all segments of the University.
- University Advancement and Marketing, the College of Arts and Sciences, and the faculty in the Applied Mathematics program must develop and implement a recruitment plan to attract more quality students.
    - This plan should involve both internal and external marketing.
    - It should take advantage of the skills and the contacts of the advisory committee and graduates working in industry.
    - The plan should also target employees of the insurance companies in the state who are a significant employer of actuaries.

Questions for Applied Mathematics Panel

The bulleted items found under item 5 pages 15-16 of the document Academic Program Review: A Guide for Participants are the primary basis of the evaluation of the Applied Mathematics Program. The following questions are directly related to these criteria. The bullet number to which the question refers is cited prior to the question.

2 **What distinguishes the Applied Mathematics degree at Ferris State University from the mathematics degrees offered at the other colleges and universities in the state of Michigan? Why is it important that Ferris offer this degree?**

As mentioned in the report, our Applied Mathematics program, with its five tracks of specialization, is unique in the state of Michigan. We offer our students a wide variety of applications of mathematics to specialize in. All of our surveys indicate that the Applied Mathematics program fits the mission of the university, and we feel that we are a vital part of Ferris State University.

2 **Other than depending on the placement of graduates into jobs, is anything currently being done to increase the visibility of the Applied Mathematics program?**

Several faculty members are presenting the results of their research at national conventions this year.

We have a good number of our students participating in the Midwest MATH Challenge competition.

Several faculty members volunteer their time in community activities and recruitment activities like middle school and high school mathematics competitions.

We are always involved in any recruitment activity of the College of Arts and Sciences.

5 **Please list the primary skills, abilities, and knowledge base that you expect that a graduate of your program would possess.**

We have designed our curriculum to give our students a broad background in mathematics and the ability to apply this knowledge to a wide range of real-world problems. We would like our students to have knowledge of the foundations of mathematics and the ability to write computer programs to solve mathematical problems. We would also like them to be exposed to specific applications of mathematics and to be able to use their mathematical skills to understand, set up and solve original problems. This should give a graduate of our program the necessary background and skills to either go on to graduate school or become immediately employable in a mathematics career.

5 **For each skill, ability or knowledge base listed in the previous question, identify the major component(s) of your curriculum that are designed to develop that characteristic in your graduate.**

All of our students must complete a core of mathematics and computer science classes regardless of what track they are specializing in. This core includes a three-semester sequence in calculus, providing the students with a foundation to be used for other classes. The core also includes a course in a computer programming language. Subsequent courses unique to the track chosen by the student will provide the necessary skills to apply mathematics to specific real-world problems.

12 **Please indicate the number of full time tenured and tenure track faculty that teach one or more of the courses listed in the curriculum review in section 9 of the report. Of these faculty members; how many hold a PhD degree? MS or MA degree? Other (please specify)?**

There are currently sixteen full time tenured and tenure track faculty members who teach classes in our Applied Mathematics curriculum. Ten of these people have at least one PhD degree and the other six faculty members have at least one MS (3) or MA (3) degree.

12 **With regard to the professional activities and accomplishments of the full time tenured or tenure track faculty who currently teach the courses listed in the curriculum review in section 9 of the report:**

How many have received a promotion or merit award in the last 5 years?

4

How many have attended a regional or national professional meeting in the last 5 years?

14

How many have had a publication in a professional journal and/or presented a paper/poster at a professional meeting in the last 5 years?

7

How many have received a sabbatical leave during the last five years.

1

12 **How many part-time and one year temporary faculty teach the courses listed in the curriculum review in section 9 of the report?** None **What percentage of course sections in this program are taught by part-time or one year temporary faculty?** 0%

The following questions or requests for information are the result of our discussion concerning specific statements or material within the Applied Mathematics Program Review Panel Document. The page number containing the material upon which the question is based is cited prior to the question.

1-1 **The section on the Actuarial Science track indicates that this program prepares a student to take the first exam required of actuaries. Please elaborate on this series of tests and their relationship to a career in actuarial science. Do you have any information concerning the success on and/or scores of your graduates who take this exam?**

There are currently a series of 10 tests that are available for actuaries to take. The undergraduate curriculum at Ferris State University prepares the student for the first exam, dealing with mathematical concepts encountered in calculus, linear algebra and our one-year sequence in mathematical statistics. Upon successful completion of this first exam, a graduate would be highly sought after by employers. In fact, we currently have two students who have passed this exam and one already has a good job lined up upon graduation in May. Many actuaries never pass or even take all ten exams. The other exams deal with somewhat less mathematical concepts and are typically taken by actuaries after employment as their careers develop.

This first test is not an easy one, even with the proper course work. In the past three years we have had three students pass the first test and five or six students who have taken the exam and not passed. This is not unusual as typically less than half of the people taking these tests pass them. Last year the pass rate was 38.1% and the previous year it was 36.1%. Several of our recent graduates have acquired good jobs working for insurance companies in the actuarial field without passing or even taking one of the exams.

1-2 **Please describe the similarities and/or differences between your Computer Science track 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 a CS graduate

has a mathematics background well beyond calculus. The types of applications solved by a CIS student are primarily business-related, whereas the CS applications encountered by students are mathematically and scientifically oriented. The types of jobs the students would apply for can be quite different.

1-3; 10-1 **How many students are currently enrolled in each track? Do you have an explanation for the disparity between the numbers of students enrolled in the program listed on pages 1-3 and 10-1?**

It is difficult to accurately measure the number of students in each track because a student does not need to officially specify a track until he/she applies for graduation. At the present time we have 7 students in Actuarial Science, 3 in Applied Mathematics, 12 in Computer Science, 4 in Operations Research, 1 in Statistics and 4 in our newly created BA Mathematics degree program.

These numbers change on a weekly basis. For the Administrative Program Review, the numbers are taken after the sixth day of classes in the fall semester. The Program Coordinator takes his numbers several weeks later than that after students have had a chance to settle into the semester and make any desired changes.

1-5; 4-3 **Which of the courses listed in section 9 suffer low enrollment? In the last five years, how frequently have upper division level courses been cancelled due to low enrollment? What has the impact of this been on the quality education that your students receive?**

The courses which traditionally suffer from low enrollment include Cpsc 300, Cpsc 340, Math 310, Math 380, Math 414, Math 416 and Math 440. Some of the other upper level elective courses also have difficulty getting enough students on occasion. As you can see from Section 9, these are vital courses for some of our tracks and their cancellation causes real concern among students and advisors.

The Program Coordinator tries to substitute equivalent classes whenever possible to minimize the effect of a class cancellation. There are certain courses, however, that are so important for a track that there is no substitution possible. For example, the Math 414/416 year-long sequence in mathematical statistics and the Math 360 Operations Research course must be completed by any student hoping to graduate in the appropriate track. Since these classes are only offered once every two years, every effort is made to get the students in that track to take the course when it is offered.

1-5 What is status of the search for the 3 faculty mentioned in the Administrative Program Review?

We successfully hired three new tenure track faculty members:

Dr. Enoch Lee, PhD Mathematics, MS Computer Science
(computer science track)

Dr. Michael Dekker, PhD Mathematics
(applied mathematics track)

Ms. Holly Price, MS Statistics
(statistics track)

1-5; 4-4; 5-3 An area of concern expressed in the Administrative Program Review, and in student and faculty comments is the cancellation of classes with small enrollment. Please discuss the frequency with which this occurs and the implications of this as it relates to the quality of the education of the students in this program? What is the nature of the course substitutions that are implemented when a course is cancelled?

The frequency of course cancellations varies from semester to semester. This semester Math 380 was cancelled and Cpsc 320 was allowed to run with 6 students. 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 courses because they are afraid of the course being cancelled and their schedules affected.

As mentioned above, the Program Coordinator tries to substitute appropriate classes for those that are cancelled to minimize the effect of the cancellation, but sometimes no similar course 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).

1-5 Please discuss the relationship between the BA in Mathematics and the BS in Applied Math. Who advises the students in each of these degree programs?

These programs, while they share a common core of mathematics courses, are very different. As its name implies, the BS in Applied Mathematics concentrates on the applications of mathematics and prepares students to use mathematics in their jobs. The BA in Mathematics provides students with a more liberal historical approach to mathematics.

At the present time, the Applied Mathematics Program Coordinator advises students in both programs, but as the BA program grows, there will be a need for a second Program Coordinator. We do have specific advisors

for some of the tracks within Applied Mathematics, specifically the Computer Science and Actuarial Science tracks.

1-5; 4-2; 5-2 The Administrative Program Review mentions internships and question 4 on the student survey and question 9 on the faculty survey relate to related work/or internship experiences. How are the internships in the Actuarial Science track monitored? Are they paid or unpaid? Have you considered internships in all tracks? Are their any impediments to offering internships in other tracks?

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.

1-6 Please elaborate on the response to item number 9 in the Administrative Program Review.

As mentioned in this report, many of our students have achieved great success after graduation. Several have gone on to graduate schools and have done exceptionally well, while others have acquired good jobs working in business and industry. As mentioned earlier in this response to questions, our faculty have been quite involved in writing, research, presenting, etc. This is in addition to achieving excellence in teaching.

1-6 Please clarify how placement rate impacts on Program Outcomes Assessment and what curricular changes have been made in the Computer Science and Actuarial tracks as a result of this.

We have achieved a very high placement rate for graduates of our program. Their success in the job market is a strong indicator of the success of our programs. Several members of our Advisory Board have informed us that our Actuarial Science track is fine the way it is now. The Computer Science track is undergoing several changes, based on input from one of our new faculty members. These changes are detailed elsewhere in this response to questions.

2-3 Please explain why you chose to use an n of comments that was less the total number of comments. Were there any negative comments from graduates?

We didn't know you wanted to see every single comment in its entirety. We chose a representative sample of the comments. Several of the comments were quite similar. The only negative comments we received dealt with the cancellation of classes due to low enrollment.

3-2 Please comment on the relatively lower score in response to question 3 on the employer survey than to other questions.

Apparently some of the employers of our graduates think that our graduates are not as prepared as graduates from other universities. There were no comments in this regard on any of the surveys, so we don't know how to respond to this concern.

3-3 Please explain why you chose to use an n of comments that was less the total number of comments. Were there any negative comments from employers?

We didn't know you wanted to see every single comment in its entirety. We chose a representative sample of the comments. Actually, in the employer survey we included every comment we got. Some employers did not make any comments.

3-3 Please comment on the lower score in the employer survey to the question concerning skills that Ferris graduates have when compared to students from other universities.

This is identical to the question two questions up.

5-1 Do you have any insight as to why only 9 out of 20 faculty members responded to the survey?

The surveys were handed out to all faculty members and they were given several weeks to complete them. 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.

5-2 In question 2 the responding faculty members give a negative rating to the question concerning adequate funding for the program. What are the financial needs for the program? Has adequate funding been requested in the Unit Action Plan? Please submit the Unit Action Plans for the Department for the last 5 years.

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. It may be that many of the mathematics faculty are dissatisfied in general with the administration and the survey provides them with a means of venting their displeasure.

5-2; 8-1 **In questions 5 and 6 the responding faculty members give a relatively negative rating to the questions concerning computer hardware and software yet there is no indication of this being a problem in the facilities section and the recommendations section. Is their a lack of computer access and a deficiency of software that hinders the ability of the faculty in this program to offer quality education to your students?**

We don't believe there is a deficiency of computer software or hardware that impacts the program. Again the problem may lie with the mathematics faculty and their perceptions of administration in general.

5-3 **Please elaborate on the faculty perception concerning the lack of support for this program from the Administration.**

See the above two answers.

6-1; 13-2 **What is status of the Advisory Committee? Has this committee met?**

As mentioned in the report, we now have an Advisory Committee consisting of 6 members, including current Ferris employees, alumni and outside experts, covering all of our tracks. We are already benefiting from their expertise and plan on consulting with them frequently. This is a completely new Board and has not yet met as a group. We are planning the first meeting of this Board on campus in the spring of 2004.

6-4 **Please elaborate on the Advisory Board comment concerning the need for improvement of applications and tools classes. Does this refer to software or hard ware?**

This refers to giving students hands-on experience using application software packages. The Math 320 Simulations course, being offered this semester is addressing this need through special software. Similarly, the Math 310 statistics course also uses specialized software.

7-1 **Is there still a strong demand for graduates of your computer science track?**

Since the survey that was used for this report, the demand for computer science graduates has indeed dropped. We feel that it is still a very employable field and that knowledge of computer science still opens doors for employment.

9-1 This section lists 5 tracks in Applied Mathematics. Is there the potential for adequate enrollment to justify retaining all of these tracks?

There would be no financial difference if we changed the number of tracks from 5 to 3, or even to 7. Most, if not all, courses, appear in more than one track and it would make no sense to eliminate a track. This would only reduce the opportunities for our students without producing any positive results. We have had students graduate from all of our tracks and think it is a good idea to give the students the widest choice possible in specializing in a particular branch of applied mathematics.

9-2 Please clarify the difference between the Applied Math track and the Operations Research track. What is the justification for having these as separate tracks?

Admittedly, these two tracks are quite similar. The idea of the two tracks was to provide the students with more choices. Some students prefer to have only the words *Applied Mathematics* appear on their transcript, rather than a particular specialization. In the future, we may expand our Math 360 course to a one-year sequence in Operations Research and add Cpsc 320 , which would further distinguish the Operations Research track from the Applied Mathematics track.

9-3 Mention is made that last year significant changes have been proposed to the requirements. What are these changes and what is their status?

A change was initiated from a new faculty member in regards to our Computer Science track. The proposal dealt with replacing Cpsc 340 with Cpsc 328 as a required course in the track and requiring our students to take both Cpsc 200 and Cpsc 244. We are happy to have new faculty members who have an expertise in our various tracks and make proposals that will improve the program we offer students. Another proposal dealt with changing the core requirement for all tracks from either Cpsc 150 or Cpsc 244 to requiring either Cpsc 244 or Cpsc 200. These proposals are currently awaiting approval by the College Curriculum Committee. We are currently considering dramatically changing the Operations Research track to provide the student with a one-year sequence in Operations Research and a course in simulation (Cpsc 320). This proposal is just in the planing stages at this time.

10-1 What is your attrition rate?

Our attrition rate is about one-third. About half of our majors are students who switch into Applied Mathematics from other programs. These students usually stick with the program through graduation. Our attrition occurs with freshmen that enter Ferris and later change their minds due to other interests or the difficulty of the program. Approximately one-third of our freshmen leave the program, usually in their first year. Our program is not one that students major in to get an easy degree. It is a demanding program and our students are among the best at Ferris.

10-1; 13-2 Do you have articulation agreements with Junior Colleges?

Yes, we have signed articulation agreements with a large number of junior colleges and 4-year colleges, most of these coming within the past five years.

10-1 Have considered recruiting in current employees in the insurance industry for the Actuarial Science track?

We have not done this in the past. We now have Advisory Board members and employer contacts through our surveys that work in the insurance field, so this may become a good recruitment possibility in the future.

13-2 What are your recruitment plans?

Our recruitment opportunities are limited by our workload. One-quarter release time for the Program Coordinator is not sufficient to adequately run the program, let alone be involved in a lot of recruiting. We do participate in all recruitment programs offered by the College of Arts and Sciences and volunteer our time with such programs as football recruiting weekends when they involve students interested in majoring in math. The Program Coordinator regularly responds via phone or e-mail to any person interested in our program. We also send letters to high school students interested in our program. Several faculty members volunteer their time in community activities, including mathematics competitions and talking to local groups.

C-2 to C-32 **A number of these syllabi list the name of individuals who are no longer employed at Ferris State University? Please provide use with current syllabi for these courses.**

All of the submitted syllabi are the current ones for the courses. The individuals that are no longer employed at Ferris have only recently retired, and there has not been a need to revise syllabi until the content of the course changes or a new textbook has been adopted. When this occurs, the new contact person for the affected course will prepare a new syllabus.

BS DEGREE IN APPLIED MATHEMATICS

CATALOG DESCRIPTION:

Choose Applied Mathematics?

The Mathematics Department at Ferris State lets you choose from five different application concentrations for your Bachelor of Science degree in Applied Mathematics: Actuarial Science, Applied Mathematics, Computer Science, Operations Research and Statistics. Each concentration requires that you satisfy the General Education requirements of the University plus the Applied Mathematics core courses and the required courses for your chosen concentration.

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First year student admission is open to high school graduates (or equivalent) who demonstrate academic preparedness, maturity and seriousness of purpose with educational backgrounds appropriate to their chosen program of study. High school courses and grade point average, ACT composite score, and ACT reading and mathematics sub-scores will be considered in the admission and placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course, or they must provide their high school records and ACT scores for admission review.

Graduation Requirements

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SPECIFIC CRITERIA:

- **CENTRALITY TO FSU MISSION:**

  Ferris State University will be a national leader in providing opportunities for innovative teaching and learning in career-oriented, technological and professional education.

  The purpose of this program is to prepare students for employment upon graduation in a mathematics related field. All of the surveys conducted during this review indicate that this program is perceived to be directly related to the mission of Ferris State University. (page 12-1)

- **UNIQUENESS AND VISIBILITY OF PROGRAM:**

  Although every college and university in the state of Michigan offers a degree in mathematics, the Applied Mathematics program at Ferris State University, with its five tracks of specialization, is unique in the state of Michigan. It offers Ferris State University students a wide variety of applications of mathematics in which to specialize.

  A number of students in this program are participating in the Midwest MATH Challenge competition. Several faculty members are presenting the results of their research at national conventions this year. Faculty members volunteer their time in community activities and recruitment activities such as middle school and high school mathematics competitions. Faculty members are always involved in any recruitment activity of the College of Arts and Sciences.

  The program has signed articulation agreements with a large number of community or 2-year colleges and 4-year colleges, with most of these coming within the past five years.

- **SERVICE TO STATE, NATION, WORLD:**

  Recent graduates are now working in numerous different fields or pursuing graduate studies throughout the Midwest. (page 12-1)

- DEMAND BY STUDENTS:

  There has been a steady increase in enrollment during the last 5 years with a low of 10 in the fall of 1998 to a high of 27 in the fall of 2002. (page 1-3) According to the report the program coordinator has received numerous telephone and e-mail inquiries about the program. (page 12-1)

  A student does not need to officially specify a track until he/she applies for graduation so is difficult to accurately measure the number of students in each track. At the present time there are 7 students in Actuarial Science, 3 in Applied Mathematics, 12 in Computer Science, 4 in Operations Research, 1 in Statistics There are also four students enrolled in the Math BA degree, a different but complementary degree in which students take many of the same courses taken by Applied Math students.

- **DEMAND FOR, PLACEMENT OF, AND AVERAGE SALARY OF GRADUATES:**

  The placement rate for graduates is 100%. Many students have jobs lined up before they graduate. No salary data from graduates was provided. (page 12-1) The labor market analysis (page 7-1) included in the report suggests that there is a high demand for graduates in mathematical sciences who can expect a salary of approximately $30,000. In the field of computer science the median salary is approximate $44,000.

- **SERVICE TO NON-MAJORS:**

  The courses in the Applied Mathematics curriculum are open to any Ferris student who has the necessary background. Approximately 90 students who are enrolled in Mathematic Education take Applied Mathematics courses. The program also offers minors in Applied Mathematics and Computer Science for non-majors throughout the university. (page 12-1)

- **QUALITY OF INSTRUCTION:**

  Survey data from graduates and current students suggests that most students in the Applied Mathematics program are satisfied with the mathematics education that they receive at Ferris State University.

  Students from this program have achieved great success after graduation. Several have gone on to graduate schools and have done exceptionally well, while others have acquired good jobs working in business and industry.

- **FACILITIES AND EQUIPMENT:**

  Currently three classrooms are equipped with a computer and large screen display. The program review panel believes that at present the facilities and equipment are adequate to run this program, but as the program grows, the needs will grow. (page 12-3)

  The committee believes 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.

- LIBRARY INFORMATION RESOURCES:

  The library resources are sufficient for the program. Internet and on-line searches supplement the holdings in the library. (page 12-3)

- COST:

  According to the 2000-2001 report from institutional research:

	Total cost per SCH
Applied Mathematics BS	$157.18
Applied Mathematics (Actuarial Science) BS	$163.37
Applied Mathematics (Computer Science Track) BS	$157.12
Applied Mathematics (Operations Research Track) BS	$152.26
Applied Mathematics (Statistics Track) BS	$163.53
Total program cost	
Applied Mathematics BS	$18,861.63
Applied Mathematics (Actuarial Science) BS	$19,604.13
Applied Mathematics (Computer Science Track) BS	$18,854.17
Applied Mathematics (Operations Research Track) BS	$18,271.76
Applied Mathematics (Statistics Track) BS	$19,624.01

- FACULTY:
  - QUALIFICATIONS:
    - There are currently sixteen full time tenured and tenure track faculty members who teach classes in the Applied Mathematics curriculum. Ten of these have at least one PhD degree and the other six faculty members have at least one MS (3) or MA (3) degree. Three of these are new to the University this year. Several others have been at Ferris State University three years or less.
    - No part-time or one year temporary faculty teach courses in this program.
  - PROFESSIONAL AND SCHOLARLY ACTIVITIES:
    - Four of the sixteen tenured or tenure track faculty members have received a promotion or merit award during the last five years.
    - Fourteen of the sixteen have attended a regional or national professional meeting in the last 5 years
    - Seven of the sixteen tenured or tenure track faculty members have had a paper published and/or made a presentation/poster session at a professional meeting during the last five years.
    - One of the sixteen tenured or tenure track faculty members has been awarded a sabbatical leave during the last five years.

- ADMINISTRATIVE EFFECTIVENESS:

The administration of the Applied Mathematics program is divided between the Program Coordinator and the Department Head. The program coordinator is primarily responsible for recruiting students, advising students, clearing students for graduation awarding scholarships and making contacts with employers. The department head is responsible for the departmental budget and for ensuring that a suitable schedule of courses is offered. The cooperation between these two individuals has been excellent. (page 12-4)

The frequency of course cancellations varies from semester to semester. This semester Math 380 was cancelled and CPSC 320 was allowed to run with 6 students. 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 courses because they are afraid of the course being cancelled and their schedules affected.

The Math 414/416 year-long sequence in mathematical statistics and the Math 360 Operations Research course must be completed by any student hoping to graduate in the appropriate track. Since these classes are only offered once every two years, the department makes every effort to get the students in that track to take the course when it is offered.

Applied Mathematics Program Review

Fall, 2003

Program Review Panel:

1. Robert McCullough, Chair of PRP
   Program Coordinator for Applied Mathematics
   Associate Professor, Mathematics

2. Dave Frank, Department Head, Applied Mathematics

3. Holly Price, Assistant Professor, Mathematics

4. Kent Sun, Associate Professor, Mathematics

5. Joan Totten, Head, Development Programs and Curriculum Programs

6. Shaw Walker, Assistant Professor, Mathematics

Applied Mathematics Program Review

Fall, 2003

Table of Contents

Program Overview

The mathematics department at Ferris State University offers a Bachelor of Science degree in Applied Mathematics with five different application tracks 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 last Program Review in the fall of 1997. The main outcome of the review was the idea of dividing our degree into five options, or "tracks", which would, hopefully, make our program more attractive to students. An overview of the five tracks appears below.

Actuarial Science track

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 track

This track 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 track

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.

Operations Research track

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 track

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.

ADMINISTRATIVE PROGRAM REVIEW 2002

Program/Department: APPLIED MATHEMATICS

Purposes of Administrative Program Review:

1. to make deans and department heads/chairs aware of important quantitative and qualitative information about the programs in their colleges
2. to make the Vice President for Academic Affairs' Office aware of important quantitative and qualitative programmatic information from across the University
3. to document annual information that will be useful in the University's accreditation efforts
4. to provide information for the Academic Program Review Council to use in its deliberations

Please provide the following information:

Enrollment

	Fall 1998	Fall 1999	Fall 2000	Fall 2001	Fall 2002
Tenure Track FTE	25	21	23	25	21
Overload/Supplemental FTEF	2.2/2.2	2.5/5	4/5	3.9/3.7	5.2/7.7
Adjunct/Clinical FTEF (unpaid)					
Enrollment on-campus total*	10	11	19	21	27
Freshman	3	3	6	7	11
Sophomore	1	1	5	5	3
Junior	4	3	4	3	6
Senior	2	4	4	6	7
Masters					
Doctoral					
Pre-Professional Students					
Enrollment off-campus*					
Traverse City					
Grand Rapids					
Southwest					
Southeast					

*Use official count (7-day)

If there has been a change in enrollment, explain why:

Capacity:

Estimate program capacity considering current number of faculty, laboratory capacity, current equipment, and current levels of S&E.

___50___ students

What factors limit program capacity? Faculty positions.

Financial

Expenditures*	FY 98	FY 99	FY 00	FY 01	FY 02
Supply & Expense					
Faculty Prof. Development					
General Fund					
Non-General Fund					
UCEL Incentives					
FSU-GR Incentives					
Equipment					
Voc. Ed. Funds					
General Fund					
Non-General Fund					
UCEL Incentives					
FSU-GR Incentives					

*Use end of fiscal year expenditures.

If you spent UCEL and FSU-GR incentive money for initiatives/items other than faculty professional development and equipment, what were they? Explain briefly. Please also include amounts spent on each initiative/item.

