Program Review - Mathematics

Originally submitted February 25, 2009
Revised October 30, 2009
Executive Summary

The mathematics program at St. Norbert College serves students with a wide variety of interests, goals, and abilities. It gives majors a solid understanding of the various branches of mathematics, trains them in the methodologies of the field, and shows them how to apply math to real-world situations. It provides students majoring in areas such as business, economics and the sciences with an understanding of calculus which can be applied to their chosen specialties. Through its general education courses, it helps students across the campus become more aware of, and educated in, the techniques and applications of mathematics.

The mathematics program is administered by a dedicated faculty. The members of the mathematics discipline work collegially to provide an appropriate selection of courses. Moreover, they are engaged with the students outside the classroom, working with the math club and supervising student research projects. The discipline also interacts with the College at large, helping to coordinate placement testing and working with the College Credit Program. Finally, the faculty are valuable members of the greater mathematical community, providing community service, helping to train current teachers and serving in leadership roles in professional organizations.

The mathematics faculty is in something of a transition phase. After twenty-three years without a new tenure-track addition to the math discipline, the College has hired two tenure-track mathematicians in the last three years and is currently searching for a third. As the veterans approach the retirement stage, the newer members are stepping up, continuing effective practices and bringing their own innovations. There is every reason to expect the program to continue to be successful for many years to come.

Assessment data indicate that the mathematics program is effective at preparing majors for careers or graduate studies in math or a related field. Majors report a high degree of satisfaction. Furthermore, data show that the math program’s contribution to the GS8 portion of the College’s General Education Program is effective; for the most part, students much stronger competency after they have taken MATH 114 or 115 than they do before.

The mathematics program is proving to be an attractive option for students. The percentage of SNC students majoring in mathematics is consistently higher than national percentages as well as the percentages of peer and aspirant institutions.

The mathematics program is innovative. Up-to-date technology is incorporated where appropriate. Myriad teaching techniques, from group work to student-presented lectures keep the subject fresh. Students are assigned or encouraged to investigate questions and topics that take math out of the classroom and provide a truer research experience. Moreover, the discipline provides opportunities for students to present their findings at local, regional, and national student and professional conferences.
Program Review - Mathematics

I. Mission Statement

The mathematics discipline strives to help St. Norbert College achieve its mission of providing students with a superior education and encouraging all students to develop their full potential in understanding and serving their world. The mathematics program is designed to be personally and intellectually challenging, and has three objectives:

1) to introduce students to the methodology and applications of mathematics;
2) to provide students in all disciplines with the mathematical competency required in their studies; and
3) to train professional mathematicians for graduate school, teaching, or other careers.

The faculty members of the mathematics discipline strive to maintain the Norbertine ideal of communio, characterized by trust, mutual esteem, and shared responsibilities, and to present this model of collegiality to the students they teach and advise.

Mathematics is housed in the Natural Science Division of St. Norbert College and is associated with the various disciplines in the Natural Science Division: several courses in mathematics are requirements or electives for the various science disciplines. But mathematics is also required by students outside the Natural Sciences Division, most notably within Education, Business Administration, Accounting, and Economics. The mathematics discipline contributes to the liberal arts identity of the College through its analytical, logic-based, and quantitative approaches to learning; through its contributions to the general education of every St. Norbert student; and through its efforts to address the needs of wider communities beyond the College.

II Program Description

A. Program Objectives and Learning Outcomes of the Major Program

In addition to the three program objectives listed above, the mathematics program has the following learning outcomes:

1) Each student should have a firm grounding in calculus, set theory, logic, and strategies of mathematical proof and problem solving.

2) Each student should have a working knowledge of at least five of the following mathematical areas: linear algebra, abstract algebra, differential equations, numerical analysis, operations research, probability and statistics, modern
geometry, real analysis, and complex analysis. The precise combination of areas will depend on the student's particular interests and career objectives.  

3) Each student should understand the connections and the differences between pure and applied mathematics. Students should be able to reason rigorously in mathematical arguments, and students should be able to use mathematical models and algorithms to solve problems.

4) Each student should master the language, symbology, and form used in mathematical proof and develop the ability to communicate mathematics clearly.

5) Each student should develop the ability to use technology to reason numerically, symbolically, graphically, and verbally. Students should be able to write computer programs or use appropriate software to solve mathematical problems.

6) Each student should develop the ability to be a self-learner in mathematics in order to maximize the student's future success as a professional mathematician, an actuary, a high school teacher, a computer scientist, etc.

B. Program Curriculum

The curriculum is consistent with best practices in the field of mathematics. (See Section III. D of this document.) The major consists of ten courses plus a senior exam: three semesters of calculus, advanced foundations of mathematics, introduction to computer science, and five advanced mathematics courses. The mathematics teaching major is similar except that three of the five advanced courses must be abstract algebra, probability and statistics, and modern geometry, to meet the requirements of the Wisconsin Department of Instruction. The mathematics academic minor requires six courses: three semesters of calculus, advanced foundations, and two advanced courses. The mathematics teaching minor requires six courses as well: two semesters of calculus, advanced foundations, introduction to computer science, abstract algebra, and either probability and statistics or modern geometry.

We also provide significant service to students pursuing majors or minors in accounting, biology, business administration, chemistry, computer science, economics, education, environmental science, geology, IBLAS, and physics through required or highly recommended courses that address their curricular needs. In addition, we provide general education Area 8, quantitative skills, courses to those students across campus. Approximately 94% of the student body takes at least one mathematics course during their years at St. Norbert College. Roughly 60% of faculty instruction time each year is devoted to general education courses.

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1 With the addition of other 300 and 400 level courses, this outcome may have to be modified.
C. Program Administration

Mathematics has a disciplinary coordinator (currently John Frohliger) who acts as the liaison with the Associate Dean of the Natural Sciences. The position of coordinator changes every two years, rotating through the tenured members of the discipline. There are also designated persons responsible for different aspects of assessment. In addition, various members

- coordinate the teaching assistants,
- moderate the two student mathematics organizations (ΣΝΔ Mathclub and PME Wisconsin Delta Chapter),
- coordinate the summer math placement testing,
- serve as liaison between the math department and the College Credit Program.

Policy matters, such as budgets and initiatives regarding curriculum, are jointly discussed by all members of the discipline at weekly meetings. An attempt is made to distribute the administrative work of the discipline. The discipline works well together and usually comes to a consensus on whatever matter is being discussed. Scheduling of courses, instructors, and times offered is done collegially, taking into consideration the needs and preferences of each member.

D. Peer and Aspirant Comparisons

Here are some data on how St. Norbert College’s mathematics program compares to the mathematics programs at the peer and aspirant schools, as identified by OIE in the 2009 list. This list provides 10 peer and 10 aspirant schools. Of these, some schools have combined math and computer science departments:

<table>
<thead>
<tr>
<th>Type of Program</th>
<th>Math</th>
<th>Math/Computer Science</th>
<th>Other*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peers</td>
<td>3</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Aspirants</td>
<td>6</td>
<td>4</td>
<td>0</td>
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</tbody>
</table>

(* The other department structure represented is Hampshire College; it has an interdisciplinary natural science department. Hampshire offers very few standard mathematical content courses; most courses are interdisciplinary.)

We offer two tracks for our mathematics major. This is in line with the number of major tracks available at other schools. Half of our peers’ and aspirants’ programs offer a mathematics secondary education major as well as a more traditional major in mathematics. Some programs offer additional tracks; many of these alternate tracks are interdisciplinary. Since so many St. Norbert students are double majors, we do not feel that adding a math/economics or math/physics track within the mathematics department would add additional opportunities for our students.
Tracks for Major

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<thead>
<tr>
<th></th>
<th>Mathematics</th>
<th>Math Secondary Ed</th>
<th>Other *</th>
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<tr>
<td>Peers</td>
<td>9</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Aspirants</td>
<td>10</td>
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<td>5</td>
</tr>
<tr>
<td>St. Norbert</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

*Other tracks:
  - Applied Math (1 peer, 1 aspirant)
  - Statistics (1 peer, 1 aspirant)
  - Math/Econ Interdisciplinary (1 peer, 2 aspirants)
  - Math/Physics Interdisciplinary (1 peer, 1 aspirant)
  - Masters Degrees offered by 2 aspirants
    (1 M.S. in Mathematics, and 1 M.A.T. in mathematics)

Our staffing level is consistent with the number of full time staff at our peer institutions. It is worth noting that on average our aspirant institutions have two and a half more faculty members. These averages may underreport the use of adjunct instructors, because not all adjunct use is listed on departmental websites. Adjuncts are used in at least half of our peer and aspirant math departments.