Revenues	FY 98	FY 99	FY 00	FY 01	FY 02
Net Clinic Revenue					
Scholarship Donations					
Gifts, Grants, & Cash Donations					
Endowment Earnings					
Institute Programs/Services					
In-Kind					

Other

	AY 97-98	AY 98-99	AY 99-00	AY 00-01	AY 01-02
Number of Graduates* - Total	2	0	4	2	8
- On campus	2	0	4	2	8
- Off campus					
Placement of Graduates	2	0	4	2	8
Average Starting Salary					
Productivity - Academic Year Average					
- Summer					
Summer Enrollment					

* Use total for full year (S, F, W)

1. a) Areas of Strength:
   - Small Classes
   - Five different tracks (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 continues to grow

   b) Areas of Concern and Proposed Actions to Address Them:
   - Enrollment remains low, although steadily increasing
   - Cancellation of some classes with low enrollment requires substituting classes, which impacts the overall quality of the program
   - 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

2. Future goals (please give time frame):
   - Continue to advertise our programs and work toward increasing enrollment
   - Employ more faculty with strong backgrounds in Computer Science and Statistics (current search for three tenure-track positions is promising)

3. Other Recommendations:
   - Recruit students to our newly approved BA in Mathematics Degree program

4. Does the program have an advisory committee? One is currently being established.

   a) If yes, when did it last meet?

   b) If no, why not? By what other means do faculty receive advice from employers and outside professionals?

   c) When were new members last appointed?

   d) What is the composition of the committee (how many alumni, workplace representatives, academic representatives)?

   e) Please attach the advisory committee charge, if there is one.

5. Does the program have an internship or other cooperative or experiential learning course? No.

   a) If yes, is the internship required or recommended?

   b) If no, what is the reason for not requiring such an experience? Only the actuarial track has industrial internship opportunities.

   c) How many internships take place per year? What percentage of majors has internships? All actuarial students who desire them.

6. Does the program offer courses through the web? No.

a) Please list the web-based courses (those delivered primarily through the internet) the program offered last year?

b) Please list the web-assisted courses the program offered last year.

7. What is unique about this program? Graduates receive an especially strong mathematics background regardless of the specialty track they select, thus making them highly employable.

a) For what distinctive characteristics is it known, or should it be known, in the state or nation?

b) What are some strategies that could lead to (greater) recognition? Recruiting blue chip math students, and hiring young, enthusiastic teachers with interest/skills in growing the program.

8. Is the program accredited? By whom? If not, why? When is the next review? There is no specific accrediting body for mathematics other than the North Central Association accreditation of the institution as a whole.

9. What have been some major achievements by students and/or graduates of the program? By faculty in the program? Completion of graduate degrees.

10. Questions about Program Outcomes Assessment/Assessment of Student Learning at the Program Level (Attach additional sheets, if necessary.)

a) What are the program's learning outcomes?
Preparation for graduate school and/or a technical career.

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

c) What are the standards for assessment results?
Placement rate.

d) What were the assessment results for 2001-02?
100% placement.

e) How will / how have the results been used for pedagogical or curricular change?
Curricular changes in the Computer Science and Actuarial tracks.

11. Questions about Course Outcomes Assessment:

a) Do all multi-sectioned courses have common outcomes? Yes

b) If not, how do you plan to address discrepancies?

c) Do you keep all course syllabi on file in a central location? Yes

*If you have questions about the outcomes assessment portions of this survey, please contact Laurie Chesley (x2713).

Form Completed by Darrell E. Allgaier, Department Head/February 10, 2003
Name and Title / Date

Reviewed by Dean [signature] 2/13/03
Name / Date

Comments by Dean:

Perceptions of Graduates

Recent graduates of our Applied Mathematics program were surveyed. Of the 13 students who have graduated since our program was divided into tracks, 5 submitted completed surveys. The questionnaire consisted of 7 questions and the opportunity to write comments. The survey, average of each response 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.

4.8

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

4.3

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

4.3

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

4.8

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

4.3

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

4.5

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

4.5

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

Analysis of Graduate Questionnaire

It is interesting to note that our survey of recent graduates has higher ratings than our other surveys. Our graduates seem to be pleased with the education they received. Again, however, several students commented on our infrequent offering of and occasional cancellation of the upper level courses, which are vital to their later success.

Some of their comments from the surveys:

"Students in the actuarial science track should be encouraged to take at least the first actuarial exam during their study in FSU. "

"I loved my experience at FSU with the Math Dept. The professors were always kind and helpful. I felt well-prepared afterwards while in graduate school, and can now appreciate the relaxing environment I had as an Applied Math student at FSU."

"The math program is great and the faculty is always willing to help any way possible. Thank you for all of your help."

"I enjoyed Ferris and those years were the best of my life, so far."

Employer Perceptions

Employers of our recent graduates from the Applied Mathematics program were surveyed. Of the 13 students who have graduated since our program was divided into tracks, we received responses from 4 employers. The questionnaire consisted of 7 questions and the opportunity to write comments. The survey, average for each response and a short analysis of the results appear on the following pages.

Employer 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.

4.50

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

4.25

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

3.75

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

4.50

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

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.

4.25

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

4.75

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

Analysis of Employer Questionnaire

Employers seem to be generally satisfied with graduates of our Applied Mathematics program, the main concern being that our graduates may not have skills/knowledge comparable to graduates of other programs in the state. However, a few comments appearing below speak well for our students preparation.

"*We have a very highly regarded program in actuarial science that attracts many outstanding students. [She] is one of them. She appears to be well trained and should have no difficulty in completing her [Masters] degree.*"

"*She was one of our top graduate statistics students.*"

Perceptions of Students

Students in the Applied Mathematics program were surveyed. Of the 28 students in the program, 9 submitted completed surveys. The questionnaire consisted of 6 questions and the opportunity to write comments. The survey, average of each response and a short analysis of the results appear on the following pages.

Student Survey

Answer each question as follows:

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

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

3.8

2. Computer software is adequate for the needs of the program.

3.8

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

4.2

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

2.5

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

4.1

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

4.0

Analysis of Student Questionnaire

The results of the student questionnaire were quite revealing. While most students are happy with the instruction that they receive and the quality of the program, they remain concerned about two main issues.

First, they worry about the ability of the department to offer the upper level courses in a timely manner. Several times we have been forced to cancel upper level courses because of low enrollment. Since some of our courses are only offered once every two years, this can become a big problem. Obviously, increasing the number of students majoring in Applied Mathematics would help alleviate this problem. To the credit of the administration of the college of Arts and Sciences, they have allowed many of our upper level courses to run even with low enrollment. For example, this fall semester we have upper level courses running with enrollments of 6, 9, 11 and 12 students each. We appreciate the willingness of the Dean to allow us to run these courses, which are vital to the success of our program. Hopefully, increased enrollment will allow us in the future to offer upper level courses more often to our students.

Second, some of our students would like to see more opportunities for internships and other job-related activities. Admittedly, there have been few such opportunities in past years. That is starting to change, however. This past year one faculty member involved some of our students actively in his research. This is obviously an area in which we need to improve.

Some of the student comments appear below:

"*I am excited that the math dept, is taking steps in the direction of program improvement.*"

"*I think it is a good program, and the faculty/staff do their best to make it that way. My only complaint would be that some classes are offered infrequently and it is hard to coordinate my schedule with them.*"

"Higher level courses need to be offered when they are scheduled to be offered regardless of how many students sign up, just so people will see there's an actual schedule to things and more students will be willing to come into the program."

"Why do you cancel these required classes, only causing your own applied mathematics students a difficult time of graduating?"

Perceptions of the Mathematics Department

Members of the Mathematics Department were surveyed. Of the 20 members of the department, 9 submitted completed surveys. The questionnaire consisted of nine questions and the opportunity to write comments. The survey, average of each response and a short analysis of the results appear on the following pages.

Faculty Survey

Answer each question as follows:

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

1. The Applied Mathematics program is in line with the mission of Ferris State University.

4.9

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

2.9

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

4.8

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

3.7

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

2.9

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

3.1

7. 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.

4.3

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

3.0

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

3.0

Analysis of Faculty Questionnaire

There is unanimous agreement on several issues; namely, that the Applied Mathematics program is 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. Some of the quotes from the surveys:

"The variety of the courses could be improved. This is a business/funding issue, though."

"Considering how much money is earned for FSU in our 'big' Math 110 and Math 115 classes, the University should allow all required courses to run at least once every two years with low enrollment (not currently done)."

"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."

As will be mentioned elsewhere in this report, the math department produces a lot of money for the University through our low-level courses. Perhaps this is some justification for allowing low enrollment courses to run.

Perceptions of the Advisory Board

The mathematics department has not done a very good job at getting and keeping an Advisory Board in the past. For our last evaluation six years ago, John Hansen, our department head at the time, formed a Board consisting of three people that he knew in business and industry. There was no Board meeting, just telephone calls and mailings. When Dr. Hansen left, the Board kind of left with him.

We have been actively recruiting a new board for some time and now have a member for each specialty track in our program. The present members of our board include

1. Mr. Sam Burgess, Programmer/Project Director, Professional Services Division, Compuware Corporation. Some of his assignments have included the creation and implementation of *statistical* databases.

2. Dr. Steven Butt, Professor of Industrial and Manufacturing Engineering, Western Michigan University. He has a Ph.D. in Industrial Engineering and *Operations Research*.

3. Dr. John Hansen, Professor of *Computer Science*, Saginaw Valley State University. He is a former department chair of our mathematics department and is the architect of our five track program.

4. Ms. Tegan Reist, Procurement Analyst, Allstate Insurance Company, Tegan is a graduate of our Applied Mathematics program in the *Actuarial Science* track.

5. Dr. Dave Frank, Interim Department Head, Mathematics, Ferris State University

6. Robert McCullough, Program Coordinator, Applied Mathematics Program, Ferris State University

Our board members were surveyed. The questionnaire consisted of six questions and the opportunity to write comments. Of the 6 members of the Board, 3 have submitted completed surveys. The survey, average of each response and a short analysis of the results appear on the following pages.

Advisory Board 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.

4.67

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

4.00

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

4.67

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

4.33

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

4.67

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

5.00

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

Analysis of Advisory Board Questionnaire

Several of our Board members are new to the Board and need to learn more about our program before being able to help us. Nonetheless, this first look at our Board's opinions of our program is quite encouraging. We look forward to receiving many helpful suggestions from our distinguished Board in the future. A few comments from our Board members appear below.

"I think the academic rigor of the required courses in the Applied Math program does adequately prepare students for the job market, however I do feel that there is great room for improvement in the areas of classes that center around applications and tools."

"I do think that FSU prepared an immediately employable graduate in myself."

"Looks like a good program with many opportunities available for students."

Labor Market Analysis

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 1999 survey, which was released in the year 2000.

We have included some of the pertinent tables in Appendix A of this report. To summarize the tables, the survey received over 23,700 responses from graduates in the mathematical sciences. Of these respondents, 4,800 were pursuing a higher degree, 3,900 were employed in science or engineering, 13,900 were employed in other occupations (most likely in the business field) and an insignificant number (< 100) were neither employed nor going to school. The median salary for these recent graduates was around $30,000. There were virtually no differences between the numbers of males and females, their current pursuits or their median salary, which was in stark contrast to some of the other fields.

In the field of computer science, 46,000 responses were received with only insignificant numbers (< 100) indicating not pursuing a higher degree or unemployed. Their median salary was around $44,000. There were dramatic differences between males and females in this field, with 75% of the respondents being male. The median salaries for males ($45,000) and females ($41,000) also showed a small difference.

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 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 six years, since that is the time frame for the evaluation of our new degree with its numerous specialty tracks.

Several of our recent graduates have chosen to pursue advanced degrees. One student, who graduated under the statistics track, recently 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 has just recently been selected as a tenure-track member of our department. A second graduate of our statistics track is currently pursuing a Masters degree in statistics from Western Michigan University. Another graduate from our actuarial science track is currently working on a Masters degree in actuarial science from the University of Iowa and just recently passed the second national actuarial exam.

Other students in our actuarial science track usually find jobs with insurance companies after graduation. Auto Owners and State Farm insurance companies have recently hired our graduates. A student from our computer science track has secured a good job working with computers for Ford Motor Company near Detroit. Other recent graduates have become teachers in the public school system or in a community college.

Our program has suffered form low numbers of students in recent years and is only now regaining strength. 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.

Evaluation of Facilities and Equipment

Rooms and Hardware

There are presently three classrooms equipped with a computer and large screen display. These classrooms are used for computer science courses and for courses in mathematics in which DERIVE (a symbolic algebra system) or other specialized software is used.

Students taking our CPSC courses currently have several options for working on assignments outside of class. The main computer lab in the Library is available to our students, but many students may now use the public computer rooms located in the dorms and even their own personal computers. Residential Network Support (RNS) gives students the software needed to use the computers in their room.

Software

Computer Science Classes

Presently the department is using Microsoft Visual Studio. In particular, we are using the Visual BASIC and C/C++ parts of this software to support our CPSC 150 and CPSC 200/300 courses. We are also using the Lahey Fortran 90 compiler to support our CPSC 244 course.

As our program grows we will probably need to purchase some special software for our advanced CPSC courses.

Mathematics classes

We are presently using DERIVE, a computer algebra system, to support various mathematics courses, including the calculus sequence. We have versions 4.0 and 5.0 of DERIVE available for faculty and student use.

Statistics classes

The SAS statistical package is needed for student use in some of our advanced statistics courses. The cost of around $3,000/year to lease this software could be met by requiring the students to purchase a student version or through department funds.

Section 9

Curriculum Review

Based on the recommendations given to us by the 1997 Academic Program Review Council, we completely revised our Bachelor of Science degree program in Applied Mathematics to consist of five different tracks: actuarial science, applied mathematics, computer science, operations research and statistics. Each student in our program must complete a basic core of classes, listed below.

Applied Mathematics Core - 22 credit hours required

1.	Cpsc 150	Visual BASIC Programming or	
	Cpsc 244	Scientific Programming in FORTRAN	3 credits
2.	Math 220	Analytical Geometry & Calculus 1	5 credits
3.	Math 230	Analytical Geometry & Calculus 2	5 credits
4.	Math 251	Statistics for the Life Sciences	3 credits
5.	Math 320	Analytical Geometry & Calculus 3	3 credits
6.	Math 322	Linear Algebra	3 credits

The student can then choose which track to specialize in, with each track having its own set of additional requirements, listed below.

Actuarial Science Track Requirements - 21 credit hours required

1.	Math 310	Linear Models in Statistics	3 credits
2.	Math 314	Probability	3 credits
3.	Math 340	Numerical Analysis	3 credits
4.	Math 414	Applied Analysis	3 credits
5.	Math 416	Mathematics Modeling	3 credits
6.	Insr 290	Risk Management	3 credits
7.	Econ 221	Principles of Economics	3 credits

Applied Mathematics Track Requirements - 18 credit hours required

1. Math 330	Differential Equations	3 credits
2. Math 340	Numerical Analysis	3 credits
3. Math 360	Operations Research	3 credits
4. Math 380	Applied Analysis	3 credits
5. Math 440	Mathematics Modeling	3 credits
6. Math or Cpsc 300/400 elective		3 credits

Computer Science Track Requirements - 21 credit hours required

1. Cpsc 200	Object Oriented Programming	4 credits
2. Cpsc 300	Data Structures and OO Design	4 credits
3. Cpsc 340	Hardware and Software Organization	4 credits
4. Math 340	Numerical Analysis	3 credits
5. Math 420	Introduction to Abstract Algebra	3 credits
6. Cpsc 300/400	Elective	3 credits

Operations Research Track Requirements - 18 credit hours required

1. Math 330	Differential Equations	3 credits
2. Math 360	Operations Research	3 credits
3. Math 440	Mathematics Modeling	3 credits
4. Math or Cpsc 300/400 elective		3 credits
5. Math or Cpsc 300/400 elective		3 credits
6. Math or Cpsc 300/400 elective		3 credits

Statistics Track Track Requirements - 18 credit hours required

1. Math 310	Linear Models in Statistics	3 credits
2. Math 314	Probability	3 credits
3. Math 414	Mathematical Statistics 1	3 credits
4. Math 416	Mathematical Statistics 2	3 credits
5. Math or Cpsc 300/400 elective		3 credits
6. Math or Cpsc 300/400 elective		3 credits

This diversity in fields within our applied mathematics program is probably one of the main reasons for the growth of our program.

We follow the success of our students as they progress through the tracks and just last year proposed several significant changes to the above requirements, reflecting the needs of our students, which will make our program stronger.

We are constantly monitoring these tracks and will propose more changes in the coming academic year to continue to improve our programs and make them more attractive and beneficial to our students.

Also within the past six years, we have completely revised our Applied Mathematics and Computer Science minors programs, based on suggestions from within and outside the department, to bring these minors more in line with other minor programs offered at Ferris State University.

Curriculum vitae for members of the mathematics department are included in Appendix B.

The content sheets for all of our upper level mathematics courses and the checksheets for the programs are included in Appendix C.

Section 10

Enrollment Trends

Enrollment in our Applied Mathematics program has shown a steady increase over the past six years and now stands at its highest total since the 1980s. The most obvious reason for the increase may lie with the revision of our program into five distinct tracks. Here are the numbers for the past six years, starting with Fall, 1997, the last time the program was reviewed:

Fall, 1997:	7 students
Fall, 1998:	9 students
Fall, 1999:	11 students
Fall, 2000:	19 students
Fall, 2001:	20 students
Fall, 2002:	28 students
Fall, 2003	28 students

Graduates from our program are as follows:

1997-1998:	1 student
1998-1999:	0 students
1999-2000:	4 students
2000-2001:	3 students
2001-2002:	6 students
2002-2003:	2 students
2003-2004:	between 7 and 10 students [projected]

While these numbers may still seem low, we are proud of quadrupling our enrollment (how many departments can say that?) in the past six years. Hopefully, our enrollment will continue to increase during the next six years.

During this time we have graduated students from each of our five tracks and currently have a large group of students in the actuarial science and computer science tracks.

Section 11

Program Productivity/Cost

The data available is from the 2000-2001 academic year and comes from the Office of Institutional Research. This report ranks programs using many factors according to cost.

The total average cost per student credit hour:

Applied Mathematics (Actuarial Science track)	BS	$163.37
Applied Mathematics (Applied Mathematics track)	BS	$157.18
Applied Mathematics (Computer Science track)	BS	$157.12
Applied Mathematics (Operations Research track)	BS	$152.26
Applied Mathematics (Statistics track)	BS	$163.53

Compare these costs with related programs:

University average		$191.59
Computer Information Systems	BS	$179.20
Insurance	BS	$161.99

The average department cost per student credit hour:

Of the 23 departments in the University ranked from most expensive (Television Production: $216.79) to least expensive (Child Development: $6.56), the Mathematics department comes in 22nd with a cost of $8.38. Only Child Development has a lower department cost than Mathematics. This is counting all of the service courses that the Mathematics department teaches in addition to the advanced courses, but is still very impressive.

The total Program Cost:

Biotechnology	BS	$38,460.02	(highest 4 year BS program)
Applied Mathematics	BS	$18,861.63	
Business Administration	BS	$17,301.33	(lowest 4 year BS program)

Applied Mathematics rates as one of the least expensive 4 year BS programs offered by the University.

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

Conclusions

We feel that the Applied Mathematics program has made great strides in improving the enrollment in and quality of our program in the past six years In this section, the twelve areas of analysis raised by the APRC are addressed.

i. *Centrality to FSU mission*

The purpose of our program is to prepare our students for employment upon graduation in a mathematics-related field. The mission statements of the department of mathematics and the Applied Mathematics program were constructed and approved within the context of the overall FSU mission. In its report in 1997, the APRC listed centrality to the FSU mission as the number one strength of our program. All of the surveys indicate that our program is perceived to be directly related to Ferris' mission.

ii. Uniqueness and visibility

There are only a handful of universities in the state of Michigan that offer an Applied Mathematics degree and our program is unique in the offering of five different tracks of study. As more of our students graduate and move into the job market, the visibility of our program will grow.

iii. Service to state and nation

The Applied Mathematics program is providing a service to employers in both the state of Michigan and the nation. Our recent graduates are now working in numerous different fields or pursuing graduate studies throughout the Midwest.

iv. Demand by students

According to our enrollment trends, our program is in increasing demand by our students. If the phone calls and e-mails received by the Program Coordinator this summer are any indication, this demand will remain steady and, perhaps, even grow in the coming years.

v. Quality of instruction

The mathematics department has always maintained a high quality of instruction, as is evidenced by our survey results. Within the past six years we have recruited faculty with expertise in statistics, computer science and actuarial science to help us improve our program.

vi. Demand for graduates

The labor market analysis section of this report shows that there is now and will continue to be a great demand for graduates with a background in applied mathematics.

vii. Placement rate

The placement rate for our graduates is 100%. Many of our students have jobs lined up before they graduate. One of our majors who will be graduating next spring already has a lucrative job lined up after graduation. We do not currently have data on the average salary of our graduates, but many get very good jobs.

viii. Service to non-majors

Ferris offers a degree in Mathematics Education, which currently has around 90 students. These students take many of our upper level courses, both as required courses and as electives. Our courses are open to any student at Ferris who has the necessary

background. We also offer minors in Applied Mathematics and Computer Science for non-majors throughout the university.

ix. Facilities and equipment

There are presently three classrooms equipped with a computer and large screen display. These classrooms are used by our computer science students and other students in our calculus classes. A fuller description of the facilities and equipment used by the mathematics department can be found in Section 8 of this report. Our facilities and equipment are adequate at this time to run our program, but as the program grows, our needs will grow too.

x. Library information resources

The resources of the library are sufficient for our program. The resources available through the Internet and on-line searches supplement the holdings of the library.

xi. Cost

As Section 11 of this report dramatically illustrates, the cost of offering the Applied Mathematics program is among the cheapest in the entire university. Many of our facilities, faculty and courses would be needed whether there was a degree program or not.

xii. Faculty professional and scholarly activities

As can be seen by the enclosed curriculum vitae, many of the mathematics faculty members are engaged actively in applied mathematics research, attending conferences, serving on committees, volunteering in the community and doing an excellent job in the classroom.

xiii. Administration effectiveness

The administration of the Applied Mathematics program is divided between the Program Coordinator and the Department Chair. The program coordinator is primarily responsible for recruiting students, advising students, clearing students for graduation, awarding scholarships and making contacts with employers. The Department Chair is responsible for the departmental budget and for ensuring that a suitable schedule of courses is offered. The cooperation between these two individuals has been excellent.

For the above reasons, we are proud of our Applied Mathematics program and feel that we provide a service to our students and are a vital part of Ferris State University.

Recommendations

Our Applied Mathematics program has many strengths, some of which have been added since the last APRC report in 1997.

Strengths

1. The Applied Mathematics program is central to Ferris' mission.
2. National Science Foundation data indicate that there is a strong market for graduates of our program.
3. The cost of offering the Applied Mathematics degree is among the cheapest in the entire university.
4. The program allows students a lot of flexibility because of our unique offering of five different tracks of study.
5. We offer individualized advising and provide a high quality level of instruction.
6. We have professors with specific expertise in the fields of study related to each of our tracks.
7. Our enrollment has risen dramatically since the last APRC report.
8. Our placement rate is very good.

There are some areas of concern that we still have to address.

Areas of Concern

1. Because of the nature and difficulty of the degree, our program will never attain large numbers of majors. However, our enrollment is now higher than it has been since Ferris State was a college, not a university. Furthermore, our students are among the best that attend Ferris and get good jobs upon graduation or go on to graduate study.

2. Course substitutions are required more often than desirable because upper level classes are often cancelled due to low enrollment.
3. We have had difficulty getting and keeping an Advisory Board.

During the last APRC report, we stated the following future goals.

1. Increase enrollment by a minimum of three students per year over the next five years.
2. Revise the program along the lines suggested by the Advisory Board.
3. Create a new recruiting brochure.
4. Review community college programs and devise articulation avenues where possible.
5. Enhance the coordination between the program coordinator, the department chair and the college academic counselors.

All of these goals have now been attained or exceeded. Our future goals are designed to continue the growth of our program while improving its quality.

Recommendations [Future Goals]

1. Maintain or increase our current enrollment through active recruitment.
2. Revise the tracks in our program as needed, based on recommendations from students, employers and our Advisory Board.
3. Work with the administration to offer more upper level courses in a timely manner.
4. Add an internship option to our program, allowing our students to gain employment experience while pursuing their degree.
5. Involve more of our students in research, as was done for the first time this past year.
6. Bring in speakers from industry and academia to discuss aspects of careers in applied mathematics with our students.

Program Review Panel Evaluation Form

(PRP: complete this form and include with your report)

Program: Applied Mathematics

Instructions: Circle the number which most closely describes t he program you are evaluating.

1. Student Perception of Instruction — Average Score 4.67

5 4 3 2 1

Currently enrolled students rate instructional effectiveness as extremely high.

Currently enrolled students rate the instructional effectiveness as below average.

2. Student Satisfaction with Program — Average Score 4.67

5 4 3 2 1

Currently enrolled students are very satisfied with the program faculty, equipment, facilities, and curriculum.

Currently enrolled students are not satisfied with program faculty, equipment, facilities, or curriculum.

3. Advisory Committee Perceptions of Program — Average Score 4.00

5 4 3 2 1

Advisory committee members perceive the program curriculum, facilities, and equipment to be of the highest quality.

Advisory committee members perceive the program curriculum, facilities, and equipment needs improvement.

4. Demand for Graduates — Average Score 4.33

5 4 3 2 1

Graduates easily find employment in field.

Graduates are sometimes forced to find positions out of their field.

5 4 3 2 1

5. Use of Information on Labor Market — Average Score 4.33

The faculty and administrators use current data on labor market needs and emerging trends in job openings to systematically develop and evaluate the program.