Average Number of Full Time Faculty in mathematics (including adjuncts and halves for joint appointments and phased retirement excluding faculty who are listed only as computer science faculty)

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<tbody>
<tr>
<td>Peers</td>
<td>7</td>
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<tr>
<td>Aspirants</td>
<td>9.4</td>
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<tr>
<td>St. Norbert (2009-2010)</td>
<td>7</td>
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</tbody>
</table>

Percentage of Peers and Aspirants that use Adjunct Instructors (as reported on department websites)

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<tbody>
<tr>
<td>Peers</td>
<td>50%</td>
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<tr>
<td>Aspirants</td>
<td>50%</td>
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</tbody>
</table>

III. Assessment of Student Learning Outcomes of Major Portion of Mathematics Program

A. Viable Assessment Plan

There is a viable assessment plan for the mathematics program (see Appendix 1). Thus far, this plan has served well. The Discipline, however, has begun discussing whether the current plan has a proper balance between pure and applied mathematics. This discussion may result in a revision of the plan.
B. Direct Evidence

The assessment plan includes a zero-credit course, MATH 499, Senior Examination, in which students take the ETS major field exam in mathematics as well as an exam generated in-house, and portfolios containing samples of the student’s mathematical work.

The table below shows some of the results of the major field test. The entries are the percentile ranks\(^2\) of SNC students’ scores, not the raw scores. For the most part, 2006 being the notable exception, a majority of SNC math students achieve at the 50\(^{th}\) percentile, or above, among all students taking the major field test.

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
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<td>75</td>
<td>65</td>
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<td>60</td>
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<td></td>
<td>5</td>
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<tr>
<td><strong>Number at or Above 50(^{th}) Percentile</strong></td>
<td><strong>10/12</strong></td>
<td><strong>10/13</strong></td>
<td><strong>5/14</strong></td>
<td><strong>12/17</strong></td>
<td><strong>10/15</strong></td>
</tr>
</tbody>
</table>

Below are the institutional mean scores for SNC students and the corresponding percentiles among the mean scores for all institutions taking the major field test. Our institutional percentile was low in 2004 and 2006; however, in 2005, 2007, and 2008, SNC was in at least the 70\(^{th}\) percentile.

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Institutional Mean (to nearest integer)</strong></td>
<td>154</td>
<td>161</td>
<td>155</td>
<td>161</td>
<td>160</td>
</tr>
<tr>
<td><strong>Institutional Percentile</strong></td>
<td>40</td>
<td>75</td>
<td>45</td>
<td>75</td>
<td>70</td>
</tr>
</tbody>
</table>

\(^{2}\) The percentiles are determined for ranges of scores, not necessarily individual scores. As a result, many of the percentiles are given as multiples of five.
Note: Some caution must be taken reading these numbers. These percentiles reflect only those schools which choose to participate in the major field test. Furthermore, it is not known what criteria those schools used in determining which students take the exam.

The purpose of the in-house test is to supplement information we obtain from the Mathematics Field Test. While the field test is a good measure of content, it is a multiple-choice test and therefore gives no information about the students’ communication skills in mathematics, in particular with regard to proof techniques, and does not measure the students’ ability to process and use new information.

The in-house portion of MATH 499 has changed. Originally, it consisted of small content-specific tests. Student would choose their exams based on the classes they had taken. After several administrations of this, however, the mathematics discipline concluded that results indicated more who studied for the test than how well they learned the material in the first place. In addition, students who did well on the in-house exams tended to do well on the content-based major field test; consequently, the in-house tests were not telling the Discipline anything new.

After some discussion, the Discipline decided to replace the original in-house exams with a single proof-based exam that was, for the most part, not content-specific. To ensure objectivity, each exam is graded by two math faculty members using the same rubric.

The latest version of the in-house examination consists of fifteen proofs. The Discipline has been administering this test only since 2007. About half of the problems are of fundamental properties studied in MATH 250, our introduction-to-proof course. For example, the following is Question 14:

An integer $a$ divides an integer $b$ if and only if $b = ak$, for some integer $k$.
Prove: If $a$ divides $b$ and $a$ divides $c$, then $a$ divides $b + c$.

Based on results from two administrations of the test to a total of twenty-five students, this item was the one on which the students performed the best, scoring a collective 187 out of a possible 200 points (93.5%) from two scorers using a pre-defined rubric. This result is heartening because many of these students would not have been exposed to such a problem for at least one year.

In contrast to the above item is the following (Question 13):

Prove by induction: For every natural number $n$, $n^2 + 3n$ is even. (Even is defined as $n = 2k$ for some integer $k$.)