The faculty and administrators do not use labor market data in planning or evaluating the program.

Program Review Panel Evaluation Form (page 2)

6. Use of Profession/Industry Standards — Average Score 4.33

5 4 3 2 1

Profession/industry standards (such as licensing, certification, accreditation) are consistently used in planning and evaluating this program and content of its courses.

Little or no recognition is given to specific profession/industry standards in planning and evaluating this program.

7. Use of Student Follow-up Information — Average Score 4.33

5 4 3 2 1

Current follow-up data on completers and leavers are consistently and systematically used in evaluating this program.

Student follow-up information has not been collected for use in evaluating this program.

8. Relevance of Supportive Courses — Average Score 4.33

5 4 3 2 1

Applicable supportive courses are closely coordinated with this program and are kept relevant to program goals and current to the needs of students.

Supportive course content reflects no planned approach to meeting needs of students in this program.

9. Qualifications of Administrators and Supervisors — Average Score 4.67

5 4 3 2 1

All persons responsible for directing and coordinating this program demonstrate a high level of administrative ability.

Persons responsible for directing and coordinating this program have little administrative training and experience.

10. Instructional Staffing — Average Score 4.67

5 4 3 2 1

Instructional staffing for this program is sufficient to permit optimum program effectiveness.

Staffing is inadequate to meet the needs of this program effectively.

Program Review Panel Evaluation Form (page 3)

11. Facilities Average Score 4.33

5 4 3 2 1

Present facilities are sufficient to support a high quality program.

Present facilities are a major problem for program quality.

12. Scheduling of Instructional Facilities Average Score 4.67

5 4 3 2 1

Scheduling of facilities and equipment for this program is planned to maximize use and be consistent with quality instruction.

Facilities and equipment for this are significantly under-or-over scheduled.

13. Equipment Average Score 4.33

5 4 3 2 1

Present equipment is sufficient to support a high quality program.

Present equipment is not adequate and represents a threat to program quality.

14. Adaption of Instruction Average Score 3.67

5 4 3 2 1

Instruction in all courses required for this program recognizes and responds to individual student interests, learning styles, skills, and abilities through a variety of instructional methods (such as, small group or individualized instruction, laboratory or "hands on" experiences, credit by examination).

Instructional approaches in this program do no consider individual student differences.

15. Adequate and Availability of Instructional Materials and Supplies Average Score 4.33

5 4 3 2 1

Faculty rate that the instructional materials and supplies as being readily available and in sufficient quantity to support quality instruction.

Faculty rate that the instructional materials are limited in amount, generally outdated, and lack relevance to program and student needs.

Appendix A

Results from the National Science Foundation's 1999 report on Characteristics of Recent Science and Engineering Graduates.

Characteristics of Recent Science and Engineering Graduates: 1999 [Early Release Tables]

This report presents summary data tabulations about the demographic and employment characteristics of persons receiving bachelor's or master's degrees in science or engineering fields from U.S. institutions during the 1997 and 1998 academic years. These statistics are derived from the 1999 cycle of the National Science Foundation's National Survey of Recent College Graduates (NSRCG), the fourteenth in a biennial series. The statistics in this set of Early Release Tables are final and will not be revised unless errors are found that warrant revision.

Initial data collection for the 1999 survey was conducted by computer assisted telephone interview (CATI) and mail. Nonrespondents to the CATI were followed up with a mail instrument. Information in the 1999 survey was collected for the week of April 15, 1999. Data collection took place between October 1999 and March 2000. The overall unweighted response rate for the 1999 survey was 79 percent. As in most sample surveys, weighting was used to adjust for the effects of survey nonresponse and imputation techniques were used to compensate for item nonresponse. The statistics in this report are subject to both sampling and nonsampling error.

The final report, *Characteristics of Recent Science and Engineering Graduates: 1999*, containing the full set of statistics from this survey will be published later this year. It will provide information on the number of science and engineering graduates by educational characteristics such as type of degree (bachelor's or master's), field of degree, academic year of degree; by demographic characteristics such as citizenship and place of birth; and employment-related characteristics such as occupation, sector of employment, median salary, and various labor force rates. The report will also contain detailed information about the methodological aspects of the 1999 survey.

John Tsapogas
Division of Science Resources Studies
National Science Foundation
4201 Wilson Boulevard, Suite 965
Arlington, VA 22230

(703) 292-7799
E-mail: jtsapoga@nsf.gov

List of Tables

The following tables are available in spreadsheet (.xls) format.
See Help for more information about viewing publications in different formats.

Table	Title
S-1	Recipients of science and engineering bachelor's degrees in 1997 and 1998, primary education and employment status, and median salary by field of degree: April 1999
S-2	Recipients of science and engineering master's degrees in 1997 and 1998, primary education and employment status, and median salary by field of degree: April 1999
S-3	Recipients of science and engineering bachelor's degrees in 1997 and 1998, primary education and employment status, by median salary, field of degree, and sex: April 1999
S-4	Recipients of science and engineering master's degrees in 1997 and 1998, primary education and employment status, by median salary, field of degree, and sex: April 1999
S-5	Recipients of science and engineering bachelor's degrees in 1997 and 1998, primary education and employment status, by median salary, field of degree, and race/ethnicity: April 1999
S-6	Recipients of science and engineering master's degrees in 1997 and 1998, primary education and employment status, by median salary, field of degree, and race/ethnicity: April 1999

National Science Foundation, Division of Science Resources Studies
Characteristics of Recent Science and Engineering Graduates: 1999 [Early Release Tables]
Arlington, VA, 2000.

Last Modified: Nov 27, 2000 Comments to srsweb@nsf.gov

A-3

Table S-1. Recipients of science and engineering bachelor's degrees in 1997 and 1998, primary education and employment status, and median salary by field of degree: April 1999

Field of degree	Total recipients	Primary education and employment status				Median salary for full-time employed [1]
		Full-time student	Not full-time student			
			Employed in science and engineering	Employed in other occupation	Not employed & not full-time student	
All science and engineering fields	743,400	165,500	161,900	377,300	38,800	$30,000
Total science	628,800	150,800	83,100	359,300	35,500	28,000
Computer and information sciences	46,000	S	27,000	15,100	S	44,000
Life and related sciences, total	164,000	54,300	20,900	79,100	9,800	25,000
Agricultural and food sciences	15,700	3,200	S	10,000	0	27,000
Biological sciences	134,900	48,800	16,200	62,000	7,800	25,000
Environmental life sciences including forestry science	13,500	2,300	3,000	7,100	S	26,000
Mathematical and related sciences	23,700	4,800	3,900	13,900	S	30,000
Physical and related sciences, total	36,500	12,600	11,100	11,900	1,000	29,000
Chemistry, except biochemistry	20,100	7,900	6,300	5,500	S	29,000
Earth sciences, geology, and oceanography	8,700	1,900	2,500	4,000	S	26,000
Physics and astronomy	7,200	2,600	2,200	2,200	S	35,000
Other physical sciences	600	S	S	S	S	S
Psychology	146,700	34,400	7,300	95,200	9,800	25,000
Social and related sciences, total	211,800	42,400	13,000	144,100	12,300	28,000
Economics	32,700	4,900	3,300	22,600	S	35,000
Political science and related scienc	71,700	20,500	4,100	42,300	4,700	29,000
Sociology and anthropology	69,500	11,700	S	51,600	S	25,000
Other social sciences	37,900	5,300	S	27,600	2,800	26,000
Total engineering	114,600	14,600	78,700	18,000	3,300	43,000
Aerospace and related engineering	2,400	500	1,300	500	S	41,000
Chemical engineering	12,400	1,900	8,500	1,600	S	45,000
Civil and architectural engineering	20,200	2,500	14,200	2,800	S	37,000
Electrical, electronic, computer and communications engineering	34,200	4,000	25,500	4,200	S	46,000
Industrial engineering	6,000	400	3,700	1,500	S	41,000
Mechanical engineering	26,300	2,600	18,500	4,600	S	43,000
Other engineering	13,200	2,700	7,200	2,800	S	40,000

[1] Salary data for the following groups are not included in the table: self-employed persons, full-time students, and people whose principa was less than 35 hours per week. Salary data are for principal job only.

KEY: S = Data with weighted values less than 100 or unweighted sample sizes less than 20 are suppressed for reasons of respond confidentiality and/or data reliability.

NOTE: Details may not add to totals because of rounding.

SOURCE: National Science Foundation/Division of Science Resources Studies, National Survey of Recent College Graduates, 1999.

primary education and employment status, by median salary, field of degree, and sex: April 1999

Field of degree and sex	Total recipients	Primary education and employment status				Median salary for full time employed[1]
		Full-time student	Not full-time student			
			Employed in science and engineering	Employed in other occupation	Not employed & not full-time student	
All science and engineering fields	743,400	165,500	161,900	377,300	38,800	$ 30,000
Total science						
Male	274,800	66,900	48,500	147,900	11,400	30,000
Female	354,000	83,900	34,600	211,400	24,200	26,000
Computer and information sciences						
Male	34,200	S	20,600	10,400	S	45,000
Female	11,800	S	6,500	4,600	S	41,000
Life and related sciences						
Male	73,000	25,000	9,000	36,000	2,900	27,000
Female	91,100	29,300	11,800	43,100	6,900	25,000
Mathematical and related sciences						
Male	12,600	2,800	2,000	7,400	S	29,000
Female	11,100	2,000	1,900	6,500	S	30,000
Physical and related sciences						
Male	22,500	7,500	7,400	7,000	S	30,000
Female	14,100	5,100	3,600	4,900	S	28,000
Psychology						
Male	34,200	10,300	S	20,100	S	27,000
Female	112,500	24,100	4,900	75,100	8,400	25,000
Social and related sciences						
Male	98,300	19,100	7,100	67,000	5,100	30,000
Female	113,400	23,300	5,900	77,100	7,200	26,000
Total engineering						
Male	92,000	10,900	64,400	14,400	2,300	43,000
Female	22,600	3,700	14,400	3,600	900	42,000
Aerospace and related engineering						
Male	2,100	400	1,100	400	S	40,000
Female	300	S	200	S	S	42,000
Chemical engineering						
Male	7,300	900	5,300	800	S	45,000
Female	5,100	900	3,200	700	S	46,000
Civil and architectural engineering						
Male	15,100	1,800	10,600	2,200	S	37,000
Female	5,100	S	3,500	S	S	37,000
Electrical, electronic, computer and communications engineering						
Male	30,500	3,100	23,100	3,800	S	46,000
Female	3,700	S	2,400	S	S	47,000
Industrial engineering						
Male	4,000	S	2,300	1,200	S	41,000
Female	2,000	S	1,400	S	S	42,000
Mechanical engineering						
Male	23,000	2,300	16,600	3,700	S	43,000
Female	3,300	S	1,900	S	S	44,000
Other engineering						
Male	10,100	2,200	5,400	2,300	S	40,000
Female	3,100	S	1,800	S	S	40,000

[1] Salary data for the following groups are not included in the table: self-employed persons, full-time students, and people whose principal job we less than 35 hours per week. Salary data are for principal job only.

KEY: S = Data with weighted values less than 100 or unweighted sample sizes less than 20 are suppressed for reasons of respondent confidentiality and/or data reliability.

NOTE: Details may not add to totals because of rounding.

SOURCE: National Science Foundation/Division of Science Resources Studies, National Survey of Recent College Graduates, 1999.

primary education and employment status, by median salary, field of degree, and race/ethnicity: April 1999

Field of degree and race/ethnicity	Total recipients	Primary education and employment status				Median salary for full-time employed [1]
		Full-time student	Not full-time student			
			Employed in science and engineering	Employed in other occupation	Not employed & not full-time student	
All science and engineering fields	743,400	165,500	161,900	377,300	38,800	$30,000
Total science						
White, non-Hispanic	478,100	112,600	60,200	280,600	24,800	27,000
Black, non-Hispanic	45,800	9,900	5,100	27,900	2,800	27,000
Hispanic	46,200	11,700	6,200	24,900	3,400	28,000
Asian or Pacific Islander	54,300	15,500	11,400	23,600	3,700	33,000
American Indian/Alaskan Native	4,300	S	S	2,200	S	24,000
Computer and information sciences						
White, non-Hispanic	30,400	S	18,400	9,500	S	44,000
Black, non-Hispanic	4,900	S	2,600	1,700	S	40,000
Hispanic	3,700	S	2,200	S	S	45,000
Asian or Pacific Islander	6,900	S	3,800	S	S	44,000
American Indian/Alaskan Native	S	S	S	S	S	S
Life and related sciences						
White, non-Hispanic	123,300	37,900	15,500	63,700	6,200	25,000
Black, non-Hispanic	9,000	3,100	S	4,600	S	25,000
Hispanic	9,700	3,400	S	4,100	S	28,000
Asian or Pacific Islander	21,200	9,700	S	6,400	S	28,000
American Indian/Alaskan Native	S	S	S	S	S	S
Mathematical and related sciences						
White, non-Hispanic	18,800	3,800	3,000	11,300	S	29,000
Black, non-Hispanic	1,600	S	S	1,000	S	30,000
Hispanic	900	S	S	S	S	S
Asian or Pacific Islander	2,300	S	S	S	S	S
American Indian/Alaskan Native	S	S	S	S	S	S
Physical and related sciences						
White, non-Hispanic	29,800	10,000	9,100	9,900	800	28,000
Black, non-Hispanic	2,100	800	500	700	S	30,000
Hispanic	1,600	400	S	700	S	26,000
Asian or Pacific Islander	2,900	1,400	S	S	S	31,000
American Indian/Alaskan Native	S	S	S	S	S	S
Psychology						
White, non-Hispanic	115,600	26,700	5,300	76,900	6,800	25,000
Black, non-Hispanic	11,200	2,800	S	7,300	S	26,000
Hispanic	11,800	2,900	S	6,800	S	26,000
Asian or Pacific Islander	6,000	S	S	S	S	S
American Indian/Alaskan Native	S	S	S	S	S	S
Social and related sciences						
White, non-Hispanic	160,200	33,100	9,000	109,400	8,800	27,000
Black, non-Hispanic	17,100	2,600	S	12,600	1,300	27,000
Hispanic	18,500	4,500	S	11,700	S	28,000
Asian or Pacific Islander	15,000	S	S	9,900	S	33,000
American Indian/Alaskan Native	S	S	S	S	S	S

See end of table for notes and source.

Table S-5: Number of 1997 and 1998 science and engineering bachelor's degree recipients, primary status, by median salary, field of degree, and race/ethnicity: April 1999

Field of degree and race/ethnicity	Total recipients	Primary education and employment status				Median salary for full-time employed [1]
		Full-time student	Not full-time student			
			Employed in science and engineering	Employed in other occupation	Not employed & not full-time student	
Total engineering						
White, non-Hispanic	83,100	9,400	59,700	12,000	2,100	42,000
Black, non-Hispanic	5,800	700	3,100	2,000	S	40,000
Hispanic	7,900	600	5,300	1,600	400	42,000
Asian or Pacific Islander	17,300	3,900	10,300	2,500	S	45,000
American Indian/Alaskan Native	400	S	S	S	S	S

[1] Salary data for the following groups are not included in the table: self-employed persons, full-time students, and people whose principa job was less than 35 hours per week. Salary data are for principal job only.

KEY: S = Data with weighted values less than 100 or unweighted sample sizes less than 20 are suppressed for reasons of respond confidentiality and/or data reliability.

NOTE: Details may not add to totals because of rounding.

SOURCE: National Science Foundation/Division of Science Resources Studies, National Survey of Recent College Graduates, 1999.

Appendix B

Curriculum vitae for tenure and tenure-track faculty of the mathematics department at Ferris State University.

M E M O R A N D U M

To: Dean Donald G. Butcher

From: N. Musselman, Department of Mathematics

Subject: Employment of Mr. Ram K. Agrawal for a teaching position (new position) in Mathematics, School of General Education

Date: May 18, 1970

Educational Background:

B.S. - Agra University, Agra, India, 1957

M.S. - Agra University, Agra, India, 1959

All course requirements completed for Ph.D. Now writing thesis. Expects Ph.D. by September 1970.

Teaching Experience:

Six years in India

1. S.M. College, Chandausi, India, 1959-63 and 1964-65.
2. U.P.A. University, Pant Nazar, India - August 1963 and February 1964
3. M.N.R. Eng. College, Allahabad, India-February 1964 and September 1964

Five years at Michigan State University as a teaching assistant, 1965-70

References:

The written recommendations from Dr. G.D. Anderson and E.A. Nordhaus are favorable. Comments of high academic praise, effective teaching, excellent performance, and cooperativeness are present in the written recommendations. On May 6, 1970 I made a trip to Michigan State University to personally talk with three professors (Drs. D.W. Hall, E.A. Nordhaus and J. Adney.) who know Mr. Agrawal. Each interview strengthened the qualities listed above. Dr. Douglas W. Hall gave me the added information that according to the student ratings, Mr. Agrawal rates above the average as a teacher and the best among the present foreign Graduate Assistants.

Summary:

Mr. Agrawal was interviewed on the Ferris campus, May 8, 1970 at which time the Mathematics staff had an opportunity to talk with the candidate. The Mathematics staff as a whole agreed that Mr. Agrawal would make a satisfactory

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

Advising:

A few years ago each of the math ed majors was assigned to a member of the Mathematics Education Committee. Now these students have both an education professor and a mathematics professor to help them progress through their program in a timely fashion and in a manner suited to their abilities. Since I know so many of these majors personally, I was very pleased that they are now obtaining advice from teachers in their chosen profession.

Committees:

I have served on most of the usual department committees, including the planning committee and a department head search committee.

I was one of three math teachers serving on the tutor screening committee for five years. Prior to this, I worked closely with Judy Hooper to improve the quality of the mathematics tutors. Jamey Coduti, Chad Daley and I put together the training film that is used with new mathematics tutors.

I have been chairperson of the Mathematics Education Committee since 1990.

SANDRA BRIGANCE

EXPERIENCE

August 2001–Present | Ferris State University | Big Rapids, MI

Assistant Professor of Mathematics

- Teach a variety of undergraduate mathematics courses, mostly at the developmental and introductory stage.
- Serve as academic advisor to Pre-Pharmacy students.
- Serve on various committees in the mathematics department.

August 2000–June 2001 | Kalamazoo Valley Community College | Kalamazoo, MI

Part-Time Mathematics Instructor

- Taught Probability & Statistics, Finite Mathematics, Algebra Fundamentals, Pre-Algebra, & Basic Math.

August 2000–April 2001 | Western Michigan University | Kalamazoo, MI

Part-Time Mathematics Instructor

- Taught Pre-Calculus.

June 2000–August 2000 | Lansing Community College | Lansing, MI

Adjunct Mathematics Instructor

- Taught Calculus with Applications.
- Tutored at Mathematics Help Desk.

August 1998–April 2000 | Western Michigan University | Kalamazoo, MI

Graduate Assistant

- Taught Pre-Calculus.
- Conducted Pre-Calculus Recitations.
- Tutored in Mathematics Lab.

August 1995–June 1998 | Kern High School District | Bakersfield, CA

High School Mathematics Teacher at Foothill High School

- Taught Integrated Mathematics I and II to grades nine through twelve.
- Coached Academic Decathlon Team.
- Served on various committees throughout district.

EDUCATION

April 2000 | Western Michigan University | Kalamazoo, MI

- M.A. Pure Mathematics

April 1995 | Western Michigan University | Kalamazoo, MI

- B.S. Secondary Mathematics Education

CERTIFICATION

Michigan Professional Education Certificate - Secondary Level with EX and FF endorsements.

FERRIS STATE UNIVERSITY -MATH DEPARTMENT - 820 CAMPUS DRIVE - ASC 2027 - BIG RAPIDS, MI 49307-2295 - E-MAIL BRIGANCS@FERRIS.EDU - PHONE (231) 591-5032

RESUME

David Burns
Mathematics Department
Ferris State University
Big Rapids, MI

EDUCATION:

PhD	Theoretical Mathematics	Western Michigan University	1979
SpA	Theoretical Mathematics	Western Michigan University	1976
MA	Theoretical Mathematics	Western Michigan University	1972
BS	Theoretical Mathematics	University of Michigan	1970

EMPLOYMENT: 1980 – present faculty member Department of Mathematics Ferris State University
1973-1974 Computer Programmer
1970 – 1977 Commissioned Officer, U.S. Army Reserve
Field Artillery and Medical Service

WRITING: I have published 57 articles in mathematics, all in my specialty field of graph theory

TEACHING: I have taught under 29 different course titles, all in mathematics and computer science

SERVICE: I have served approximately 185 units of committee work, where one unit equals one quarter or semester of work on one committee. In addition, I have volunteered for aproximately 25 special projects other than traditional committee duty.

To: Dean Murray

From: W, Musselman

Subject: Employment of Mr. Elwyn D. Cutler for teaching position in Mathematics (replacement for Mr. Melvin Nyman) in the School of General Education.

Educational Backgroung:

B.A. - Michigan State University, 1960

M.A.T. - Cornell University, 1966

M.S. - Utah State University, now being completed and expected in June, 1969.

Teaching experience:

Grand Blanc Public Schools, Grand Blanc, Michigan - 4 years; 1961-65

Utah State University, Logan, Utah - Teaching assistant; 1966-67 (1 year)

Southwestern Michigan College, Dowagiac Michigan - 2 years ; 1967-69

References:

Summaries of three (3) recent telephone conversations with references who know Mr. Cutler are attached. The telephone calls and written recommendations concerning Mr. Cutler are unanimous in their praise of this man's good teaching and academic qualities. Both his former principal and college president commented on the excellent rapport he has with his students.

Summary:

Mr. Cutler spent a day on campus and during that time most of the mathematics staff got an opportunity to talk with him. Each staff member agreed that Mr. Cutler would make a very satisfactory addition to the Mathematics faculty at Ferris State College. I also was very favorable impressed with the candidate. Mr. Cutler is married and has two small children. He maintains a close and favorable family relationship.

Recommendation:

I recommend that Mr. Elwyn Cutler be employed to fill the mathematics position (replacement for Mr. Melvin Nyman) beginning in September, 1969 with the rank of assistant professor and a salary of $9,700 (A.M.+; increment #4); this salary to be contingent upon Mr. Cutler's successful completion of the requirements for a second master's degree. Should Mr. Cutler fail to qualify for master's plus, then the salary is to be $9,400 (A.M. - increment #5).

MICHAEL J. DEKKER

(231) 591-2987 (office)
(616) 696-8133 (home)

Department of Mathematics
Ferris State University
Big Rapids, MI 49307

dekkerm@ferris.edu
www.nd.edu/~mdekker/

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

Research Experiences for Undergraduates — 1997
Purdue University, directed by Dr. Carl C. Cowen

TEACHING EXPERIENCE

Assistant Professor of Mathematics — 2003-present
Ferris State University

Instructor, Mathematics Department, University of Notre Dame
- Finite Mathematics for arts & letters students — Spring 2002 & 2003
  Special admissions section
- Calculus for business and arts & letters students — Fall 2000
- Calculus for business and arts & letters students — Summer 2000

Instructor, Balfour-Hesburgh Scholars Program
University of Notre Dame — Summers 2001-2003

This program is an introduction to college for incoming minority first-year students at the University of Notre Dame that places them through a rigorous four-week schedule of classes. My teaching duties included calculus for science and engineering students, calculus for business and arts & letters students, and finite Mathematics for business and arts & letters students

Teaching Assistant, Mathematics Department, University of Notre Dame
- Multivariable Calculus — Spring 2001
- Differential Equations and Linear Algebra — Spring 2001
- Calculus II for pre-professional and science students — Spring 2000
- Calculus I for pre-professional and science students — Fall 1999

CURRENT RESEARCH

Dissertation: "A New Proof of the Bordism Invariance of the Index". Directed by Dr. Stephan Stolz. I prove the bordism invariance of the index of the Dirac operator of a spin manifold from a new and more useful point of view.

Forintos, Mary Rose
Assistant Professor, Mathematics
Appointed Fall 2000

Academic Degrees

M.A.	The University of Michigan	1979	Secondary Mathematics Education
B.A.	Mercy College of Detroit	1971	Elementary Education (Major: Mathematics, Minor: Art)

Professional Experience

1999-Present	Ferris State University
1995-1999	Cedar Falls High School, Cedar Falls, Ia.; mathematics teacher
1993-1995	University of Northern Iowa, Cedar Fall, Ia.; Full-time temporary instructor
1995-1999	University of Northern Iowa, Part-time instructor
1985-1993	Mercy High School, Farmington Hills, Mi.; mathematics teacher, mathematics department chair
1991-1992	Schoolcraft College, Livonia, Mi.; Part-time mathematics instructor
1980-1985	Gabriel Richard High School, Riverview, Mi.; mathematics teacher, mathematics department chair
1977-1980	St. Cyril of Jerusalem Elementary School, Taylor, Mi.; mathematics teacher, building mathematics coordinator
1971-1977	SS. Peter and Paul Elementary School, Detroit, Mi.; teacher

Professional and Academic Association Memberships

National Council of Teachers of Mathematics
Michigan Council of Teachers of Mathematics
National Education Association
Michigan Education Association

Formerly, Detroit Area Council of Teachers of Mathematics, Executive Board 1987-1991, Vice-president 1989-1991, Representative to the National Council, 1987-1989

Current Professional Activities

School Board Member, Doicese of Grand Rapids Board of Catholic Education
School Board Member, St. Michael Elementary School, Remus, Mi.