This item was specifically designed to measure the students’ ability to use a particular proof technique learned in MATH 250 and used occasionally thereafter in 300-level mathematics courses. The students scored only a collective 112 out of 200 points (56%) on this item. This was considerably lower than expected (our goal is 75%) and suggests
that the Discipline should more systematically reinforce this concept in upper-level courses.

Two fundamental concepts introduced in MATH 250 are injective, or one-to-one, functions; and surjective, or onto, functions. These concepts continue to be important in upper-level courses. The proof that a function is injective uses a direct, syllogistic technique, and is somewhat easier than the “existence” proof that is required to demonstrate that a function is surjective. So the Discipline expected the in-house test to reflect that. This expectation was confirmed. Questions 4 and 5 involve the injective property:

4. Prove: If \( f: A \rightarrow B \) is one-to-one and \( g: B \rightarrow C \) is one-to-one, then \( g \circ f \) is one-to-one.

5. Let \( f: \mathbb{R} \rightarrow \mathbb{R} \) be defined by \( f(x) = 5x + 2 \). Prove that \( f \) is one-to-one.

The students scored 276 out of a possible total of 400 points (69%) on these two questions. On the other hand, Questions 3 and 6 involve the surjective property:

3. Prove: If \( f: A \rightarrow B \) and \( g: B \rightarrow C \) such that \( g \circ f \) is surjective (i.e. onto \( C \)), then \( g \) is surjective.

6. Let \( f: \mathbb{R} \rightarrow \mathbb{R} \) be defined by \( f(x) = 5x + 2 \). Prove that \( f \) is onto \( \mathbb{R} \).

The students scored 219 out of a possible total of 400 points (54.75%). Neither the 69% nor the 54.75% is considered high enough by members of the Discipline. (A realistic objective would be to increase these percentages to at least 80% and 70%, respectively.) A concerted effort will be made to reinforce more vigorously these concepts in upper-level courses.

While half of the assessment test focuses on fundamental mathematical concepts first introduced in MATH 250, the remainder of the test presents the students with new definitions and requires them to write proofs using these new definitions. A good example of such a problem is Question 8:

A subset \( A \) of the real numbers \( \mathbb{R} \) is **closed under squaring** if and only if \( x \) is in \( A \) implies that \( x^2 \) is in \( A \). Prove: If \( A \) and \( B \) are closed under squaring, then \( A \cap B \) is closed under squaring.

The definition given in Question 8 is not only new to the students, but it is also unknown in mathematics, since it was specifically invented for the assessment test. The students scored 175 out of a possible 200 points (87.5%). This result is gratifying. While the students occasionally see and do proofs in which the intersection of two sets inherits a universal property shared by the original two sets, it is not always routine to apply that experience to an entirely new situation.
The current version of the in-house test focuses on proof-based “pure” mathematics. The Discipline is anticipating adding assessment of applied mathematics courses in the future.

The mathematics discipline has been maintaining a portfolio for each major. The portfolios contain collections of examinations in which students are asked to construct proofs. The discipline used a 4-point rubric to evaluate the collected items. The discipline expected to be able to use the portfolios to observe a progression in students’ proof-writing abilities. What it found, however, was that the students’ performances were often problem/course dependent. Because different students took different upper-level classes, the proofs students were assigned were not necessarily comparable. The discipline concluded that the use of portfolios to track students’ proof-writing abilities was perhaps not effective. The hope is that the new in-house test which is not content-specific will provide more usable data.

As was said above, for the most part, the information gleaned from the portfolios was not very useful. There was one notable exception, however. It was observed that students in MATH 303, Linear Algebra, consistently confused row reduction of matrices with diagonalization. As a result, an extra effort was made to address this weakness in class. One instructor, for example, added a chapter to the class manuscript notes for this course.

C. Indirect Evidence

Appendix 2 shows data from the Current Student Surveys for the last five years. The table below shows the percentages of mathematics majors who answered “Satisfied” or “Very Satisfied” compared to the percentages for all majors in the latest survey. For the most part, the percentages of math majors responding positively are comparable to the high numbers recorded for all majors. The two notable exceptions are in the categories of Range of Courses Offered, where the math majors gave a noticeably higher approval rate (Math: 87%, All: 78%); and Career Preparation, where the math percentage was noticeably lower (Math: 71%, All: 80%).