March 5, 1970

To: Dean Butcher

From: N. Musselman

Subject: Employment of Mr. Roy Gifford for teaching position in Mathematics (New position) in the School of General Education.

Educational Background:

B.S. - Kent State University, 1964

M.A. - University of Michigan, 1965

Teaching Experience:

Kent State University, Kent, Ohio - Instructor in Mathematics 1965-70 (5 years)

References:

The written recommendation from Drs. Russell I. Iwanchuk, Richard K. Brown, and Kenneth Cummins are all very favorable. They are unanimous in their praise of this candidate's good teaching and academic qualities. As further evidence of his good teaching ability, I personally observed one of his classes on February 25, 1970 at Kent State University and rated his teaching very good.

Summary:

Mr. Gifford spent a day on campus and during that time most of the Mathematics staff got an opportunity to talk with him. Each staff member agreed that Mr. Gifford whould make a very satisfactory addition to the Mathematics faculty at Ferris State College. I also was very favorable impressed with the candidate. Mr. Gifford is married and has one child.

Mr. Gifford impressed me as one who enjoys teaching and does an excellent job of it.

Recommendations:

I recommend that Mr. Roy Gifford be employed to fill the Mathematics position beginning in September, 1970 with the rank of instructor and a salary of $9,000.00

N Musselman

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, 2003

Math 010	Prealgebra	12 semester hours
Math 110	Intermediate Algebra	4 semester hours

Winter Semester 2003

Math 010	Prealgebra	8 semester hours
Math 118	Math for Elementary Teachers	3 semester hours

4. Other Collegiate Assignments, 2000-2003

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
Advising of PreOptometry students

5. Current Professional and Academic Association Memberships

National Council of Teachers of Mathematics
National Association of Developmental Education
Michigan Developmental Education Consortium

HOWARD, JAMES
Associate Professor of Mathematics
Appointed 1967

1. Academic Degrees (degrees, institutions, dates, field of specialty)

B.A.	Kalamazoo College	1966	Mathematics
M.S.	University of Michigan	1967	Mathematics

2. Professional Experience

1967-Present Ferris State University

3. Faculty and Administrative Load (most recent full year)

Fall Semester, 1999

Math 110	Fund. of Algebra	4 semester units
Math 110	Fund. of Algebra	4 semester units
Math 110	Fund. of Algebra	4 semester units

Winter Semester, 2000

Math 110	Fund. of Algebra	4 semester units
Math 110	Fund. of Algebra	4 semester units
Math 110	Fund. of Algebra	4 semester units

Other Collegiate Assignments

Department Faculty Development Committee

Department Liaison to the Mathematics Association of America

4. Current Professional and Academic Association Memberships

Mathematical Association

Vitae-James Howard

In 1966, I graduated magna cum laude with honors in mathematics from Kalamazoo College. While there, I was inducted into the phi beta kappa society as a junior.

In 1967, I received an M.S. in mathematics from the University of Michigan.

In the fall of 1967, I accepted a position at Ferris State University where I am currently an associate professor.

While at Ferris, I attended National Science Foundation summer institutes at the University of Georgia, the University of Wisconsin and Colgate University.
In 1971, I received a faculty fellowship grant from the National Science Foundation to attend Michigan State University during the 1971-72 school year. The grant included my full salary, tuition, private office and other expenses.

Through the years at Ferris State University, I have submitted several solutions to problems presented in various mathematics journals.

I am a member of the Mathematical Association of America and have acted as its representative here at Ferris State University for many years.

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 2001- present

Assistant Professor of Mathematics, Ferris State University, Big Rapids, MI

Utilized creative teaching strategies

- 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 entitled "The most common errors".

Courses Taught

- Fundamentals of Algebra (math110), Intermediate Algebra (math115), Trigonometry (math120), and Mathematical Analysis for Business (math122), Fall 2001.
- Fundamentals of Algebra, Contemporary Mathematics (math117), and Fourier Series and Applied Differential Equations (math226), Winter 2002.
- Intermediate Algebra and Numerical Trigonometry (math116), Analytical Geometry and Calculus I (math220), and Statistics for Life Science (math251), Fall 2002
- Intermediate Algebra, Analytical Geometry and Calculus I, and Fourier Series and Applied Differential Equations. Winter 2003

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

Fields of Interest

Partial Differential Equations, Mathematics Education, Applied Mathematics

Publications and Presentations

- 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.
- 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

- Dean's Initiative Grant: A Proposal on Course, Curriculum, and Laboratory Improvement to the National Science Foundation, funded by the Dean of College of Arts and Science, Ferris State University, June 2003.
- Faculty Grant Development Fund, 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, funded by the Office of Academic Senate, Ferris State University, April 2003.
- Faculty Research Grant: Asymptotic Behavior and Global Existence of Nonlinear Wave Equations, 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, funded by the Dean of College of Arts and Science, Ferris State University May 2002.
- Mathematics Instructions Using Dynamic Computer Technology, funded by the Department of Education, July 2000

- A Study on On-line Testing Using Internet Technology for Teaching and Learning Statistics, funded by Mississippi Urban Research Center, May 2000.

SERVICE

- Serve as an advisor for Pre-Pharmacy Students for 2002- 2003 Academic year.
- 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

- 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, September 20-21, 2002 at Ferris State University.
- Ferris Faculty Transition Workshops, Fall 2001.

BOOK REVIEWED

- Technical Mathematics, by Franz Helfenstein, Prentice Hall, July 2003.
- 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.

109 Barker St.
Apt F
Pembroke, NC 28372
(H) 910-521-3953
(W) 910-521-6517
enochkslee@yahoo.com

Enoch Kin Shun Lee, Ph.D. Mathematics and MS Computer Science

U.S. Permanent Resident

Experience

8/2002 - Present | University of North Carolina | Pembroke, NC

Assistant Professor

Mathematics and Computer Science Department

- Teach College Algebra and Trigonometry, Data Structures and Algorithms. (Fall 2002)
- Hold a computer lab session weekly for Data Structures and Algorithms. (Fall 2002)
- Design course materials, tests, and grade tests.
- Adviser to Student Computer Science Club.
- Will teach Abstract Algebra I in Spring 2003.

2/2002 - 6/2002

Independent Consultant | Dallas, TX

- Designed a path routing algorithm that is traffic-engineering-aware for an optical network. This algorithm enhances the survivability of the network by utilizing a proper set of Shared Risk Link Group (SRLG) link parameters specified by IETF work groups.

6/2001 - 1/2002 | Yotta Networks | Plano, TX

Systems Engineer

- Path computation scheme: Design a traffic-engineering-aware path computation engine by using Constraint based Shortest Path First (CSPF) algorithm.
- Path restoration scheme: Design a traffic-engineering-aware mesh restoration algorithm to enhance network survivability.
- MultiProtocol Label Switching (MPLS)/Generalized MPLS (GMPLS) signaling specifications and Optical User Network Interface (UNI) specifications: Participate in various work groups (Internet Engineering Task Force (IETF), Optical Internetworking Forum (OIF), MPLS Forum, etc.) discussions and developments on signaling specifications of MPLS/GMPLS including Open Shortest Path First-Traffic Engineering (OSPF-TE), Resource ReserVation Protocol-TE (RSVP-TE), Link Management Protocol (LMP), etc. to keep up with the advances of various technologies. Provide recommendations related to MPLS or GMPLS signaling issues on optical networks.

8/1998 – 6/2001 | Nortel Networks | Richardson, TX

Systems Engineer

Global Wireless Internet Engineering

- Data network performance: Studied impact of data traffics on packet networks (wireless access networks and Internet). Many data traffics exhibit self-similar characteristics. This type of bursty traffic is considered to have tremendous impact on network performance.

B -17

Understanding these characteristics provides a sound foundation for proper dimensioning of the underlying networks.

- QuickConnect study: Supported customers for the QuickConnect (a faster Internet access solution for a Global System for Mobile Communications (GSM)) excessive delay issue. Analyzed the problem (messages from a mobile handset to Veselar/CVX gateway via an InterWorking Function (IWF) in GSM) and provided recommendations for future possible enhancements. As a consequence, a new wireless Internet access architecture was proposal.
- Voice over Internet Protocol (VoIP) protocols comparison: Participated in Session Initiation Protocol (SIP)/H.323 comparison ad hoc group. The study was presented in the 3G.IP meeting at Dallas, TX.
- Analysis and performance enhancement for real-time applications (e.g.VoIP) over wireless networks: Analyzed the performance impact on wireless networks of different types of Real-time Transport Protocol/RTP Control Protocol (RTP/RTCP) sub-flows. Mathematical models were built with respect to the wireless connection with or without a reliable radio link retransmission scheme. This analysis was extended to H.323 signaling and control messages, i.e. H.225 and H.245, for call set-up over wireless networks. Different IP/User Datagram Protocol (UDP)/RTP header compression schemes were evaluated.
- System simulation design for General Packet Radio Service (GPRS) network: Participated in the network side Serving GPRS Support Node (SGSN) and Gateway GPRS Support Node (GGSN) simulation model development for a GPRS network with respect to data traffics (e.g. e-mail, web browsing, File Transfer Protocol (FTP), and Wireless Application Protocol (WAP)).

3/1997 – 8/1998 Nortel Networks Richardson, TX
Software Engineer
CDMA Development

- Design and development of software interface to support for CDMA products.
- Conducted detailed analyses of field problems. Re-created these scenarios in the lab and debug the software to design a solution.
- Provided solutions to service requests from customers.
- Derived test cases for features developed.

1/1994 - 5/1994 Louisiana State University Eunice, LA
Instructor
Mathematics Department

- Taught college level Mathematics (15hrs/sem in Algebra and Statistics).
- Used graphing calculator and computer software STATDISK in classes.
- Designed and graded tests.

8/1994 - 5/1995 University of Louisiana Lafayette, LA
8/1993 - 12/1993
Instructor
Mathematics Department

- Taught college level Mathematics (18hrs/sem in Algebra and Trigonometry).
- Used graphing calculator in classes.
- Designed and graded tests.

1/1988 - 5/1993 University of Louisiana Lafayette, LA
Teaching Assistantship
Mathematics Department

- Taught college level Mathematics (6 hrs/sem in College Algebra: 6/89 – 5/93).
- Designed and graded tests.
- Grader (Differential Equations and Calculus: 1/88 – 5/89).

Education

MS Computer Science 12/1996 University of Louisiana Lafayette, LA

Ph.D. Mathematics 5/1993 University of Louisiana Lafayette, LA

Research/Publications

- "On von Neumann Regularity of Matrix Near-rings," in preparation.
- "Theory of Polynomial Near-rings," submitted.
- "Performance Optimization of VoIP Calls over Wireless Links Using H.323 Protocol," (S. Das, K. Basu, N. Kakani, S. Sen, co-authors) IEEE Transactions on Computers, to appear 2002.
- "Involutions on universal algebras," (H. Heatherly, R. Wiegandt, co-authors), Nearrings, Nearfields and K-Loops, Kluwer Academic Publishers, Netherland, 1997.
- "Special radicals in near-rings," (G. Birkenmeier, H. Heatherly, co-authors), Tamkang Journal of Mathematics 27(4) 1996, 281-288.
- "Primitivity in near-rings with localized distributivity conditions," (H. Heatherly, co-authors), Quaestiones Mathematicae, 19(1996), 527-536.
- "On primeness and nilpotence in structural matrix near-rings," Proceedings of the Edinburgh Mathematics Society, 39(1996), 345-356.
- "Completely prime ideals and associated radicals in near-rings," (G. Birkenmeier, H. Heatherly, co-authors), Fredericton Conf. On Near-Rings and Near-Fields, eds. Y. Fong *et al.*, Kluwer Academic Publishers, Netherland, 1995.
- "An Andrunakievich lemma for near-rings," (G. Birkenmeier, H. Heatherly, co-authors), Communications in Algebra 23(8) (1995), 2825-2850.
- "Prime ideals in structural matrix near-rings," Tamkang Journal of Mathematics 26(1) (1995), 31-40.
- "Near-rings in which every prime factor is integral," (G. Birkenmeier, H. Heatherly, co-authors), Pure Mathematics and Applications 5(3) (1994), 257-279.
- "Prime ideals and prime radicals in near-rings," (G. Birkenmeier, H. Heatherly, co-authors), Monatshefte fur Mathematik 117 (1994), 179-197.
- "Completely prime ideals and associated radicals," (G. Birkenmeier, H. Heatherly, co-authors), Ring Theory, Proceedings of the Ohio State-Denison Conference, 1992, eds., S.K. Jain and S.T. Rizvi, World Scientific, Singapore, 1993.
- "Prime ideals in near-rings," (G. Birkenmeier, H. Heatherly, co-authors), Results in Mathematics 24 (1993), 27-48.
- "Localization with central units," (H. Abulkheir, G. Birkenmeier, A. Bourque, co-authors), Communications in Algebra 19 (1991), 905-917.
- Solutions to Advanced Problems 6599 and 6615 in American Mathematical Monthly, Oct. 1991, p.767 and June-July 1991, p.562, respectively.

Patents

- "Optimized Telephone Call Flow with Over-The-Air Radio Resource Reservation on a Wireless Network", disclosure filed.
- "Method and System for Improving Bandwidth Availability in a Data Communication Network by Tokenizing Messages", disclosure filed.

Highlights

- Demonstrated problem solving and ability to do research.
- Technical presentations and writings.
- Both a team player and an individual thinker.

Skills

Platforms	Sun, HP, PC
Operating System	Unix, Windows
Programming Language	C/C++, Pascal, FORTRAN
Tools	Sniff, OPNET
Protocols/Specifications	RTP/RTCP, UDP, TCP, IP, PPP, RSVP(-TE), OSPF(-TE), LMP, NTP, (G)MPLS, COPS, OIF UNI, SIP, H.323

Other Activities

- 1990/1991, President of Hong Kong Students Association at University of Louisiana.
- 1988/1989, Treasurer of Hong Kong Students Association at University of Louisiana.
- 1985/1986, Vice-President and Academic Secretary of Students Association of Mathematics at Hong Kong Baptist College. Duties - a public exhibition on Mathematics; conducted study groups in Number Theory and Fuzzy Set Theory.

Experience

8/2003 – Present
Assistant Professor Ferris State University Big Rapids, MI
Mathematics Department

8/2002 – 6/2003 University of North Carolina Pembroke, NC
Assistant Professor
Mathematics and Computer Science Department

2/2002 - 6/2002
Independent Consultant Dallas, TX

6/2001 - 1/2002 Yotta Networks Plano, TX
Systems Engineer

8/1998 – 6/2001 Nortel Networks Richardson, TX
Systems Engineer
Global Wireless Internet Engineering

3/1997 – 8/1998 Nortel Networks Richardson, TX
Software Engineer
CDMA Development

1/1994 - 5/1994 Louisiana State University Eunice, LA
Instructor
Mathematics Department

8/1994 - 5/1995 University of Louisiana Lafayette, LA
8/1993 - 12/1993
Instructor
Mathematics Department

1/1988 - 5/1993 University of Louisiana Lafayette, LA
Teaching Assistantship
Mathematics Department

Education

MS Computer Science 12/1996 University of Louisiana Lafayette, LA

Ph.D. Mathematics 5/1993 University of Louisiana Lafayette, LA

Research/Publications

- "Polynomial near-rings in k-commuting indeterminates," (N. Groenewald, co-authors), submitted.
- "Theory of Polynomial Near-rings," Communications in Algebra, to appear.
- "Performance Optimization of VoIP Calls over Wireless Links Using H.323 Protocol," (extended version) IEEE Transactions on Computers 52(6): 742-752 (2003).
- "Performance Optimization of VoIP Calls over Wireless Links Using H.323 Protocol," Proceedings of IEEE INFOCOM 2002, New York, Vo. 3, pp. 1386-1394, June 2002.
- "Involutions on universal algebras," (H. Heatherly, R. Wiegandt, co-authors), Nearrings, Nearfields and K-Loops, Kluwer Academic Publishers, Netherland, 1997.
- "Special radicals in near-rings," (G. Birkenmeier, H. Heatherly, co-authors), Tamkang Journal of Mathematics 27(4) 1996, 281-288.
- "Primitivity in near-rings with localized distributivity conditions," (H. Heatherly, co-authors), Quaestiones Mathematicae, 19(1996), 527-536.
- "On primeness and nilpotence in structural matrix near-rings," Proceedings of the Edinburgh Mathematics Society, 39(1996), 345-356.
- "Completely prime ideals and associated radicals in near-rings," (G. Birkenmeier, H. Heatherly, co-authors), Fredericton Conf. On Near-Rings and Near-Fields, eds. Y. Fong *et al.*, Kluwer Academic Publishers, Netherland, 1995.
- "An Andrunakievich lemma for near-rings," (G. Birkenmeier, H. Heatherly, co-authors), Communications in Algebra 23(8) (1995), 2825-2850.
- "Prime ideals in structural matrix near-rings," Tamkang Journal of Mathematics 26(1) (1995), 31-40.
- "Near-rings in which every prime factor is integral," (G. Birkenmeier, H. Heatherly, co-authors), Pure Mathematics and Applications 5(3) (1994), 257-279.
- "Prime ideals and prime radicals in near-rings," (G. Birkenmeier, H. Heatherly, co-authors), Monatshefte fur Mathematik 117 (1994), 179-197.
- "Completely prime ideals and associated radicals," (G. Birkenmeier, H. Heatherly, co-authors), Ring Theory, Proceedings of the Ohio State-Denison Conference, 1992, eds., S.K. Jain and S.T. Rizvi, World Scientific, Singapore, 1993.
- "Prime ideals in near-rings," (G. Birkenmeier, H. Heatherly, co-authors), Results in Mathematics 24 (1993), 27-48.
- "Localization with central units," (H. Abulkheir, G. Birkenmeier, A. Bourque, co-authors), Communications in Algebra 19 (1991), 905-917.
- Solutions to Advanced Problems 6599 and 6615 in American Mathematical Monthly, Oct. 1991, p.767 and June-July 1991, p.562, respectively.

Faculty Data Summary Sheet

Linnen, John
Assistant Professor, Mathematics
Undergraduate Faculty
Appointed 1970

1. Academic Degrees

M.S.	University of Notre Dame	1968	Mathematics
B.S.	Wisconsin State University-Oshkosh	1965	Secondary Education, Mathematics

2. Professional Experience

1970-Present	Ferris State University, Assistant Professor, Mathematics
1969-1970	University of Notre Dame, Instructor, Mathematics
1967-1968	Ripon, Wisconsin, High School Math Teacher
1965-1967	Omro, Wisconsin, High School Math Teacher

3. Faculty Load

Fall Sememster, 1999

Math 115	Intermediate Algebra	3 semester units
Math 130	Advanced Algebra	3 semester units
Math 110	Beginning Algebra	4 semester units

Winter Semester 2000

Math 120	Trigonometry	3 semester units
Math 135	Calculus for Life Sciences	3 semester units
Math 115	Intermediate Algebra	3 semester units
Math 115	Intermediate Algebra	3 semester units

Other Collegiate Assignments, 1999-2000

Member Mathematics Education Committee
Member Faculty Search Committeee

4. Current Professional and Academic Association Memberships

National Education Association Member
Michigan Education Association Member

5. Current Professional Assignements and Activities (non-teaching)

None

Current Resume

McCullough, Robert N.
Associate Professor, Mathematics
Ferris State University
2042 ASC
(231)-591-5876 (office) Robert_Mccullough@ferris.edu
(231)-796-3986 (home) bulldogs@netonecom.net

Academic Background

-	WV College of Graduate Studies	1978-1979	IESA
-	Michigan State University	1972, 1974	Mathematics/Comp Sci
M.S.	Michigan State University	1971	Mathematics
B.S. (high 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

Recent Collegiate Assignments

Advisor, Applied Mathematics students, 1997 - present
Chair, Applied Mathematics Committee, 1997 - present
Chair, Program Review Panel (Applied Mathematics), 2002 – present
Coordinator, Applied Mathematics program, 1997 – present
Coordinator, Mathematics (B.A.), 2002 – present
Member, Faculty Search Committees, 1998 - present
Member, Arts and Sciences Liaison Committee, 1990 - present
Member, Department Faculty Scheduling Committee (Group Chairperson), 1990 - present

Member, Department Tenure Review Committee, 1994 – present

Mentor, New Faculty, 2001 – present

Mentor, Math Science Technology Students, 1998 – 2000

Current Professional and Academic Association Memberships

Member, Phi Beta Kappa

Member, Pi Mu Epsilon

Current Professional Assignments and Activities

Regional Resource Person, National Air and Space Museum

Reviewer, *Science Books & Films*

Moderator, Chapter Mathcounts competition

Author, newly published second edition of my textbook Mathematics for Data Processing for Morton Publishing Company

Publications

"Calculating Coefficients: Mathematics and the Wrights", *Mechanical Engineering*, November, 2003, publication pending

Review of *Beyond Pluto: Exploring the Outer Limits of the Solar System*, by John Davies. *Science Books & Films*, Nov/Dec 2002: 545

"Growing Twelve Generations of Space Tomatoes ", *Crimson and Gold*, Fall, 2002: 16-17

"Growing Eleven Generations of Space Tomatoes ", *The Insider*, May, 2002: 47-50

Review of *Eclipse: The Celestial Phenomenon That Changed the Course of History*, by Duncan Steel. *Science Books & Films*, Jan/Feb 2002: 310

"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

Review of *If An Asteroid Hit Earth*, by Ray Spangenburg and Kit Moser. *Science Books & Films*, May/Jun 2001: 110

Review of *A Look at Mars*, by Ray Spangenburg and Kit Moser. *Science Books & Films*, May/Jun 2001: 121

Review of *the History of NASA*, by Ray Spangenburg and Kit Moser. *Science Books & Films*, May/Jun 2001: 121

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

Review of *What's in Space? The Earth, The Moon and Space Flight*, by SVE and Churchill Media. *Science Books & Films*, Jan/Feb 2001: 39

Review of *The Solar System: An A-Z Guide*, by Christina Wilsden. *Science Books & Films*, Sep/Oct 2000: 221

Review of *Carl Sagan: A Life*, by Keary Davidson. *Science Books & Films*, Mar/Apr 2000: 212

Review of *The Messier Objects: A New Look at the Most Famous Deep-Sky Wonders in the Heavens*, by Stephen O'Meara. *Science Books & Films* Sep/Oct 1999: 212

Review of *Alien Life: The Search for Extraterrestrials and Beyond*, by Barry Parker. *Science Books & Films* Oct 1998: 206

Review of *Isaac Newton: The Greatest Scientist of All Time*, by Margaret Anderson. *Science Books & Films* Special Edition 1998: 56

Review of *The Search for Alien Worlds*, by Warner Home Video. *Science Books & Films* 1998

Review of *To The Edge of the Universe*, by Warner Home Video. *Science Books & Films* 1998

Review of *Journey Into Space: The Missions of Neil Armstrong*, by Andrew Langley. *Science Books & Films* Jan/Feb 1995: 18; May 1997: 120

Review of *The Earth's Shifting Axis: Clues to Nature's Unsolved Mysteries*, by Mac B. Strain. *Science Books & Films* May 97: 102

Review of *The Case for Space: Who Benefits from Exploration of the Last Frontier?*, by Paul Harderson. *Science Books & Films* Apr 1997: 78

Review of *Cambridge Pocket Star Atlas*, by John Cox. *Science Books & Films* Dec 1996: 268

"Space Program Helps Mankind" *Grand Rapids Press* Nov 1996

Review of *Hubble Vision: Astronomy with the Hubble Space Telescope*, by Carolyn Peterson and John Brandt. *Science Books & Films* Apr 1996: 79

Review of *Neptune: The Farthest Giant*, by Clearvue. *Science Books & Films* Feb 96: 182

Review of *The Solar System*, by Clearvue. *Science Books & Films* Feb 96: 182

Review of *Exploring the World of Astronomy*, by George Burns. *Science Books & Films* Nov 1995: 240

Review of *Advanced Transportation*, by PBS. *Science Books & Films* Aug/Sep 1993: 185-186

Review of *Graphic Design*, by PBS. *Science Books & Films* Aug/Sep 1993: 186

Review of *The Vindication of the Big Bang: Breakthroughs and Barriers*, by Barry Parker. *Science Books & Films* Aug/Sep 1993: 168

"The Wright Stuff" *UMAP Journal* Summer, 1992: 113-132 and cover

Review of *The Fullness of Space*, by Gareth Wynn-Williams. *Science Books & Films* 1992

Review of *A Spacefaring Nation*, by Martin Collins and Sylvia Fries. *Science Books & Films* 1992

"Wright On" *Science News* December 14, 1991: 387

Review of *Colliding Galaxies: The Universe in Turmoil*, by Barry Parker. *Science Books & Films* Mar/Apr 1991: 38

Review of *The First Steps in Space Exploration*, by Films for the Humanities. *Science Books & Films* Sep/Oct 1990: 76

Review of *Flight to the Moon*, by Films for the Humanities. *Science Books & Films* Sep/Oct1990: 76

Review of *Computer – A Child's Play*, by Dharma Rajaraman. *Science Books & Films* Jan/Feb 1990: 144

Review of *Mathematics*, by GPN. *Science Books & Films* Jan/Feb 1990: 154

Review of *Discovering Science on your Apple II*, by John Pellini. Science Books & Films Mar/Apr 1989: 243

Review of *Smart Apples: 31 Artificial Intelligence Experiments with the Apple II*, by Delton Horn. *Science Books & Films* Mar/Apr 1989: 243

Review of *Space Shuttle After Flight Reports Vol 5*, by Ricon Enterprises. *Science Books & Films* Sep/Oct 1988: 59

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

Review of *Larousse Astronomy*, by Phillippe de la Cotadiere. *Science Books & Films* Sep/Oct 1987: 13

Review of *Is Anybody Out There*, by NOVA. *Science Books & Films* Sep/Oct 1987: 52

Review of *New Worlds: In Search of the Planets*, by Heather Couper and Nigel Henbest. *Science Books & Films* Apr/May 1987

"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

"The Wright Stuff: The Mathematics of the Wright Brothers", Math 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

"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, 1993-1994

"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, 2003

Nominated for Distinguished Teacher Award, 2002

Nominated for the Ferris Award for Academic Excellence, 2002

Nominated for *Who's Who Among America's Teachers*, 2002

Merit Award, 1998

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, 1984

Griff Nyuydinkong McTume, Ph.D.
Department of Mathematics,
ASC 2056, Ferris State University,
Big Rapids, MI 49315
Phone: (231) 591-5864
E-mail: mctumeg@ferris.edu

EDUCATION:

-***Ph.D.*** *(Mathematics),* Auburn University, Auburn, AL *(2000)*
-**Postgraduate Diploma** *(Mathematics),* ICTP, Trieste, Italy *(1995)*
-**Postgraduate Diploma** *(Computer Science),* University of Lagos, Nigeria *(1994)*
-***M.Sc.*** *(Mathematics),* University of Lagos, Nigeria *(1992)*
-***B.Sc.*** *(First-Class Honors, Mathematics),* University of Nigeria, Nsukka *(1991)*

TEACHING EXPERIENCE:

-**Assistant Professor**, Ferris State University, Big Rapids, MI (*2000 - Present)*

Taught the following courses:

Math 314 – Probability (Interactive TV Course, Big Rapids / Traverse City) – Presently
Math 430 - Advanced Calculus (Interactive TV Course, Big Rapids / Traverse City)
Math 420 - Introduction to Abstract Algebra
Math 322 - Linear Algebra (Interactive TV Course, Big Rapids / Traverse City)
Math 132 - Calculus for Business
Math 135 - Calculus for the Life Sciences
Math 251 - Statistics for the Life Sciences
Math 116 – Intermediate Algebra and Trigonometry
Math 126 - Algebra and Analytic Geometry
Math 122 – Mathematical Analysis for Business– Presently
Math 120 - Trigonometry
Math 115 - Intermediate Algebra

-**Graduate Teaching Assistant**, Auburn University, Auburn, AL (*1995 - 2000)*

Taught the following courses:

MH 0161 - Calculus and Analytic Geometry I
MH 0162 - Calculus and Analytic Geometry II
MH 0169 - Business Mathematics
MH 0160 - Pre-Calculus with Trigonometry

SERVICE ACTIVITIES:

-Academic Advisor, Pre-Pharmacy Students
-Reviewer, Mathematical Reviews
-Member, Ferris State University Senate Diversity Committee
-Member, Mathematical Association of America
-Member, Faculty Development Committee
-Member, Algebra, Service, and Theoretical Divisions, Department of Mathematics
-Member, Math Advisory Board Ad-hoc Committee, Ferris State University *(2002)*
-Member, Math 110-115 and Math 216-226 Text Search Committees *(2001)*
-Volunteer, Auburn University Science Olympiad *(1999, 2000)*

RESEARCH / PUBLICATIONS:

-Bernstein-type Inequalities for the polar derivative of a polynomial
- *in preparation*

-Some generalizations involving the polar derivative of an inequality of Paul Turán (with N. K. Govil)
- to appear in *Acta Mathematica Hungarica*

-Some extensions of the Eneström-Kakeya Theorem (with N. K. Govil)
- *International Journal of Applied Mathematics*, 11, 245-253*(2002)*

-Some L^p inequalities for the polar derivative of a polynomial (with N. K. Govil and B. Tameru),
Journal of Mathematical Analysis and Applications, 254, 618-626 *(2001)*

-On the maximum modulus of polynomials not vanishing inside the unit circle (with N. K. Govil),
Journal of Interdisciplinary Mathematics, 4, 93-100 *(2001)*

-L^p inequalities for polar derivatives of polynomials (with N. K. Govil),
Mathematical Inequalities and Applications, Vol. 3, No. 3 *(2000)*

WORKSHOPS / SEMINARS / CONFERENCES:

-WebCT Workshop, Ferris State University *(Winter 2003)*
-MAA/AMATYC Sectional Conference, Saginaw, MI *(May, 2003)*
-Math Colloquium: "Inequalities for the Polar Derivative of a Polynomial" *(April, 2002)*
-Lilly North Conference, Big Rapids, MI *(September, 2002)*
-MAA/AMS Joint Sectional Conference, Atlanta, GA *(March, 2002)*
-Lilly South Conference, Athens, GA *(March, 2001)*
-Graduate Seminar, Auburn University *(Fall 1999, Summer 2000)*
-Mini-Conferences on Real, Harmonic Analysis & Related Areas, Auburn University *(1995-2000)*

AWARDS / PRIZES / GRANTS:

-Department Travel Assistance *(2001, 2002)*
-Timme Grant *(2001)*
-UNESCO/IAEA Scholarship *(1994-1995)*
-Indira Gandhi Memorial Prize for the Valedictorian, University of Nigeria, Nsukka *(1991)*
-Cameroon Government Scholarship *(1988-1994)*

COMPUTER SKILLS / HOBBIES:

-Programming Languages (C++, FORTRAN)
-Microsoft NT/2000, Cisco, HTML, Web Page Design
-Word, Excel, PowerPoint
-Soccer, Football, Math, Reading

REFERENCES:

Upon Request

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 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: Attended 79th 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 live satellite teleconference on " Teaching and Assessing for Critical Thinking and Deep Learning" featuring Tom Angelo, sponsored by Academic Affairs, Ferris State University.

Attended Annual Spring Learning Institute on March 22, 2002 at Ferris State University, organized by CTLFD, Ferris State University.

Attended Martin Luther King, Jr., Faculty-Staff In-Service, January 21, 2002 at Ferris State University, sponsored by the Diversity Counts! Committee.

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- 2003.

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
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 220	Analytical Geometry & Calculus I
Mathematics 230	Analytical Geometry & Calculus II
Mathematics 320	Analytical Geometry & Calculus III
Mathematics 250	Statistics for Life Sciences
Mathematics 314	Probability
Mathematics 322	Linear Algebra
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.

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.

Member of the team: 'Diversity Counts!' Project '

Committee Service:

Department Planning Committee member.

Department Faculty Development Committee member.

Applied Mathematics Committee member.

Mathematics Education Committee member.

Statistics Committee member.

Text Book and Course outline Committee member for the Following courses: Math 130,220,230,320,and 330.

Dr. Kent Sun's Tenure Review Committee Member.

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 Oscelo Intermediate School District.

Member of College of Arts and Sciences Promotion Committee for 1996-98.

Member of Department Search Committee for tenure-track faculty during Winter 1998.

University -Wide Substance Abuse Task Force Committee Member for one year term – 2000-2001.

Member of College of Arts and Sciences Promotion Committee, 2001 – 2003.

Member of Department Search Committee for tenure –track Faculty during 2001-2002.

Dr. Bakhodirzhon Siddikov's Tenure Review Committee Member.

Dr. Hengli Jiao's Tenure Review Committee Member.

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 1999-2000

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

ARTHUR J. SHERWOOD

8281 West Pickard
Remus, MI. 49340
Home: (989) 644-5016
Work: (231) 592-2567

CAREER OBJECTIVE

Continue my career in teaching college level Mathematics, Statistics, and Computer Science.

EDUCATION

1990 — Central Michigan University, Assembly Language, Marketing, Managerial Finance

1981-1983 — Air Force Institute of Technology, Wright-Patterson AFB, Ohio
Degree: Masters of Science
Major: Mathematics Minor: Operations Research

Thesis: "On the Distribution of the Likelihood Ratio Criteria Associated with k Samples of Two Correlated Random Variables Presented and Published March 1983, AIAA Symposium, Wright-Patterson AFB, Ohio

1980 — Central Michigan University, Mt. Pleasant, Michigan Nine graduate credits, MBA Program

1972 — Oklahoma State University, Stillwater, Oklahoma
Degree: Bachelor of Science Major: Mathematics

TEACHING EXPERIENCE

1989-present — Instructor of Mathematics Ferris State University, Big Rapids, Michigan.

Teaching undergraduate mathematics (Basic Mathematics, Beginning and Intermediate Algebra and Pre-Calculus), Statistics (Biostatistics and Business Statistics) and Computer Science (BASIC AND PASCAL).

1983-1987 — Assistant Professor and Course Director of Mathematical Sciences

UNITED STATES AIR FORCE ACADEMY, Colorado Springs, Colorado Responsible for the administration, preparation and teaching of undergraduate mathematics and statistics courses. Experienced in teaching Algebra/Trig, Calculus (honors), Differential Equations (honors), Probability and Statistics, and Discrete Mathematics. Course directed the Academy's largest Math course, Differential Equations. (Supervised eleven instructors and 832 students.) Planned, developed and directed the Academy's first Discrete Mathematics course for Electrical Engineers and Computer Science Majors.

Chairman Math Placement Committee

Responsible for evaluating the potential of approximately 1300 entering freshman and placing them in the proper math course. Provided technical advice toward the design and development of the Automated Math Placement Model which reduced the time required to place incoming students from several days to about six hours.

Staff Instructor Navigator

Taught cadet aviation fundamentals through classroom instruction, trainers and flight demonstration.

Chairman Wrestling Eligibility Committee

Reviewed the academic records of Varsity Wrestlers and recommended corrective action and counseling to cadets not meeting the Academy's academic standards.

ADDITIONAL EMPLOYMENT

1987-1989 Chief Instructor Navigator, Training Branch, Griffiss AFB, Rome, NY. Plans, coordinates and directs personnel training and staff development for over 80 rated crew members. Formulates training policies and procedures, utilizing knowledge of identified training needs and organizational goals. Organized and developed training manuals, reference library, and testing and evaluation procedures. Screens and recommends personnel for promotion and upgrade.

1975-1981 KC-135 Navigator/Instructor Navigator (prereq: Undergraduate Navigator Training/Flight Instructor Course), Wurtsmith AFB, MI
Responsible for training assigned navigators and directly supporting the mission of the Strategic Air Command throughout North and South America, the Pacific, European and Asian Theaters.

1973-1975 Communication Systems Officer (prereq: Communications Systems, Operations and Maintenance Course), Grand Forks AFB, ND. Responsible for the accountability, issue and destruction of classified communications documents. Managed the Communications Security Program (COSMIC), for training individual custodians and ensuring proper practices and procedures were followed in safeguarding classified material.

1969-1971 Avionics Equipment Specialists (prereq: Communications and Navigation Maintenance Course), K I Sawyer AFB, MI
Responsible for the repair, maintenance and quality control of avionics systems.

ADDITIONAL EDUCATION

Air Command and Staff College: An advanced service school offering training in leadership, management, and international relations.

Air Force Squadron Officers Training School: Service school offering training in leadership and management.

Air Force Officer Training School: An intensive training course in military leadership, personnel management techniques, and written and oral communications.

REFERENCES

Transcripts and letters of reference will be furnished upon request.

CURRICULUM VITAE

Bakhodirzhon M. Siddikov, Ph.D., Assistant Professor

Contact Information

Office:
Ferris State University
Mathematics Department
820 Campus Drive, ASC 2021
Big Rapids, MI 49307-2225
Phone: (231) 591 – 5913
Fax: (231) 591 – 2627
E-mail: SiddikoB@ferris.edu

Home:
521 West Fuller Avenue
Apartment #304D
Big Rapids, MI 49307
Phone: (231) 796 – 0728

Education

Ph.D. in Mathematics, May 2001	University of Wisconsin-Milwaukee, Milwaukee, WI
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

- Area of research: numerical analysis
- 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).
- Current research interests: numerical analysis, in particular, finite difference methods for solving linear and nonlinear PDEs; industrial and applied mathematics

Work Experience

• Assistant Professor	2001 – Present	Ferris State University, Mathematics Department, Big Rapids, MI, U.S.A.
• Teaching Assistant and Graduate Student	1996 – 2001	University of Wisconsin-Milwaukee, Department of Mathematical Sciences, Milwaukee, WI, U.S.A.
• Assistant Professor	1994 – 1995 1992 – 1993	Tashkent State Polytechnic University at Ferghana, Department of Mathematics, Ferghana, Uzbekistan.
• Fellow of Fellowship Program	1993 – 1994	Marquette University, Department of Economics, Milwaukee, WI, U.S.A.
• Student	1991 – 1992	Moscow State Linguistic University, Department of English for Academic Teachers, Moscow, Russia.
• Assistant Professor	1990 – 1991	Ferghana Polytechnic Institute, Department of Applied Mathematics and Computer Science.
• Graduate Student	1986 – 1989	Kiev State University, Department of Cybernetics, Division of Applied Mathematics, Kiev, Ukraine.
• Research-Mathematician	1985 – 1986	Kiev State University, Department of Cybernetics, Division of Applied Mathematics.
• Programmer	1983 – 1985	Ferghana Polytechnic Institute, Computing Center.

Publications

1. Numerical Simulation of the Passive Regenerator (with D. Schultz and B. Wade), *International Journal of Applied Science & Computations*, Vol. 9, pp. 89 – 97 (2002).

2. Numerical Simulation of the Active Magnetic Regenerative Refrigerator, *Second Ph.D. thesis*, University of Wisconsin – Milwaukee, May, 2001, 140 pages.

3. 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).

4. 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.

5. 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).

6. 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).

7. Identification of Velocity of Hydroacoustic Signals, *Journal of Modeling and Optimization of Complex Systems*, Vol. 8, pp. 6-8 (1989).

Talks and Abstracts

1. 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 (2002). Gave a talk.

2. Numerical Simulation of the Active Magnetic Regenerative Refrigerator, at the *Math Colloquium*, Department of Mathematics, Ferris State University, Big Rapids, Michigan, October 11 (2001).

3. Numerical Simulation of the Passive Regenerator, Abstracts of *Confer. Midwest Numerical Analysis and Scientific Computing Day 2000*, Indianapolis, Indiana, pp. 19-21 (2000). Gave a talk.

4. Numerical Simulation of the Active Magnetic Regenerator, Abstracts of *Inter. Confer. Dynamical Systems, Modeling, and Stability Investigation*, Kiev, Ukraine, pp. 90-91 (1999). Gave a talk.

5. Cubic Spline Interpolation, Abstracts of *Confer. Modern Methods of Information Technology*, Osh, Kirgizistan, p. 98 (1995). Gave a talk.

6. A Modified Descent – Lift – Transfer Method for Global Optimization of Multiextremal Functions, *Confer. Modeling and Identification in Chemical Industry*, Alushta, Ukraine (1990). Gave a talk.

Organizations

- Member of American Mathematical Society
- Member of Society for Industrial and Applied Mathematics

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Grants and Awards

- Professional Development Grant , "Developing and Implementing Internet-Based Instruction of Math 216, Applied Calculus Course", from Ferris State University, Big Rapids, MI (2003, $4,000).
- Faculty Research Grant , "Numerical Simulation of the Active Magnetic Regenerative Refrigerator", from Ferris State University, Big Rapids, MI (2002, $2,685).
- Award for editing the book "Essential Trigonometry and Algebra for University Students" from the McGraw-Hill Publishing Companies (2000, $400).
- 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).
- Professional Development Grant in Economics from the U.S. Congress (1993, $25,000).

Courses Taught (Most are for multiple semesters)

- 325 – College Geometry — at Ferris State University
- 230 – Analytical Geometry and Calculus II — at Ferris State University
- 220 – Analytical Geometry and Calculus I — at Ferris State University
- 216 – Applied Calculus — at Ferris State University
- 130 – Advanced Algebra and Analytical Trigonometry — at Ferris State University
- 116 – Intermediate Algebra and Numerical Trigonometry — at Ferris State University
- 115 – Intermediate Algebra — at Ferris State University
- 110 – Fundamentals of Algebra — at Ferris State University

- 231 – Calculus and Analytic Geometry — at University of Wisconsin-Milwaukee
- 226 – Calculus with Precalculus II — at University of Wisconsin-Milwaukee
- 225 – Calculus with Precalculus I — at University of Wisconsin-Milwaukee
- 211 – Survey in Calculus and Analytic Geometry — at University of Wisconsin-Milwaukee
- 105 – Intermediate Algebra — at University of Wisconsin-Milwaukee

- High Mathematics (=Complete sequence of Calculus in the U.S.) — at Tashkent State Polytechnic University

- Numerical Analysis — at Ferghana Polytechnic Institute
- Linear Programming and Optimization — at Ferghana Polytechnic Institute
- Programming Languages (FORTRAN and BASIC) — at Ferghana Polytechnic Institute

Committee Work

- Chair of a Core Division Committee (December 2002 – present).
- Member of an Applied Division Committee (September 2002 – present).
- Member of a Faculty Development Committee (February 2002 – present).
- Member of a Faculty Search Committee (September 2002 – May 2003).
- Member of Math Advisory Board Committee (September – December 2002).
- Member of Applied Calculus Course Textbook Selection Committee (Winter 2002).

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Computer Skills

- UNIX, MS-DOS, FORTRAN, PL-I, BASIC, HTML, MATLAB, MAPLE, DERIVE

References

- Dr. David Frank, Head of Mathematics Department, David_Frank@ferris.edu
- Professor Robert McCullough, Robert_Mccullough@ferris.edu
- Professor Roy Gifford, Roy_Gifford@ferris.edu
- Professor John Linnen, John_Linnen@ferris.edu

All four 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

- Professor David H. Schultz (thesis advisor), schultz@uwm.edu
- Professor Bruce A. Wade, wade@uwm.edu
- Professor Richard J. O'Malley, omalley@uwm.edu

All three 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

PHILIP P STICH
Assistant Professor of Mathematics
Appointed 1970

1. Academic Degrees (degrees, institutions, dates, field of specialty)

M.A.	University of Illinois	1969	Mathematics
B.S.	Moorhead State University	1963	Mathematics/Physics

2. Professional Experience (list last first, including elementary and secondary teaching and school support service)

1970-present	Ferris State University
1969-1970	New York Mills Public School
1963-1968	Herman Community Schools

3. Faculty and Administrative Load (most recent full year)

Fall Semester, 1999

Math 110	Beginning Algebra	4 semester units
Math 130	Adv Algebra & Trig	4 semester units
Math 132	Calc for Business	3 semester units

Winter Semester, 2000

Math 116	Int. Algebra & Trig	4 semester units
Math 132	Calc for Business	3 semester units
Math 220	Calculus I	5 semester units
Cpsc 244	Prog with Fortran	3 semester units

Other Collegiate Assignments

Student Advising

4. Current Professional and Academic Association Memberships

Mathematical Association of America
Michigan Section of Mathematics Association of America
National Education Association
Michigan Education Association
Ferris Faculty Association

*Super Computer Conference at Michigan Technological University, July 1986
*Annual Conference of MACAL, 1997
*National Meeting of MAA and AMS, 1988
*Michigan Section MAA, 1989
*National Meeting of MAA and AMS, 1990

*National Meeting of MAA and AMS, 1992
*Seventh International Congress on Mathematics Education, 1992
*Fourth Annual Michigan Conference on Calculus in Transition, 1993
*Tri-Sectional Meeting MAA, 1993
*National Meeting of MAA and AMS, 1994
*National Meeting of MAA and AMS, 1996
*National Meeting of MAA and AMS, 1998
*Summer Meeting of MAA, 1998

8. Research (list funded or personal research, special studies, documented research in progress)

GRANTS

Timme Center Instructional Assistance Grant for purchase of a computer and some software to compare the relative merits of two different Computer Algebra Systems to aid the teaching of calculus to technology students with Betty Arnold, summer 1992.

Timme Center Equipment Grant for purchase of Laptop Computer and software with Betty Arnold and Gene Arnold, 1993.

KENT SUN

17860 205th Ave.
Apt. 1
Big Rapids, MI 49307

Ferris State University
ASC 2031
Department of Mathematics
(231) 591-2579
kentsun@ferris.edu

PERSONAL: Natural-born United States citizen

EDUCATION:

Post-Doctoral Training in Biostatistics UNC at Chapel Hill 9/97 - 9/00
Training in biostatistics with an emphasis in clinical trials studies and recursive partitioning

Ph.D. Applied Mathematics & Statistics SUNY at Stony Brook 12/96
Dissertation Topic: Diffusion Problems in Fluid Flow Models
Advisor: Professor Reginald P. Tewarson

M.S. Applied Mathematics & Statistics SUNY at Stony Brook 5/92

M.S. Electrical Engineering Polytechnic University 5/98

B.S. Electrical Engineering Cornell University 5/85

TEACHING EXPERIENCE:

At SUNY at Stony Brook
- Introduction to Statistics
- Introduction to Finite Mathematics
- Fundamentals of Computing

At Ferris State University
- Intermediate Algebra (Math 115)
- Calculus for Business (Math 132)
- Calculus for the Life Sciences (Math 135)
- Statistics for the Life Sciences (Math 251)
- Linear Models in Statistics (Math 310)
- Actuarial Science Professional Exam Preparation I (Math 385)
- Mathematical Statistics I (Math 414)
- Mathematical Statistics II (Math 416)

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 Factor Modification in a Lower-Middle Class Community in Pakistan: The Metroville Health Study - A USA-Pakistan Cooperative Study
Pending publication at the *Asia Pacific Journal of Public Health*

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:

Promoted to Associate Professor (Fall 2003)
Outstanding Teaching Award (Spring 1997, SUNY at Stony Brook)
Memorandum acknowledging a positive student impact (Winter 2001, FSU)
Invited faculty member at the First Student Athlete Advisory Council's Faculty Appreciation Night. (Winter 2002, FSU)
Invited faculty member at a Faculty Appreciation Night by the women's volleyball team (Fall 2002, FSU)

COMMITTEE WORK:

Departmental:

Department Meeting Secretary (Winter 2001 - Winter 2002)
Member of the Math 110/115 course curriculum Committee (Winter 2002)
Faculty Search Committees (Fall 2000 - Winter 2001, Fall 2001 - Winter 2002, and Fall 2002 - Winter 2003 (ongoing))
Chair of the Department Statistics Committee (Present)
Chair of the Committee for forming the Math Advisory Board (Present)
Member of the Assessment Committee (Present)
Member of the Curriculum Committee (Present)

College:

Member of the Arts and Science Dean Search Committee (Present)
Member of the committee for revising the promotion/merit policy(Present)

SEMINARS ATTENDED:

New to Ferris Faculty (Fall 2000 - Winter 2001) (required for all new faculty)
Facilitating Student Learning Program (9/00 - 12/00)
Test What You Teach, Teach What You Test (9/01 - 11/01)
Learning and Teaching (2/02 - 4/02)

PRESENTATION:

Title: A Tree Grows in Big Rapids: An Introduction to the Statistical Method of Recursive Partitioning

Abstract: Recursive partitioning is an alternative statistical method of relating input variables to an output variable that unlike classical methods such as linear regression requires fewer assumptions. This method creates a tree diagram that is easy to understand since the structure of the tree diagram is similar to the way that we think. An additional advantage is that not only can it be used to predict a response given a set of input values but that the structure of the tree itself may provide clues as to how the input and output variables are actually related.

Presented 11/21/02 at the math department's colloquium which was open to the public

RECENT CONFERENCES:

Lilly Conference (Winter 2001)
Equity Conference (Winter 2001)
Lilly Conference (Fall 2002)
Michigan MATYC Faculty Conference (Fall 2002)

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

Tripp, Joseph S., Ph.D.
Assistant Professor
Mathematics Department
Ferris State University
Appointed 1999

1. Academic Degrees

Ph.D.	Syracuse University	1999	Mathematics Education
M.S.	Syracuse University	1993	Mathematics Education
B.A.	State University of New York at Plattsburgh	1991	Mathematics and Secondary Math Education

2. Professional Experience

1999 - Present	Ferris State University
1995 - 1999	Syracuse University, Mathematics Teaching Associate
1991 – 1993	Syracuse University, Mathematics Teaching Assistant
1995	University of Maryland University College, Lecturer

3. Faculty and Administrative Load

Fall Semester, 1999

Math 010	Fundamentals of Mathematics	12 semester hours

Winter Semester, 2000

Math 010	Fundamentals of Mathematics	9 semester hours
Math 117	Contemporary Mathematics	4 semester hours

Fall Semester, 2000

Math 010	Fundamentals of Mathematics	12 semester hours

Winter Semester, 2001

Math 010	Fundamentals of Mathematics	3 semester hours
Math 110	Fundamentals of Algebra	8 semester hours

Fall Semester, 2001

Math 010	Fundamentals of Mathematics	12 semester hours

Winter Semester, 2002

Math 010	Fundamentals of Mathematics	8 semester hours
Math 110	Fundamentals of Algebra	4 semester hours

Other Collegiate Assignments (1999 – 2002)

Member, Faculty Search Committees
Member, Elementary Education Mathematics Courses Committee
Chair, Faculty Development Committee
Member, Mathematics Department Head Search Committee
Member, Course Scheduling Committee

4. Publications

Tripp, J. S. (1999). Reprint of "Getting Students to do Homework." Missouri Council of Teachers of Mathematics Bulletin, 24(4), 15-16.

Doerr, H. M., & Tripp, J. S. (1999). Understanding How Students Develop Mathematical Models. Mathematical Thinking and Learning, 1(3), 231-254.

Tripp, J. S. (1998). Getting Students to do Homework. The Mathematics Teacher, 91(6), 478-479.

Masingila, J., Dominguez, A., King, K., & Tripp, J. (1997). Algebraic Operations and Functions. Needham Heights, MA: Simon & Schuster Custom Publishing.

Masingila, J., Dominguez, A., King, K., & Tripp, J. (1998). Algebraic Operations and Functions, 2nd Ed. Needham Heights, MA: Simon & Schuster Custom Publishing.

5. Papers Presented

Doerr, H. M., & Tripp, J. S. (April 1998). Model Development and Shifts in Students' Thinking. Paper Presented at Challenges and Opportunities of a Modeling Curriculum Symposium at the Annual Meeting of the American Educational Research Association, San Diego, California.

Tripp, J. S. (October 1997). The Effects of a Reform-Based Classroom Experience on Students' Conceptions of Mathematics and Mathematics Learning. Dissertation proposal presented at the 4th Annual New York Graduate Mathematics Education Research Conference at Syracuse University, Syracuse, New York.

Tripp, J. S. (October 1997). The Effects of a Reform-Based Classroom Experience on Students' Conceptions of Mathematics and Mathematics Learning. Dissertation proposal presented at the monthly meeting of the Teaching and Leadership Faculty, School of Education, Syracuse University, Syracuse, New York.

Doerr, H. M., & Tripp, J. S. (June 1997). Shifts in Student Thinking. Paper presented at The Fourth International Misconceptions Seminar—From Misconceptions to Constructed Understanding, Cornell University, Ithaca, New York.

Tripp, J., Myers, A., Nigam, P., & de Silva, R. (April 1997). Bridging the Gap Between Mathematics and Mathematics Education: Reflections on Designing Materials and Implementing Pedagogy and Research. 23rd Annual New York State Regional Graduate Mathematics Conference, Syracuse University, Syracuse, New York.

Tripp, J., Dominguez, A., Myers, A., Nigam, P., O'Brien, K., & de Silva, R. (November 1996). Mathematics Reform at the Undergraduate Level: Reflections on Designing

Materials and Implementing Pedagogy. 3rd Annual New York Graduate Mathematics Education Research Conference at Syracuse University, Syracuse, New York.

Tripp, J., Reap, J., McGuire, K., & Mariano, M. (May 1996). Research Proposal: Persistence Across Ethnic Groups and Stages of Doctoral Study. Research proposal presented before the members of a Graduate Course on Educational Research Methods, Syracuse University, Syracuse, New York.

Tripp, J. S. (November 1995). Cognitive Style and the Learning of Geometry. Paper presented before the members of a Graduate Course on Teaching Geometry, Syracuse University, Syracuse, New York.

Shaw Walker, Assistant Professor
Department of Mathematics, Ferris State University

1. Academic Degrees

M.S.	Stanford University	Scientific Computing and Computational Mathematics
B.S.	Santa Clara University	Mathematics
B.M.	Eastman School of Music	Percussion

2. Professional Experience

2001–Present	Ferris State University	Assistant Professor, Department of Mathematics
1999–2001	Santa Clara University	Adjunct Lecturer, Department of Mathematics and Computer Science Adjunct Lecturer, Department of Computer Engineering System Administrator, Department of Mathematics and Computer Science
1998	Hitachi Internetworking	Technical Support Engineer

3. Teaching and Administrative Duties

Ferris State University

CPSC 200	Object Oriented Programming
CPSC 300	Data Structures and Algorithms
CPSC 320	Computer Simulation
MATH 110	Fundamentals of Algebra
MATH 116	Intermediate Algebra and Trigonometry
MATH 117	Contemporary Mathematics

Santa Clara University

MATH 9	Precalculus Mathematics
MATH 10	Introduction to Computer Science (in C++)
MATH 11	Calculus and Analytic Geometry I
MATH 12	Calculus and Analytic Geometry II
COEN 44	Applied Programming (in C)

Departmental Service (Ferris State University)
Chair, Computer Science Division
Academic advisor for Computer Science students
Member, Departmental Curriculum Committee
Member, Statistics Division Committee
Member, Departmental Program Review Panel
Member, Mathematics Advisory Board Committee
Departmental Meeting Recorder

4. Current Professional and Academic Association Memberships

Society for Industrial and Applied Mathematics
American Mathematical Society
Mathematical Association of America
Association for Computing Machinery
Phi Beta Kappa
Pi Mu Epsilon
Sigma Xi

5. Current Professional Assignments and Activities

N/A

6. Publications

N/A

7. Papers Presented

N/A

8. Research

N/A

Appendix C

Course content sheets for all of our computer science and mathematics courses that are relevant to our Applied Mathematics major.

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

G. Lobo
Fall, 1993

MATHEMATICS COURSE CONTENT

CPSC 244 SCIENTIFIC PROGRAMMING IN FORTRAN 3 Credits

Coding Mathematical problems in FORTRAN 77. If software is made available FORTRAN 77 will be replaced with FORTRAN 90. MICROSOFT package used. Documentation, flowcharting, arithmetic statements, formatted input/output statements, control statements, arrays, functions, recursion, decision structures, subprograms and file processing. If time permits graphics and complex data types will also be covered.

PREREQUISITE: MATH 216 or MATH 230 or EQUIVALENT.

TEXT: FORTRAN 77 for Engineers and Scientists, Third Edition, Larry Nyhoff and Sanford Leestma, Macmillan Publishing Company.

CONTENT

Chapter 1 INTRODUCTION AND HISTORY
You should spend at most four lectures on this chapter and an introduction to the software that will be used.

Chapter 2 PROGRAMMING DEVELOPMENT
Spend at most three lectures on this Chapter.

Chapter 3 BASIC FORTRAN
- 3.1 Data + Algorithms = Programs.
- 3.2 Program Format.
- 3.3 Constants and Variables.
- 3.4 Arithmetic Operations and Functions.
- 3.5 The Assignment Statement.
- 3.6 List Directed Input/Output.
- 3.7 (OPTIONAL) Program Composition.

Chapter 4 STRUCTURED PROGRAMMING
- 4.1 Sequential Structure.
- 4.2 The Logical Data Type.
- 4.4 The IF Selection Structure.
- 4.5 Repetition Structure : DO Loops.
- 4.6 The While Repetition Structure.
- 4.7 The DO WHILE Statement.
- 4.8 (OPTIONAL) Implementing While Loops in Standard FORTRAN.
- 4.9 A Posttest Repetition Structure.

Chapter 5 INTRODUCTION TO SUBPROGRAMS AND MODULAR PROGRAMMING
- 5.1 Function Subprograms.
- 5.2 (OPTIONAL) Examples. May use your own examples.
- 5.3 Subroutine Subprograms.
- 5.4 (OPTIONAL) Examples. May use your own examples.
- 5.5 Functions and Subroutines as examples.
- 5.6 (OPTIONAL) The COMMON Statement.

Chapter 6 INPUT/OUTPUT
- 6.1 Formatted Output.
- 6.2 Examples - May use your own examples.
- 6.3 Formatted Input.
- 6.4 The WRITE Statement and the General READ Statement.
- 6.5 Introduction to File Processing.
- 6.6 (OPTIONAL) Examples - May use your own examples.
- 6.7 (OPTIONAL) Miscellaneous Input/Output Topics.

Chapter 7 ONE DIMENSIONAL ARRAYS
- 7.1 Introduction to Arrays : Scripted Variables.
- 7.2 Input/Output of Arrays.
- 7.4 Array Processing.

Chapter 8 MULTI DIMENSIONAL ARRAYS
- 8.1 Introduction to Multi dimensional Arrays.
- 8.2 Processing Multi dimensional Arrays.

Chapter 9 DOUBLE PRECISION AND COMPLEX DATA TYPES
- 9.1 Double Precision Type.
- 9.2 (OPTIONAL) Complex Type.

Chapter 10 ADVANCED CHARACTER DATA
- 10.1 Character Data and Operations.
- 10.2 The INDEX and LEN Functions.
- 10.3 Character Comparision.

OPTIONAL : If time permits then graphics, Chapters 11 - 13 may be covered.

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

Spring, 1993
R. McCullough

MATHEMATICS COURSE CONTENT

CPSC 320 COMPUTER SIMULATIONS 3 Credits

This course will cover continuous and discrete simulations of real-life processes. The continuous system language DYNAMO and a general purpose high level programming language will be used.

Prerequisite: Knowledge of a high-level computer language
MATH 231

Text: None required, but material will be taken from:
Introduction to Computer Simulation, by Roberts, Anderson, Deal, and Scaffer, Addison-Wesley Publishing Co., 1983
and Simulation Using Personal Computers, by Carroll, Prentice-Hall, Inc., 1987.

CONTENT

(from Introduction to Computer Simulation)

PART V:	INTRODUCTION TO SIMULATION	
Chapter 13	Levels and Rates	5 days
Chapter 14	Simulation Using DYNAMO	3 days
Chapter 15	Using Simulation to Analyze Simple Positive and Negative Loops	2 days
Chapter 16	Representing More Complex Causal Relations	3 days
Chapter 17	Introduction to Delays	2 days
PART VI:	FORMULATING AND ANALYZING SIMULATION MODELS	
Chapter 18	Modeling the Ecology of the Kaibab Plateau	4 days
Chapter 19	Dynamic Characteristics of Flu Epidemics	2 days
Chapter 20	Urban Growth	2 days

(from Simulation Using Personal Computers)

Chapter 3	Random Numbers	4 days
Chapter 4	Time-Oriented Simulation	4 days
Chapter 5	Event-Oriented Simulation	4 days
Chapter 6	Distribution Functions	3 days
Chapter 9	GPSS for Personal Computers	2 days
	REVIEW AND TESTS	5 days
	Total days	45

Spring, 1993
G. Arnold

MATHEMATICS COURSE CONTENT

CPSC 326 COMPUTER GRAPHICS 3 credits

An overview of graphics hardware, object oriented programming, representation of curves and surfaces, wire frame representation, two and three dimensional transformaions, projection onto the display device, hidden line removal and programming for interaction.

Prerequisite: CPSC 215 and MATH 322 or consent of instructor

Text: Computer Graphics, by D. Hearn and M. Baker

CONTENT

CHAPTER/SECTION	TOPIC
Chapter 1	A Survey of Computer Graphics
Chapter 2	Overview of Graphics Systems
Chapter 3	Output Primitives

Note: Chapter 1 - 3 should be covered quickly as an introduction.

Introduction to Pascal Objects.

Chapter 5	Two-dimensional Transformation
Chapter 6	Windowing and Clipping
Chapter 8	Interactive Input Methods
Chapter 9	Three-dimensional Concepts
Chapter 10	Three-dimensional Representations
Chapter 11	Three-dimensional Transformations
Chapter 12	Three-dimensional Viewing
Chapter 13	Hidden-surface and Hidden-line Removal
Chapter 14	Shading and Color Models

CPSC 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

CPSC 340 Hardware and Software Organization – 4 credits

Course Description: This course introduces assembly level machine organization and assembly language programming. Topics include instruction sets and types, addressing modes, input/output and interrupts, modularity, partitioning and redundancy. This is followed by a treatment of systems software. Prerequisite CPSC 200.

Course Objectives:

1. The student will understand machine architecture.
2. The student will understand machine language.
3. The student will understand the properties of an assembly language.
4. The student will understand linkers and loaders.
5. The student will understand compiler operation.
6. The student will understand how operating systems work.

Course Outline:

Suggested Text: Computer Organization-A Top Approach, Scragg, McGraw Hill, 1992.

1. Machine Language (4 days)
2. Assembler Language (14 days)
3. Linkers and Loaders (9 days)
4. Basic Compiler Theory (7 days)
5. Compiler Case Study (7 days)
6. Elementary Concurrency and Synchronization Principles (7 days)
7. Operating Systems Overview. (7 days)
8. Evaluation(Exams, Quizzes, etc.) (5 days)

This course will involve at least one major programming project such as a machine simulator, an assembler, or a compiler.

COMPUTER SCIENCE COURSE CONTENT

CPSC 442 PROGRAMMING LANGUAGE CONCEPTS 3 CREDITS

Topics include definition and structure of a language, data types control structures and data flow, run time considerations, interpretive languages, and lexical analysis and parsing.

Prerequisite: CPSC 205, CPSC 215 and CPSC 310.

Text: The Anatomy of Programming Languages by Alice E. Fischer and Frances S. Grodzinsky
Prentice-Hall, Inc ,1993.

CONTENT

Chapter/Section	Suggested Topic
Chapter 4	FORMAL DESCRIPTION OF LANGUAGE
4.1	Foundations of Programming Languages
4.2	Syntax (Extended BNF, Syntax Diagrams)
4.3	Semantics
4.4	Extending the Semantics of a Language
Chapter 5	PRIMITIVE TYPES
5.1	Primitive Hardware Types
5.2	Types in Programming Languages
5.3	A Brief History of Type Declarations
Chapter 6	MODELING OBJECTS
6.1	Kinds of Objects
6.2	Placing a Value in a Storage Objects
6.3	The Storage Model: Managing Storage Objects
Chapter 8	EXPRESSIONS AND EVALUATIONS
8.1	The Programming Environment
8.2	Sequence Control and Communication
8.3	Expression Syntax
8.4	Function Evaluation
Chapter 9	FUNCTIONS AND PARAMETERS
9.1	Function Syntax
9.2	What Does an Argument Mean?
9.3	Higher-Order Functions
Chapter 10	CONTROL STRUCTURES
10.1	Basic Control Structures
10.2	Conditional Control Structures
10.3	Iteration
10.4	Implicit Iteration

MATHEMATICS COURSE CONTENT

Fall, 2003
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, 6th Ed., Larson, Hostetler, and Edwards, Houghton Mifflin Company

CONTENT

CHAPTER/SECTION	TOPIC
P-1 – P-3, Appendix A, A.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 and 3.10)
4.1 – 4.5, 4.6	Integration Trapezoidal Rule (Simpson's Rule is optional)
5.1 – 5.7	Logarithmic and Exponential Functions (omit 5.8 and 5.9)

MATHEMATICS COURSE CONTENT

Fall, 2003
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 with a grade of C- or better or its equivalent

TEXT: Calculus, 6th Ed., Larson, Hostetler, and Edwards, Houghton Mifflin Company

CONTENT

CHAPTER/SECTION	TOPIC
5.8 & 5.9	Inverse Trig Functions
6.1 – 6.7	Applications of Integration (6.5 and 6.7 are optional)
7.1 – 7.8	Integration Methods, L'Hopitals Rule, Improper Integrals
8.1 – 8.10	Sequences and Series, Polynomial Approximation (8.8 and 8.9 are optional)
9.1 – 9.5	Conics, Parametric Equations, and Polar Coordinates

R. McCullough
Fall, 1999

MATHEMATICS COURSE CONTENT SHEET

MATH 251 STATISTICS FOR THE LIFE SCIENCES

A first course in statistics, including a broad range of applications from science. Topics include: data display, descriptive statistics, probability, estimation, sampling, point and interval estimation and hypothesis testing.

PREREQUISITE: A grade of C- or better in MATH 130 or the equivalent

TEXT: Statistics – A First Course, 7th edition, Freund and Simon, Prentice Hall, 1999

Chapter	Topic	Hours
Chapter 1	Introduction	1.5
Chapter 2	Listing and Grouping	1.5
Chapter 3	Statistical Descriptions	3.0
Chapter 4	Possibilities and Probabilities	3.0
Chapter 5	Some Rules of Probability	4.5
Chapter 6	Probability Distributions	4.5
Chapter 7	The Normal Distribution	3.0
Chapter 8	Sampling and Sampling Distributions	3.0
Chapter 9	Problems of Estimation	4.5
Chapter 10	Tests Concerning Means	4.5
Chapter 11	Tests Based on Count Data	3.0
Tests and Review		7.0
Final		2.0
Total:		45.0 hours

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)

MATHEMATICS COURSE CONTENT

MATH 314 PROBABILITY 3 Credits
Discrete probability theory, including: Combinatorial analysis, properties of probability, conditional probability, random variables, expectation, and limit theorems.
Prerequisite: MATH 220
Text: Probablity, An Introduction; Samuel Goldberg, 1960, Dover Publications

CONTENT

CHAPTER	TOPIC
1. SETS	1. Examples of sets; basic notation, 1 2. Subsets, 8 3. Operations on sets, 16 4. The algebra of sets, 28 5. Cartesian product sets, 39
2. PROBABILITY IN FINITE SAMPLES SPACES	1. Sample spaces, 45 2. Events, 51 3. The probability of an event, 54 4. Some probability theorems, 64 5. Conditional probability and compound experiments, 74 6. Bayes' formula, 91 7. Independent events, 102 8. Independence of several events, 107 9. Indepenent trials, 113 10. A probability model in genetics, 123
3. SOPHISTICATED COUNTING	1. Counting techniques and probability problems, 132 2. Binomial coefficients, 149
4. RANDOM VARIABLES	1. Random variables and probability functions, 158 2. The mean of a random variable, 172 3. The variance and standard deviation of a random variable, 185 4. Joint probability functions; independent random variables, 197 5. Mean and variance of sums of random variables; the sample mean, 212 6. Covariance and correlation; sample mean (cont.) 232
5. BINOMIAL DISTRIBUTION AND SOME APPLICATIONS	1. Bernoulli trials and the binomial distribution, 252 2. Testing a statistical hypothesis, 272 3. An example of decision-making under uncertainty, 286

MATHEMATICS COURSE CONTENT

Fall, 2003
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: MATH 230 with a grade of C- or better or its equivalent

TEXT: Calculus, 6th Ed., Larson, Hostetler, and Edwards, Houghton Mifflin Company

CONTENT

CHAPTER/SECTION	TOPIC
10.1 – 10.7	Vectors and the Geometry of Space
11.1 – 11.5	Vector – Valued Functions
12.1 – 12.8	Functions of Several Variables
13.1 – 13.8	Multiple Integration
14.1 – 14.7	Vector Analysis (if time permits)

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 with Applications, 6th Edition, Kolman
Macmillan Publishing Company

CONTENT

CHAPTER/SECTION TOPIC

Chapter 1 Linear Equations and Matrices
- 1.1 Linear Systems
- 1.2 Matrices
- 1.3 Dot Product and Matrix Multiplication
- 1.4 Properties of Matrix Operations
- 1.5 Solutions of Equations
- 1.6 The Inverse of a Matrix

Chapter 2 Determinants
- 2.1 Definition and Properties
- 2.2 Cofactor Expansion and Applications
- 2.3 Determinants from a Computational Point of View

Chapter 3 Vectors and Vector Spaces
- 3.1 (Optional) Vectors in the Plane
- 3.2 n - vectors
- 3.3 Introduction to Linear Transformations
- 3.4 (Optional) Computer Graphics
- 3.5 Cross Products in R^3
- 3.6 Lines and Plains

Chapter 4 Linear Transformations and Matrices
- 4.1 Real Vector Spaces
- 4.2 Subspaces
- 4.3 Linear Independence
- 4.4 Basis and Dimension
- 4.5 Homogenous Systems
- 4.6 The Rank of a Matrix and Applications
- 4.7 Coordinates and Change of Basis
- 4.8 (Optional) Orthonormal Bases in R^N

Chapter 5 (Optional) Eigen Values and Eigen Vectors
- 5.1 Diagonalization
- 5.2 Diagonalization of Symmetric Matrices

MATHEMATICS COURSE CONTENT

FALL 1993
J. LINNEN

MATH 324 FUNDAMENTALS CONCEPTS IN MATHEMATICS 3 CREDITS

An introduction to mathematical structure and deductive logic thru the study of fundamental systems. Topics include logic, sets, relations and functions. The fundamental methods of mathematical proofs are emphasized throughout the
course.

PREREQUISITE: One term of calculus.

TEXT: A Transition to Advanced Mathematics; Smith, Eggen, and St. Andre; Third Edition; Brooks/Cole.

CONTENT

Chapter/Section

Chapter 1 Logic and Proofs
- 1.1 Proposition and Connectives
- 1.2 Conditionals and Biconditionals
- 1.3 Quantifiers
- 1.4 Mathematical proofs
- 1.5 Proofs involving quantifiers
- 1.6 Additional examples of proofs

Chapter 2 Set Theory
- 2.1 Basic notions of set theory
- 2.2 Set Operations
- 2.4 Mathematical induction

Chapter 3 Relatations
- 3.1 Cartesian Products and Relations
- 3.2 Equivalence Relations

Chapter 4 Functions
- 4.1 Functions as Relations

Chapter 6 Concepts of Algebra
- 6.1 Algebraic Structures

M. Dargitz
Fall, 1993

MATHEMATICS COURSE CONTENT

MATH 325 COLLEGE GEOMETRY 3 CREDITS

This course's primary function is to prepare a student to teach high school geometry.

TEXT: Roads to Geometry, Wallace and West, Prentice Hall Publishing Co.

PREREQUISITE: MATH 230 or consent of instructor.

CONTENT

The course content will consist of related topics in the first 5 chapters. Some supplementary topics will be added as deemed necessary to ensure that the students will be able to handle the teaching of the first year of high school geometry. If there are questions please contact Mr. Dargitz or Ms. Allegretto.

Chapter 1 : Axiomatic Systems
Chapter 2 : Euclidean Geometry & Non-Euclidean
Chapter 3 : Neutral Geometry
Chapter 4 : Euclidean Geometry of the Plane
Chapter 5 : Analytic and Transformational Geometry

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

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

MATHEMATICS COURSE CONTENT

MATH 340 NUMERICAL ANALYSIS 3 Credits

Numerical algorithms for root finding, interpolation, integration , linear algebra and differential equations.

Prerequisite : The knowledge of a computer programming language and at least a corequisite of MATH 320.

TEXT: Numerical Mathematics and Computing , by Cheney and Kincaid, Brooks/Cole Publishing, 4th edition.

CONTENT

CHAPTER/SECTION	SUGGESTED TOPIC
Chapter 1	INTRODUCTION
1.1	Programming Suggestions
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	Bisecting Method
3.2	Newton's 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	SYSTEMS OF LINEAR EQUATIONS
6.1	Naive Gaussian Elimination
6.2	Gaussian Elimination with Scaled Partial Pivoting
6.3	Tridiagonal and Banded Systems
Chapter 7	APPROXIMATION BY SPLINE FUNCTIONS , 7.1 and 7.2
or	
Chapter 10	SMOOTHING OF DATA AND THE METHOD OF LEAST SQUARES 10.1 and 10.2
Chapter 8	ORDINARY DIFFERENTIAL EQUATIONS
8.1	Taylor Series Method
8.2	Runge-Kutta Methods
Chapter 9	SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS
9.1	Methods for First-Order Systems
9.2	Higher-Order Equations and Systems
9.3	Adams-Moulton Methods
Chapter 12	BOUNDARY VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS
12.1	Shooting Method
12.2	A Discretization Method

MATH 360 OPERATIONS RESEARCH

This course covers the main topics of operations research, including model formulation, linear programming, integer programming, nonlinear programming, integer programming, network analysis, deterministic and stochastic dynamic programming and decision theory.

TEXT: Management Science, Mathur and Solow, Prentice Hall, 1994

PREREQUISITE: Math 322

Chapters	Topic	Approx. Hrs.
Chapter 1	Introduction to Management Science	2
Chapter 2	The Art and Science of Building Deterministic Models	3
Chapter 3	Applications of Linear Programming	4
Chapter 4	Linear Programming Graphical Method	4
Chapter 5	Linear Programming A Conceptual Approach to the Simplex Algorithm	5
Chapter 6	Linear Programming Using the Computer	4
Chapter 7	Multiobjective Optimization Using Goal Programming	4
Chapter 8	Linear Integer Programming Applications Algorithms	6
Chapter 9	Distribution Network Problems Transportation Transshipment Assignment Problems	7
Chapter 11	Decision Analysis [as time permits]	-
	Review, Quizzes and Exams	4
	Final Exam	2
	Total Hours:	45

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

Fall, 1993
G. Arnold

MATHEMATICS COURSE CONTENT

MATH 385 ACTUARIAL SCIENCE PROFESSIONAL EXAM PREPARATION I 1 credit

Prerequisite: MATH 320 and at least corequisite of MATH 322.

This course 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.

MATHEMATICS COURSE CONTENT

MATH 414 MATHEMATICAL STATISTICS I 3 CREDITS

A theoretical course in probability and statistics including distributions and densities, expectation, moment generating functions and functions of random variables. (3 + 0)

Prerequisite: MATH 320

Text: Mathematical Statistics, 5th Edition, J. Freund, Prentice Hall

CONTENT

CHAPTER/SECTION	TOPIC
Chapter 1	Introduction
1.1	Introduction
1.2	Combinatorial Methods
1.3	Binomial Coefficients
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
Chapter 3	Probability Distributions
3.1	Introduction
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
Chapter 4	Mathematical Expectation
4.1	Introduction
4.2	The Expected Value of a Random Variable
4.3	Moments
4.4	Chebyshev's Theorem
4.5	Moment-Generating Functions
4.6	Product Moments
4.7	Moments of Linear Combinations of Random Variables
4.8	Conditional Expectations

CHAPTER/SECTION	TOPIC
Chapter 5	Special Distributions
5.1	Introduction
5.2	The Discrete Uniform Distribution
5.3	The Bernoulli Distribution
5.4	The Binomial Distribution
5.5	The negative Binomial and Geometric Distribution
5.6	The Hypergeometric Distribution
5.7	The Poisson Distribution
Chapter 6	Special Densities
6.1	Introduction
6.2	The Uniform Density
6.3	The Gamma, Exponential, and Chi-square Distributions
6.4	The Beta Distribution
6.5	The Normal Distribution
6.6	The Normal Approximation to the Binomial Distribution
6.7	The Bivariate Normal Distribution
Chapter 7	Functions of Random Variables
7.1	Introduction
7.2	Distribution Function Technique
7.3	Transformation Technique: One Variable
7.4	Transformation Technique: Two Variables
7.5	Moment-Generating Function Technique
	Review and Testing

MATHEMATICS COURSE CONTENT

MATH 416 MATHEMATICAL STATISTICS II 3 CREDITS

A continuation of Math 414 including sampling distributions, estimation, hypothesis testing, regression, and ANOVA. (3 + 0)

Prerequisite: Math 414

Text: Mathematical Statistics, 5th Edition, J. Freund, Prentice-Hall

CONTENT

CHAPTER/SECTION	TOPIC
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
Chapter 9	DECISION THEORY
9.1	Introduction
9.2	The Theory of Games
9.3	Statistical Games
9.4	Decision Criteria
9.5	The Minimax Criterion
9.6	The Bayes Criterion
Chapter 10	POINT ESTIMATION
10.1	Introduction
10.2	Unbiased Estimators
10.3	Efficient Estimators
10.4	Consistent Estimators
10.5	Sufficient Estimators
10.7	The Methoid of Moments
10.8	The Method of Maximum Likelihood
10.9	Bayesian Estimators
Chapter 11	INTERVAL ESTIMATION
11.1	Introduction
11.2	Confidence Intervals for Means
11.3	Confidence Intervals for Differences Between Means
11.4	Confidence Intervals for Proportions
11.5	Confidence Intervals for Differences Between Proportions
11.6	Confidence Intervals for Variances
11.7	Confidence Intervals for Ratios of Two Variances

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

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

October 2002
David Burns

MATHEMATICS COURSE CONTENT SHEET

Math 440 Mathematical Modeling 3 Credits Offered WE

An introduction to the use of mathematics to form models of real world situations as an aid in solving problems related to them. Particular emphasis will be given to the use of graph theory as a modeling tool and to the proving of theorems.

PREREQUISITES: Math 220 and either Math 322 or Math 328

REQUIRED TEXT: "Applied and Algorithmic Graph Theory" by Gary Chartrand and Ortrud Oellermann, McGraw-Hill International Series in Pure and Applied Mathematics, 1993. ISBN 0-07-557101-3

TOPICS:

1. Elementary Graph Theory
   - The degree of a vertex
   - Isomorphic Graphs
   - Connected Graphs
   - Cut-vertices and bridges
2. Transportation problems
   - The Konigsberg bridge problem: Eulerian graphs
   - The Salesman problem: Hamiltonian graphs
3. Connection problems
   - The minimal connector problem: trees
   - PERT and the Critical Path method
4. Games and Puzzles
   - "Instant Insanity"
   - The Towers of Hanoi
   - Ramsey numbers
   - Matching
5. Digraphs as mathematical models
   - A traffic system problem
   - Tournaments
   - Paired Comparisons
6. Planar graphs and coloring problems
   - The three house three utility problem
   - Scheduling problems: chromatic numbers
   - The four color problem
7. Graphs and other mathematics
   - Graphs and matrices
   - Graphs and topology
   - Graphs and groups

By longstanding tradition, the text and course content in Math 440 may vary depending on which faculty member is teaching the course. The faculty member agreeing to teach Math 440 is responsible for timely bookstore notification if a different text is to be used

PROGRAM MAJOR/MINOR CHECK SHEET

Please attach a copy of your curriculum "check sheet" and/or "academic program requirements" list for Proposals 1, 2, and 3, and other categories as appropriate.

REVISED Computer Science Minor

Course Title	Course Number	Sem. Hours	Grade
REQUIRED 11 Cr.			
Object Oriented Programming	CPSC 200	4	
Data Structures and Object Oriented Design	CPSC 300	4	
Select One: Programming in Basic or Scientific Programming with Fortran	 CPSC 150 or CPSC 244	 3 3	
ELECTIVES 9-10 Cr.			
Computer Simulations	CPSC 320	3	
Computer Graphics	CPSC 326	3	
Discrete Structures	CPSC 328	3	
Hardware and Software Organization	CPSC 340	4	
Programming Language Concepts	CPSC 442	3	
Numerical Analysis	MATH 340	3	

PROGRAM MAJOR/MINOR CHECK SHEET

Please attach a copy of your curriculum "check sheet" and/or "academic program requirements" list for Proposals 1, 2, and 3, and other categories as appropriate.

REVISED Mathematics Minor

Course Title	Course Number	Sem. Hours	Grade
REQUIRED 16 Cr.			
Analytical Geometry and Calculus 1	MATH 220	5	
Analytical Geometry and Calculus 2	MATH 230	5	
Analytical Geometry and Calculus 3	MATH 320	3	
Linear Algebra	MATH 322	3	
ELECTIVES 6 Cr. Select from 300 or 400 level Math Courses			
Linear Models in Statistics	MATH 310	3	
Probability	MATH 314	3	
Fundamental Concepts in Mathematics	MATH 324	3	
College Geometry	MATH 325	3	
Theory of Numbers (NEW COURSE)	MATH 327	3	
Discrete Structures	MATH 328	3	
Differential Equations	MATH 330	3	
Numerical Analysis	MATH 340	3	
Operations Research	MATH 360	3	
Applied Analysis	MATH 380	3	
Mathematical Statistics 1	MATH 414	3	
Mathematical Statistics 2	MATH 416	3	
Introduction to Abstract Algebra	MATH 420	3	
Advanced Calculus	MATH 430	3	
Introduction to Complex Variables (NEW COURSE)	MATH 435	3	
Mathematics Modeling	MATH 440	3	

The mathematics department at Ferris State University offers you the opportunity to choose between five different application tracks for your Bachelor of Science degree in Applied Mathematics: Actuarial Science, Applied Mathematics, Computer Science, Operations Research and Statistics. Each track requires that you satisfy the General Education requirements of the University plus the Applied Mathematics core courses and the required courses for your chosen track.

Applied Mathematics Core (22 credits required)

1.	CPSC 150 CPSC 244	Programming in Basic or Science Programming in Fortran	3 credits
2.	MATH 220	Analytical Geometry & Calculus 1	5 credits
3.	MATH 230	Analytical Geometry & Calculus 2	5 credits
4.	MATH 251	Statistics for the Life Sciences	3 credits
5.	MATH 320	Analytical Geometry & Calculus 3	3 credits
6.	MATH 322	Linear Algebra	3 credits

Actuarial Science Track (21 credits required)

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 payout 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 will prepare you for the first two tests, which should lead to quick employment.

1.	MATH 310	Linear Models in Statistics	3 credits
2.	MATH 314	Probability	3 credits
3.	MATH 340	Numerical Analysis	3 credits
4.	MATH 414	Mathematical Statistics 1	3 credits
5.	MATH 416	Mathematical Statistics 2	3 credits
6.	INSR 243	Principles of Risk Management	3 credits
7.	Econ 221	Principles of Economics	3 credits

Applied Mathematics Track (18 credits required)

The Applied Mathematics track 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.

1.	MATH 330	Differential Equations	3 credits
2.	MATH 340	Numerical Analysis	3 credits
3.	MATH 360	Operations Research	3 credits
4.	MATH 380	Applied Analysis	3 credits
5.	MATH 440	Mathematics Modeling	3 credits
6.	MATH or CPSC 300/400 elective		3 credits

Computer Science Track (21 credits required)

The need for people with a computer science background is very high and continues to grow. 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.

1.	CPSC 200	Object Oriented Programming	4 credits
2.	CPSC 300	Data Structures & OO Design	4 credits
3.	CPSC 340	Hardware & Software Organization	4 credits
4.	MATH 340	Numerical Analysis	3 credits
5.	MATH 420	Introduction to Abstract Algebra	3 credits
6.	CPSC 300/400 elective		3 credits

Operations Research Track (18 credits required)

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.

1.	MATH 330	Differential Equations	3 credits
2.	MATH 360	Operations Research	3 credits
3.	MATH 440	Mathematics Modeling	3 credits
4.	MATH or CPSC 300/400 elective		3 credits
5.	MATH or CPSC 300/400 elective		3 credits
6.	MATH or CPSC 300/400 elective		3 credits

Statistics Track (18 credits required)

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.

1.	MATH 310	Linear Models in Statistics	3 credits
2.	MATH 314	Probability	3 credits
3.	MATH 414	Mathematical Statistics 1	3 credits
4.	MATH 416	Mathematical Statistics 2	3 credits
5.	MATH or CPSC 300/400 elective		3 credits
6.	MATH or CPSC 300/400 elective		3 credits

Admission Requirements

First-year students must have a minimum 2.0 GPA and an ACT math subscore of 19 or better. Transfer students must have a minimum 2.0 overall GPA and a "C" or better in math preparatory for MATH 115.

Graduation Requirements

The Applied Mathematics program leads to a bachelor of science degree. Graduation requires a minimum 2.0 overall GPA and a minimum of 120 credits including completion of all general education requirements as outlined in the General Education section of the University Catalog. Additionally, a minimum 2.5 GPA in all math and computer science course work is required.

More Information

For more information about this program, write to:
Department of Mathematics
Ferris State University
820 Campus Dr./ASC 2021
Big Rapids, MI 49307-2225;
or call (231) 591-2565.

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Visit us online at: www.ferris.edu

FERRIS COLLEGE OF ARTS & SCIENCES

FERRIS STATE UNIVERSITY FERRIS STATE UNIVERSITY

APPLIED MATHEMATICS

Appendix D

Data related to the Applied Mathematics BS program from the report on University costs for the academic year 2000-2001 prepared by the Office of Institutional Research

Ferris State University
Degree Program Costing 2000 - 2001 (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)	$122.22
**Department Cost per Student Credit Hour	$22.98
***Dean's Cost per Student Credit Hour	$18.17
Total Cost per Student Credit Hour (Average for program)	$163.37
Total Program Instructor Cost (Assumes a student will complete program in one year)	$14,665.86
Total Program Department Cost	$2,757.68
Total Program Dean's Cost	$2,180.59
Total Program Cost (Assumes a student will complete program in one year)	$19,604.13

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	$281,657	$47,251	$44,650	3210	$88	$15	$14	3	$263	$44	$42
CPSC150	L	$5,378	$754	$1,252	90	$60	$8	$14	3	$179	$25	$42
CULTELE	E	$1,709,820	$289,517	$261,225	18573	$92	$16	$14	9	$829	$140	$127
ECON221	L	$189,087	$33,510	$38,020	2565	$74	$13	$15	3	$221	$39	$44
ENGL150	L	$573,937	$101,166	$100,025	7191	$80	$14	$14	3	$239	$42	$42
ENGL250	L	$443,106	$62,337	$61,634	4431	$100	$14	$14	3	$300	$42	$42
ENGL311	U	$132,570	$14,730	$14,564	1047	$127	$14	$14	3	$380	$42	$42
FREEELE	E	$24,198,385	$7,382,074	$5,176,043	212177	$114	$35	$24	39	$4,448	$1,357	$951
INSR243	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
MATH220	L	$79,769	$4,190	$6,955	500	$160	$8	$14	5	$798	$42	$70
MATH230	L	$39,465	$3,268	$5,425	390	$101	$8	$14	5	$506	$42	$70
MATH251	L	$35,667	$2,262	$3,756	270	$132	$8	$14	3	$396	$25	$42
MATH310	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
MATH314	U	$11,052	$528	$876	63	$175	$8	$14	3	$526	$25	$42
MATH320	U	$6,898	$578	$960	69	$100	$8	$14	3	$300	$25	$42
MATH322	U	$11,152	$880	$1,461	105	$106	$8	$14	3	$319	$25	$42
MATH340	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
MATH414	U	$7,310	$226	$376	27	$271	$8	$14	3	$812	$25	$42
MATH416	U	$7,310	$126	$209	15	$487	$8	$14	3	$1,462	$25	$42
SCIUELE	E	$2,340,587	$685,713	$339,872	24434	$96	$28	$14	8	$766	$225	$111
SOCAELE	E	$1,465,079	$375,755	$289,735	20589	$71	$18	$14	9	$640	$164	$127

* 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

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Ferris State University
Degree Program Costing 2000 - 2001 (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)	$113.93
**Department Cost per Student Credit Hour	$24.49
***Dean's Cost per Student Credit Hour	$18.77
Total Cost per Student Credit Hour (Average for program)	$157.18
Total Program Instructor Cost (Assumes a student will complete program in one year)	$13,671.07
Total Program Department Cost	$2,938.46
Total Program Dean's Cost	$2,252.10
Total Program Cost (Assumes a student will complete program in one year)	$18,861.63

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	$281,657	$47,251	$44,650	3210	$88	$15	$14	3	$263	$44	$42
CPSC150	L	$5,378	$754	$1,252	90	$60	$8	$14	3	$179	$25	$42
CULTELE	E	$1,709,820	$289,517	$261,225	18573	$92	$16	$14	9	$829	$140	$127
ENGL150	L	$573,937	$101,166	$100,025	7191	$80	$14	$14	3	$239	$42	$42
ENGL250	L	$443,106	$62,037	$61,634	4431	$100	$14	$14	3	$300	$42	$42
ENGL311	U	$132,570	$14,730	$14,564	1047	$127	$14	$14	3	$380	$42	$42
FREEELE	E	$24,198,385	$7,382,074	$5,176,043	212177	$114	$35	$24	43	$4,904	$1,496	$1,049
MATH220	L	$79,769	$4,190	$6,955	500	$160	$8	$14	5	$798	$42	$70
MATH230	L	$39,465	$3,268	$5,425	390	$101	$8	$14	5	$506	$42	$70
MATH251	L	$35,667	$2,262	$3,756	270	$132	$8	$14	3	$396	$25	$42
MATH320	U	$6,898	$578	$960	69	$100	$8	$14	3	$300	$25	$42
MATH322	U	$11,152	$880	$1,461	105	$106	$8	$14	3	$319	$25	$42
MATH330	U	$10,257	$803	$1,002	72	$142	$8	$14	3	$427	$25	$42
MATH340	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
MATH360	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
MATH380	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
MATH414	U	$7,310	$226	$376	27	$271	$8	$14	3	$812	$25	$42
MATH440	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
SCIUELE	E	$2,340,587	$685,713	$339,872	24434	$96	$28	$14	7	$671	$196	$97
SOCAELE	E	$1,465,079	$375,755	$289,735	20589	$71	$18	$14	9	$640	$164	$127

* Instructor Cost - *Salary & Fringe* - the actual cost to teach a course
** Department 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

D-3

Source: Office of Institutional Research, g:\...\progcost\0001\progcost.rsl

Ferris State University
Degree Program Costing 2000 - 2001 (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)	$113.08
**Department Cost per Student Credit Hour	$25.09
***Dean's Cost per Student Credit Hour	$18.95
Total Cost per Student Credit Hour (Average for program)	**$157.12**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$13,569.50
Total Program Department Cost	$3,011.04
Total Program Dean's Cost	$2,273.63
Total Program Cost (Assumes a student will complete program in one year)	**$18,854.17**

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	$281,657	$47,251	$44,650	3210	$88	$15	$14	3	$263	$44	$42
CPSC150	L	$5,378	$754	$1,252	90	$60	$8	$14	3	$179	$25	$42
CPSC200	L	$11,948	$469	$779	56	$213	$8	$14	4	$853	$34	$56
CPSC300	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	4	$569	$179	$99
CPSC340	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	4	$569	$179	$99
CULTELE	E	$1,709,820	$289,517	$261,225	18573	$92	$16	$14	9	$829	$140	$127
ENGL150	L	$573,937	$101,166	$100,025	7191	$80	$14	$14	3	$239	$42	$42
ENGL250	L	$443,106	$62,337	$61,634	4431	$100	$14	$14	3	$300	$42	$42
ENGL311	U	$132,570	$14,730	$14,564	1047	$127	$14	$14	3	$380	$42	$42
FREEELE	E	$24,198,385	$7,382,074	$5,176,043	212177	$114	$35	$24	43	$4,904	$1,496	$1,049
MATH220	L	$79,769	$4,190	$6,955	500	$160	$8	$14	5	$798	$42	$70
MATH230	L	$39,465	$3,268	$5,425	390	$101	$8	$14	5	$506	$42	$70
MATH251	L	$35,667	$2,262	$3,756	270	$132	$8	$14	3	$396	$25	$42
MATH320	U	$6,898	$578	$960	69	$100	$8	$14	3	$300	$25	$42
MATH322	U	$11,152	$880	$1,461	105	$106	$8	$14	3	$319	$25	$42
MATH340	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
MATH420	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
SCIUELE	E	$2,340,587	$685,713	$339,872	24434	$96	$28	$14	7	$671	$196	$97
SOCAELE	E	$1,465,079	$375,755	$289,735	20589	$71	$18	$14	9	$640	$164	$127

* Instructor Cost - *Salary & Fringe* - the actual cost to teach a course
** Department 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

Source: Office of Institutional Research, g:\...\progcost\0001\progcost.rsl

Ferris State University
Degree Program Costing 2000 - 2001 (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)	$108.60
**Department Cost per Student Credit Hour	$24.65
***Dean's Cost per Student Credit Hour	$19.02
Total Cost per Student Credit Hour (Average for program)	$152.26
Total Program Instructor Cost (Assumes a student will complete program in one year)	$13,031.45
Total Program Department Cost	$2,958.44
Total Program Dean's Cost	$2,281.86
Total Program Cost (Assumes a student will complete program in one year)	$18,271.76

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	$281,657	$47,251	$44,650	3210	$88	$15	$14	3	$263	$44	$42
CPSC150	L	$5,378	$754	$1,252	90	$60	$8	$14	3	$179	$25	$42
CULTELE	E	$1,709,820	$289,517	$261,225	18573	$92	$16	$14	9	$829	$140	$127
ENGL150	L	$573,937	$101,166	$100,025	7191	$80	$14	$14	3	$239	$42	$42
ENGL250	L	$443,106	$62,337	$61,634	4431	$100	$14	$14	3	$300	$42	$42
ENGL311	U	$132,570	$14,730	$14,564	1047	$127	$14	$14	3	$380	$42	$42
FREEELE	E	$24,198,385	$7,382,074	$5,176,043	212177	$114	$35	$24	52	$5,931	$1,809	$1,269
MATH220	L	$79,769	$4,190	$6,955	500	$160	$8	$14	5	$798	$42	$70
MATH230	L	$39,465	$3,268	$5,425	390	$101	$8	$14	5	$506	$42	$70
MATH251	L	$35,667	$2,262	$3,756	270	$132	$8	$14	3	$396	$25	$42
MATH320	U	$6,898	$578	$960	69	$100	$8	$14	3	$300	$25	$42
MATH322	U	$11,152	$880	$1,461	105	$106	$8	$14	3	$319	$25	$42
MATH330	U	$10,257	$603	$1,002	72	$142	$8	$14	3	$427	$25	$42
MATH360	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
MATH440	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
SCIUELE	E	$2,340,587	$685,713	$339,872	24434	$96	$28	$14	7	$671	$196	$97
SOCAELE	E	$1,465,079	$375,755	$289,735	20589	$71	$18	$14	9	$640	$164	$127

* 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

D-5

Source: Office of Institutional Research, g:\...\progcost\0001\progcost.rsl

Ferris State University
Degree Program Costing 2000 - 2001 (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)	$121.96
**Department Cost per Student Credit Hour	$23.09
***Dean's Cost per Student Credit Hour	$18.48
Total Cost per Student Credit Hour (Average for program)	$163.53
Total Program Instructor Cost (Assumes a student will complete program in one year)	$14,635.57
Total Program Department Cost	$2,770.34
Total Program Dean's Cost	$2,218.11
Total Program Cost (Assumes a student will complete program in one year)	$19,624.01

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	$281,657	$47,251	$44,650	3210	$88	$15	$14	3	$263	$44	$42
CPSC150	L	$5,378	$754	$1,252	90	$60	$8	$14	3	$179	$25	$42
CULTELE	E	$1,709,820	$289,517	$261,225	18573	$92	$16	$14	9	$829	$140	$127
ENGL150	L	$573,937	$101,166	$100,025	7191	$80	$14	$14	3	$239	$42	$42
ENGL250	L	$443,106	$62,337	$61,634	4431	$100	$14	$14	3	$300	$42	$42
ENGL311	U	$132,570	$14,730	$14,564	1047	$127	$14	$14	3	$380	$42	$42
FREEELE	E	$24,198,385	$7,382,074	$5,176,043	212177	$114	$35	$24	49	$5,588	$1,705	$1,195
MATH220	L	$79,769	$4,190	$6,955	500	$160	$8	$14	5	$798	$42	$70
MATH230	L	$39,465	$3,268	$5,425	390	$101	$8	$14	5	$506	$42	$70
MATH251	L	$35,667	$2,262	$3,756	270	$132	$8	$14	3	$396	$25	$42
MATH310	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
MATH314	U	$11,052	$528	$876	63	$175	$8	$14	3	$526	$25	$42
MATH320	U	$6,898	$578	$960	69	$100	$8	$14	3	$300	$25	$42
MATH322	U	$11,152	$880	$1,461	105	$106	$8	$14	3	$319	$25	$42
MATH414	U	$7,310	$226	$376	27	$271	$8	$14	3	$812	$25	$42
MATH416	U	$7,310	$126	$209	15	$487	$8	$14	3	$1,462	$25	$42
SCIUELE	E	$2,340,587	$685,713	$339,872	24434	$96	$28	$14	7	$671	$196	$97
SOCAELE	E	$1,465,079	$375,755	$289,735	20589	$71	$18	$14	9	$640	$164	$127

* Instructor Cost - *Salary & Fringe* - the actual cost to teach a course
** Department 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

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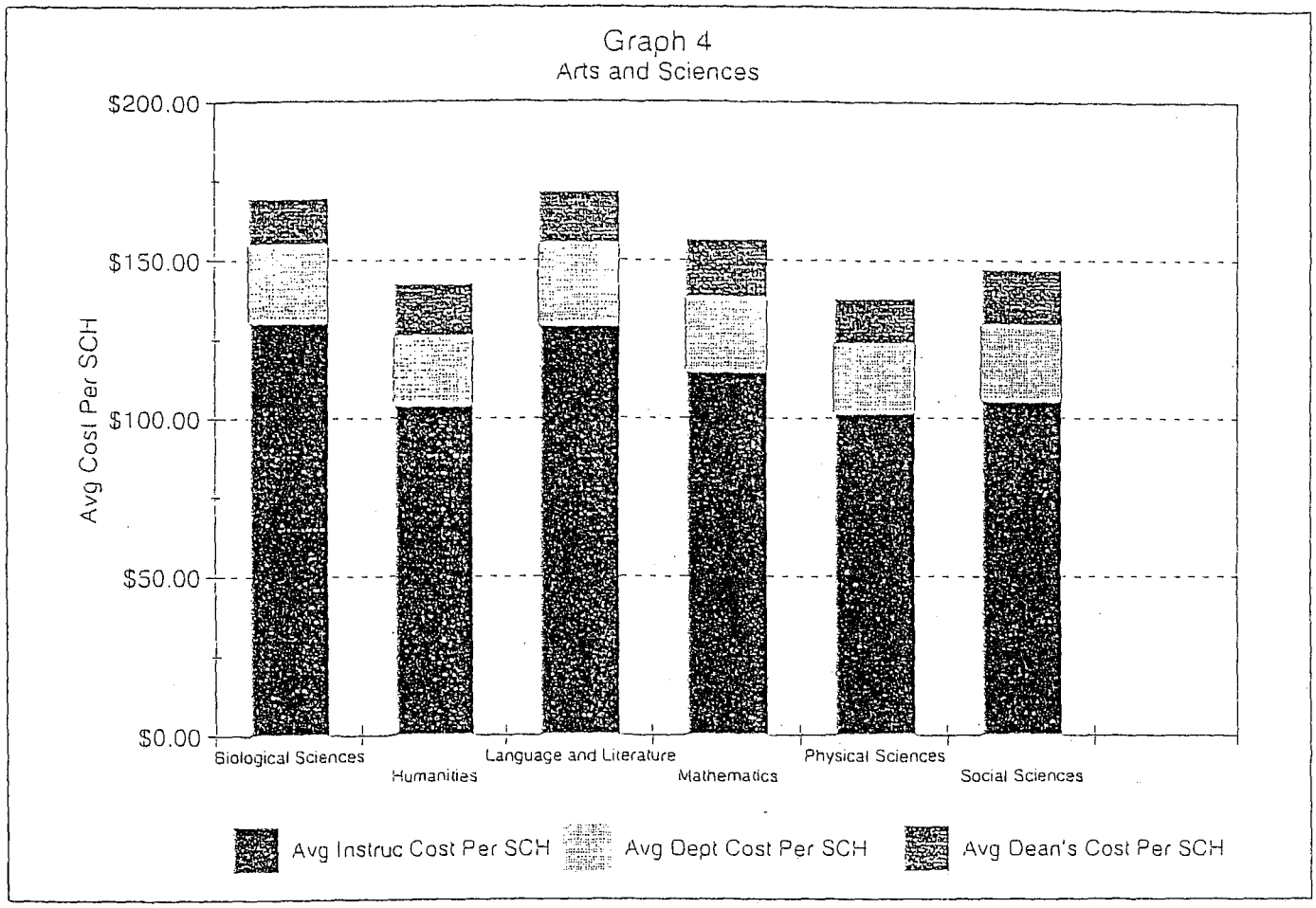
Source: Office of Institutional Research, g:\...\progcost\0001\progcost.rsl

Ferris State University

Average Instructor, Department and Dean's Cost Per SCH for Degree Programs
Departments in the College of Arts and Sciences
2000 - 2001 Data

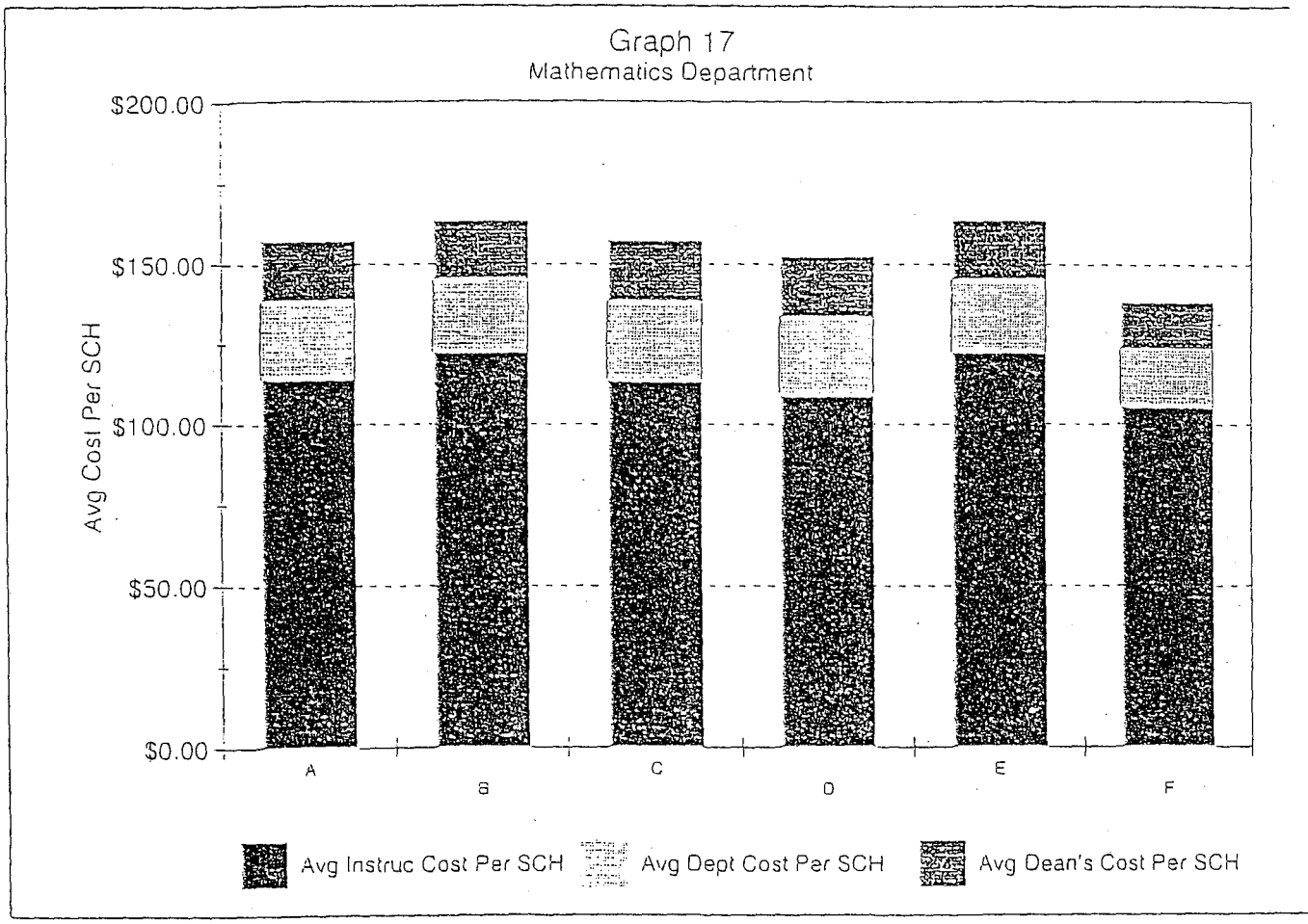


Departments	Avg Instructor Cost/SCH	Avg Dept Cost/SCH	Avg Dean's Cost/SCH	Total Avg Cost/SCH
Biological Sciences	$130.38	$24.40	$14.57	$169.35
Humanities	$103.94	$22.02	$16.54	$142.49
Language and Literature	$129.37	$25.67	$16.47	$171.50
Mathematics	$114.79	$23.43	$18.26	$156.48
Physical Sciences	$101.62	$22.00	$14.32	$137.94
Social Sciences	$105.48	$24.01	$17.50	$147.00

Source: Office of Institutional Research, g:\...\progcost\0001\avgdptas.rsl

Ferris State University

Average Instructor, Department and Dean's Cost Per SCH for Degree Program
Mathematics Department
2000 - 2001 Data



	Programs	Avg Instructor Cost/SCH	Avg Dept Cost/SCH	Avg Dean's Cost/SCH	Total Av Cost/SC
A	Applied Mathematics BS	$113.93	$24.49	$18.77	$157.
B	Applied Mathematics (Actuarial Science Track) BS	$122.22	$22.98	$18.17	$163.
C	Applied Mathematics (Computer Science Track) BS	$113.08	$25.09	$18.95	$157.
D	Applied Mathematics (Operations Research Track) BS	$108.60	$24.65	$19.02	$152.
E	Applied Mathematics (Statistics Track) BS	$121.96	$23.09	$18.48	$163.
F	Pre-Engineering AS	$105.17	$18.26	$14.83	$138.

Table IX

Average Department Cost Per SCH
Alpha by Department
2000-01

College	Department Cost*	Department SCH	Department Cost Per SCH
Accountancy/Econ/App Stats	$148,724.00	11,384.00	$13.06
Biological Sciences	$423,557.00	13,117.00	$32.29
Child Development	$4,923.00	750.00	$6.56
Computer Information Systems	$514,451.00	14,722.00	$34.94
Construction & Facilities	$822,925.00	9,425.00	$87.31
Criminal Justice	$324,909.00	7,567.00	$42.94
Design, Manufacturing & Graphic Arts	$1,165,378.00	11,189.00	$104.15
Health Management	$280,673.00	4,856.00	$57.80
Health Related	$505,507.00	5,633.00	$89.74
Humanities	$329,223.00	22,366.00	$14.72
Language and Literature	$369,452.00	26,261.00	$14.07
Leisure Studies and Wellness	$138,580.00	3,078.00	$45.02
Management	$226,527.00	12,414.00	$18.25
Marketing	$482,632.00	12,768.00	$37.80
Mathematics	$159,045.00	18,981.00	$8.38
Nursing & Dental Hygiene	$774,614.00	5,081.00	$152.45
Occupational Education	$502,354.00	7,172.00	$70.04
Optometry	$269,251.00	5,150.00	$52.28
Pharmacy	$605,109.00	11,798.00	$51.29
Physical Sciences	$279,355.00	11,672.00	$23.93
Social Sciences	$390,632.00	20,163.00	$19.37
Television Production	$226,112.00	1,043.00	$216.79
Transportation & Electronics	$638,692.00	9,963.00	$64.11

* Dean's Cost - *Dean's Level Non Instructor Compensation, Supplies and Equipment*

Source: Office of Institutional Research, g:\...\progcost\0001\dptavgcpsch.rsl

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College of Arts and Sciences
Memorandum

To: Academic Program Review Committee
From: Matthew Klein, Interim Dean, College of Arts & Sciences
Subject: Applied Math Academic Program Review
Date: September 11, 2003

The Applied Math program is absolutely vital for a comprehensive university such as Ferris. The Applied Math program has been developed with separate tracks to prepare students for different niches in the workforce. Given the "applied" nature of this program, it fits perfectly within the overall mission of Ferris State University.

This is also a tough academic program; not every student has the ability to pursue an Applied Math degree. As a result, graduates of this program readily find employment. The existence of the program itself makes it possible to run courses for other programs more frequently than would otherwise be possible, in particular, surveying engineering, other technology programs requiring calculus, and math education.

The enrollment in the program is the highest in 15 years, no doubt a result of the growing Honors program and the rise in the ACT of our incoming freshmen. At the time of the last review, there were only seven students in the program. For the last two years in a row, the enrollment has peaked at 28 students. While the program could possibly grow a little more, it will never be a large program, nor is it intended to be, due to the challenging nature of the upper-level courses.

Furthermore, with recent hires in the last five years, there has been a revitalization of the faculty in the department. There are now two tenure-track professors with expertise in computer science; five years ago there were none. Last year a professor with a degree in statistics was hired. These people have the expertise to serve specific tracks in the overall program. At the time of last program review, the department did not have the number of young top-notch faculty that it now has.

Generally, the resources allocated to the program seem adequate. If the program continues to grow over the next few years, some additional resources will be required, particularly in supplying more classrooms with computers for some of the 300-level and 400-level classes. When discussing resources, it is difficult to separate resources adequate for the department from resources adequate for the program. Growth in student numbers at the university will require more faculty in the department. It will also require more access to classrooms for the increased number of students.

While more faculty development resources have been provided in recent years, the recent influx of active young faculty (who are writing papers, giving presentations, attending conferences) requires even more faculty development dollars to help them stay up-to-date

in their fields. A few years ago, the current program coordinator went to fifteen or sixteen local high schools to present the program to high school students, faculty and counselors. If this level of recruitment effort is to take place in the future, both release time and some additional funding may be necessary to carry it out.

The College of Arts and Sciences is very proud of the Applied Math program, proud of its rigor and of the resulting success of its graduates.

Perceptions of the Advisory Board

The mathematics department has not done a very good job at getting and keeping an Advisory Board in the past. For our last evaluation six years ago, John Hansen, our department head at the time, formed a Board consisting of three people that he knew in business and industry. There was no Board meeting, just telephone calls and mailings. When Dr. Hansen left, the Board kind of left with him.

We have been actively recruiting a new board for some time and now have a member for each specialty track in our program. The present members of our board include

1. Mr. Sam Burgess, Programmer/Project Director, Professional Services Division, Compuware Corporation. Some of his assignments have included the creation and implementation of ***statistical*** databases.

2. Dr. Steven Butt, Professor of Industrial and Manufacturing Engineering, Western Michigan University. He has a Ph.D. in Industrial Engineering and ***Operations Research***.

3. Dr. John Hansen, Professor of ***Computer Science***, Saginaw Valley State University. He is a former department chair of our mathematics department and is the architect of our five track program.

4. Ms. Tegan Reist, Procurement Analyst, Allstate Insurance Company, Tegan is a graduate of our Applied Mathematics program in the ***Actuarial Science*** track.

5. Dr. Dave Frank, Interim Department Head, Mathematics, Ferris State University

6. Robert McCullough, Program Coordinator, Applied Mathematics Program, Ferris State University

Our board members were surveyed. The questionnaire consisted of six questions and the opportunity to write comments. Of the 6 members of the Board, 5 have submitted completed surveys. The survey, average of each response and a short analysis of the results appear on the following pages.

Advisory Board 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.

4.80

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

4.40

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

4.60

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

4.20

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

4.50

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

5.00

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

Analysis of Advisory Board Questionnaire

Several of our Board members are new to the Board and need to learn more about our program before being able to help us. Nonetheless, this first look at our Board's opinions of our program is quite encouraging. We look forward to receiving many helpful suggestions from our distinguished Board in the future. A few comments from our Board members appear below.

"I think the academic rigor of the required courses in the Applied Math program does adequately prepare students for the job market, however I do feel that there is great room for improvement in the areas of classes that center around applications and tools."

"I do think that FSU prepared an immediately employable graduate in myself."

"Looks like a good program with many opportunities available for students."

"This [the actuarial science track] is fine as it is." – from practicing actuaries.

"I strongly recommend that computer science students complete a course in Logic Circuit Design."

Mathematics Department
Ferris State University

ANNUAL PLANNING STATEMENT
(Unit Action Plan)

Fiscal Year 2001 (Academic Year 2000-2001)

Division: **Academic Affairs**

College: **Arts and Sciences**

Contact Person: **George Wales**

Phone: **#2565**

October 21, 1999

APPLIED MATHEMATICS MAJOR: Improve enrollment and employment opportunities of the Applied Mathematics major.

- Work toward the development of an off-campus internship program as a component of the undergraduate mathematics major.
- Increase the size of our Advisory Board and encourage their active participation in the mathematics program.
- Seek funding for tuition scholarships for the recruitment of highly qualified students.
- Recruit for the newly approved restructured applied mathematics program.

Benefits:

Advisory boards and internships provide the student with contacts and experiences different from their academic studies. Such experiences are attractive to future employers. Many potential students also find such experiences attractive and student recruitment should benefit.
Attracting highly qualified students through scholarships will, of course, increase enrollment but also greatly improves the overall program.
The new tracks in applied math are a good recruiting tool and should improve enrollment.

Objectives (University Strategic Issues, Goals, Objectives for 1999-2000):

Issue number one: objectives 3 and 4
Issue number four: objective 6

Academic Affairs Division Priorities

Enhance existing programs that are flexible, competency-based and responsive to industry, state and student needs.
Increase the number of programs with functional and effective advisory boards.
Increase the number of programs with internships

CURRICULUM: Improve our offerings to the university community.

- Develop new courses in support of the Mathematics Subject Area Option of the Masters of Education – Curriculum and Instruction.

- Develop new courses in support of the mathematics component of the Elementary Education Major.

- Continue development of MATH 110 instruction through computer mediated format.

- Run a study comparing the students who have completed Math 110 with computer-mediated instruction with those who completed Math 110 using other methods of instruction. Analyze the effectiveness of this instruction method and determine the future uses of this method.

Benefits:

The new education degrees have been successful at other universities and we can expect increased enrollment.
The computer mediated instruction method holds promise for our beginning courses. Another year will allow us to further develop the method and provide data for the study. The study will provide a means for determining the future of this method.

Objectives (University Strategic Issues, Goals, Objectives for 1999-2000):

Issue number one: objective 2
Issue number two: objectives 2, 5 and 6
Issue number four: objective 6

Academic Affairs Division Priorities

Enhance existing programs that are flexible, competency-based and responsive to industry, state and student needs.
Facilitate progressive change in the teaching and learning processes.

NEW DEGREES: Masters degrees in the teaching of mathematics and computer science.

- Study the feasibility and marketability of new masters degree programs in the teaching of computer science and the teaching of mathematics. Targeted audience would be students who wish to teach lower division college courses.

Benefits:

These degrees have the potential for enrollment increase but analysis is needed before a development effort is started.

Objectives (University Strategic Issues, Goals, Objectives for 1999-2000):

Issue number one: objective 2
Issue number two: objective 2

Academic Affairs Division Priorities

Develop new programs that are flexible, competency-based and responsive to industry, state and student needs.

IMPROVEMENTS: Changes in our current efforts that will benefit students and programs.

- Inform the campus community of the availability of Math 117 as an alternative to intermediate algebra for satisfying general education requirements.
- Development of a mathematics placement test for all incoming freshmen.
- Initiate a feasibility study of department wide exams for critical freshman courses.

Benefits:

Math 117 covers a broader scope of topics than the typical algebra course and would be more appropriate for some programs.
Too many students are placed in math courses for which they are not prepared. A placement test tailored to our curriculum should improve student placement.
Several freshman math courses are foundations for critical course sequences. Common exams may help to improve the uniformity of instruction. A study is needed to determine effectiveness and to assess the academic freedom concerns.

Objectives (University Strategic Issues, Goals, Objectives for 1999-2000):

Issue number one: objective 4
Issue number two: objectives 2 and 5
Issue number four: objective 6

Academic Affairs Division Priorities

Enhance existing programs that are flexible, competency-based and responsive to industry, state and student needs.
Facilitate progressive change in the teaching and learning processes.

Mathematics Department
Ferris State University

ANNUAL PLANNING STATEMENT
(Unit Action Plan)

Fiscal Year 2002 (Academic Year 2001-2002)

Division: **Academic Affairs**

College: **Arts and Sciences**

Contact Person: **George Wales**

Phone: **#2565**

October 30, 2000

GENERAL EDUCATION INITIATIVES

- Gain approval for increasing Math 010 to 4 credits.

- Development of a mathematics placement test for all incoming freshmen.

  Budget requests:
  $2000 incidental expenses for the development of a mathematics placement test.
  $9000 for the author of the mathematics placement test (release time).

- Continue to study the advisability of department wide exams for critical freshman courses.

- Move to closure on implementation of the C- policy.

- Involve the mathematics faculty in both the planning and implementation of the agreement with the Math Science Center to provide instruction to selected students.

- Study the feasibility of the computer-mediated format for courses other than Beginning Algebra

- Continue the study comparing the students who have completed Beginning Algebra with computer-mediated instruction with those who completed the same course using other methods of instruction. Analyze the effectiveness of this instruction method and determine if we should continue this method of instruction.

DEGREE PROGRAM INITIATIVES

- Expand and enhance the mathematics web site to showcase math and computer science programs.

  Budget requests: $8400 for student office help so that other personnel are released for the web site effort.

- Work toward the development of an off-campus internship program as a component of the undergraduate applied mathematics major.

  Budget requests: $4090 for reallocated time for faculty to set up internships.

- Increase the size of our Applied Mathematics Advisory Board and encourage their active participation in the mathematics program.

  Budget requests: $4,000 for advisory board expenses.

- Recruit for the restructured applied mathematics program and the new liberal arts mathematics major.

- Seek funding for tuition scholarships for the recruitment of highly qualified students.

Budget requests: $8000 per year for continuing scholarships to "blue chip" students.

- Complete implementation of the new Liberal Arts Mathematics degree and the new Certificate in Computer Science.

- Develop new courses in support of the Mathematics Subject Area Option of the Masters of Education – Curriculum and Instruction.

- Fully implement the Elementary Education Core Mathematics course.

- Study the feasibility and marketability of new masters degree programs in the teaching of computer science and the teaching of mathematics. Targeted audience would be students who wish to teach lower division college courses.

  Budget requests: $8,180 for allocated time for two faculty members to develop the new masters degrees.

FACULTY DEVELOPMENT INITIATIVES

- Encourage faculty to keep abreast in their field of expertise. In particular, increase the opportunities for conference and workshop attendance.

  Budget requests:
  $11,500 additional funds for attending conferences and workshops.

- Encourage faculty creative endeavors and the sharing of them with the university community

- Develop new faculty skills particularly in the areas of statistics and computer science

  Budget requests: $10,000 earmarked for professional development materials.

- Recruit new faculty with skills in mathematics, computer science, elementary education and other special needs.

  Budget requests: $18,000 (release time) to establish a faculty recruitment coordinator to facilitate the large number of faculty searches needed over the next three years.

- Attain two new positions in the mathematics faculty in support of the new elementary education curriculum and the increased load in the non-credit remedial courses.

TECHNOLOGY INITIATIVES

- Upgrade programming software for computer science courses as needed.

  Budget request: $3,000 per year.

- Purchase software license for Mathematica or Maple for faculty use and for classroom incorporation.

  Budget request: $12,000

DRAFT

Mathematics Department
Ferris State University

PRIORITY INITIATIVES
VPAA PLANNING OBJECTIVES
2004-2006

Division:	Academic Affairs
College:	Arts & Sciences
Contact Person:	Darrell Allgaier
Phone:	#2565

October 19, 2002

Strategic Direction One: Increase enrollment by enhancing existing academic offerings, prudently expanding academic majors and programs and enriching student life.

Proposal

Enhancement of the computer science track of the applied mathematics degree by

(1) gaining rapid approval and implementation of proposed curriculum changes and
(2) hiring new faculty expert in this and related fields.

Strategic Direction Two: Expand University resources through legislative appropriations, collaborative partnerships, development activities, grants and entrepreneurship.

Proposal

Continue to work toward the establishment of a Mathematics Advisory Board which will have primary responsibility for these issues.

Strategic Direction Three: Foster highly responsive academic opportunities that address student and employer needs and compete successfully with other public and for-profit universities.

Proposal

Encourage an expanding rapport between the department, employers and potential employers of our graduates, and area high school guidance counselors and high school mathematics departments.

Strategic Direction Four: Employ advanced technology to strategically extend the University's position as a national leader in providing a career-oriented academic curriculum.

Proposal

The mathematics department currently offers on-campus upper division courses to off-campus sites thru a media system using a combination of television and computer technologies. This media system is both inadequate and outdated. The department proposes that this system be overhauled.

Strategic Direction Five: Attract, retain and develop an exceptional faculty and staff in an extremely competitive higher education market.

Proposal

Remove the hiring freeze on the three unfilled tenure-track positions, and receive approval for two more tenure-track positions to reduce the department's dependence on overloads and part-time positions (roughly 25% part-time, or 33% part-time + overloads, in F02).

Strategic Direction Six: Empower individuals throughout the University to be more responsive, innovative and entrepreneurial.

Proposal

Recommend the university establish an incentive program to reward employees for ideas which improve efficiency, public recognition of the university, enrollment, or retention.

Strategic Direction Seven: Challenge everyone associated with the University to identify opportunities for leadership by expanding their external focus and perspective.

Proposal

Recommend the university establish funding to enable employees to participate in external opportunities which address leadership.

DRAFT

Mathematics Department
Ferris State University

ANNUAL PLANNING STATEMENT
(Unit Action Plan)

Fiscal Year 2004 (Academic Year 2003-2004)

Division:	Academic Affairs
College:	Arts & Sciences
Contact Person:	Darrell Allgaier
Phone:	#2565

October 19, 2002

Academic Degrees Initiatives - Mathematics

- Seek continued funding for tuition scholarships for highly qualified mathematics students. Estimated cost: $10,000 for scholarships.

- Continue to recruit for the restructured Applied Math program and for the new liberal arts BA in Math degree

- As the Applied Math program grows, work toward the development of an off-campus internship program as a component of the program. Estimated cost: $7,500 for faculty release time.

- The results of the yearlong study of the computer science curriculum will be submitted to the department for review. Curriculum proposals will be written up for approval. Once approval is obtained, implementation will begin.

- Establish a Mathematics Advisory Board and encourage their active participation in our math programs. Estimated cost: $2500.

- Study the feasibility and marketability of a new master's degree in Industrial Mathematics that would ladder on the existing Applied Math degree.

- Expand course offerings in Calculus and Statistics in support of growing enrollments in Applied Math programs.

Academic Degrees Initiatives – Mathematics Education

- The Department of Mathematics will seek involvement and participation in the student teaching component of the Mathematics Education majors. Estimated cost if active participation is obtained: $8,000 for faculty release time.

- Obtain financial resources to support math faculty participation in development of Secondary Math Education and Elementary Education mathematics Methods Courses. Estimated cost: $8,000 for faculty release time

- As needed, develop and provide mathematics courses in support of the Mathematics Subject Area Option of the Master's of Education–Curriculum and Instruction

- Due to the need for expanded cooperation between the faculty in the College of Arts and Sciences and the College of Education, the university must provide resources and opportunities for the faculty from these colleges to interact for planning and coordination of programs. The department will seek support for released time for faculty coordination with Secondary Math Education and Elementary Education. Estimated cost: $8,000 for faculty release time.

- Continue to expand our collection of instructional materials in support of the elementary education program. Estimated cost: $4,000.

General Education Initiatives

- We must have continued support for supplemental instruction at current minimal levels. Furthermore, additional supplemental support will be required to provide for growth in enrollment and cross-college initiatives, including math education coordination, math education methods courses, and student teacher supervision,. Estimated cost: $35,000.

- The Department of Mathematics must have continued base budget support for student wages to support large class instruction and departmental faculty support.

- Continue development of a mathematics placement test for all incoming freshmen in cooperation with the Office of Assessment Services/Testing. Initiate a pilot program using the ACT developed "COMPASS" software.

- Continue to study the advisability of department wide exams for critical freshman courses.

- Continue to involve the mathematics faculty in both the planning and implementation of the agreement with the Math Science Center to provide instruction to selected high school students.

- Continue to gather data on the student impact of computer-mediated instruction in elementary algebra.

- Collaborate with University College on a summer bridge program to improve math skills of potential entering freshman students.

- Continue to promote Math 117-Comtemporary Mathematics as a terminal course alternative to Math 115 – Intermediate Algebra.

Faculty Initiatives

- Recruit new faculty with skills in mathematics, statistics, computer science, developmental mathematics, elementary education, and other special needs as determined by the department. Retirees must be replaced to maintain the status quo. New positions must be established to reduce the departments dependence on overloads and part-time faculty.

- Provide specialized training and education for faculty in areas where recruitment will be difficult and expensive. Estimated cost: $52,000.

- Encourage faculty to keep abreast in the field of expertise by obtaining resources for providing support to attend conferences and workshops. Estimated cost: $4,000.

- Promote and enhance the monthly Mathematics Department Colloquium.

Technology Initiatives

- Obtain continuing financial support for necessary computer software to support expanded Computer Science course offerings. Estimated cost: $9,000.

- Purchase software license for Mathematica or Maple or other desired software for faculty and classroom use. Estimated cost: $7,500.

- Update Derive and Fortran licensed software as needed in support of instructional needs. Estimated cost: $11,000.

- Obtain financial support as needed for released time in the future for development/preparation of Web based courses. Estimated cost: $20,000.

- Utilize departmental expertise to expand and enhance the mathematics department web site to showcase math and computer science programs. We will need direct access to edit/develop site.