<table>
<thead>
<tr>
<th></th>
<th>Math Majors (N = 128) Satisfied or Very Satisfied</th>
<th>All Majors (N = 983) Satisfied or Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Quality of Instruction</td>
<td>93%</td>
<td>92%</td>
</tr>
<tr>
<td>2) Quality of Curriculum</td>
<td>91%</td>
<td>92%</td>
</tr>
<tr>
<td>3) Range of Courses Offered</td>
<td>87%</td>
<td>78%</td>
</tr>
<tr>
<td>4) Quality of Course Content</td>
<td>95%</td>
<td>91%</td>
</tr>
<tr>
<td>5) Quality of Advisement</td>
<td>88%</td>
<td>85%</td>
</tr>
<tr>
<td>6) Career Preparation</td>
<td>71%</td>
<td>80%</td>
</tr>
<tr>
<td>7) Graduate School Preparation</td>
<td>69%</td>
<td>71%</td>
</tr>
<tr>
<td>8) Overall Major Program</td>
<td>89%</td>
<td>88%</td>
</tr>
<tr>
<td>9) Acquire Depth of Knowledge in Major Field</td>
<td>91%</td>
<td>88%</td>
</tr>
</tbody>
</table>

The Curriculum and Educational Policy Committee 2004 report on the Mathematics Discipline Program Review expressed as a concern that the assessment of alumni relied
too heavily on anecdotal responses. To remedy this, and with the help of the Office of Institutional Effectiveness, we developed a survey and sent it to all graduated mathematics (and Mathematics/Computer Science) majors. The most recent version of the survey, sent out in the fall of 2007, is shown, together with the responses from alumni.

1 Strongly Agree; 2 Agree; 3 Not Sure; 4 Disagree; 5 Strongly Disagree; 0 Not Applicable.

A. The SNC Math program helped me become a problem solver. ____
B. The SNC Math program helped me think more clearly. ____
C. The SNC Math program helped me express my thoughts more clearly. ____
D. The SNC Math program prepared me well for grad school. ____
E. The SNC Math program prepared me well for my first job. ____
F. The SNC Math program prepared me well for advancement in my career. ____

G. What specific skills learned at St. Norbert College played a role in your obtaining your initial position after graduating?

Please return the completed questionnaire to Rick Poss, Mathematics, at St. Norbert College or reply by e-mail to: rick.poss@snc.edu

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<td>Before 1988</td>
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<tr>
<td>A. Problem Solver</td>
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<td>1</td>
<td></td>
<td></td>
<td></td>
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<td>1.25</td>
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<tr>
<td>B. Think Clearly</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>1.00</td>
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<tr>
<td>C. Express Thoughts</td>
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<td>D. Grad School Prep</td>
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<td>F. Career Advancement</td>
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<td>1988 and later</td>
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<td>A. Problem Solver</td>
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<td>B. Think Clearly</td>
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<td>C. Express Thoughts</td>
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</tr>
<tr>
<td>E. Prepare for Job</td>
<td>4 6 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.60</td>
</tr>
<tr>
<td>F. Career Advancement</td>
<td>4 6 2 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.83</td>
</tr>
</tbody>
</table>
Although the response was smaller than we would have liked (a total of 17 responses, divided between older and more recent graduates), this $n$ of 17 compares favorably with the total $n$ of 8 indicated in the most recent “Current Student Survey: 2006 Update.” The responses, while not anonymous, indicate that most responding alumni agree that the Mathematics program has achieved its primary student outcomes. We will continue to disseminate, collect, and analyze alumni surveys of this type.

The CEPC response to the 2004 Mathematics Program Review expressed concern that the student surveys “indicate significant dissatisfaction with the range of courses and career preparation (as is the case for many disciplines).”

According to the results of the 2008 survey, the percentage of students “very satisfied” with the range of courses has increased from 21% to 33%, which is above the percentage for all students. 96% of responding mathematics majors were either “very satisfied” or “satisfied” with the range of courses, which is considerably above the college combined average of 80%.

The low percentage of 21% (very satisfied” in the 2004 survey), which was apparently the basis for concern, seems to be an outlier; with the exception of that year, the percentage of “very satisfied” has ranged from 31% to 47%, with an average (even counting the 21%) of 36.7%, which compares favorably with the All-Major percentage of 31% in 2008.

The scores for satisfaction with career preparation remain lower than the college-wide percentage. There are some possible explanations for this. Students who complete the survey are still in college. There are relatively few careers for which a mathematics major is the sole or primary preparation. Among these are Secondary Education in Mathematics, Actuarial Science, and graduate school in one of the mathematical sciences. Students who major in mathematics but who do not want to pursue these specific careers work under a cloud of uncertainty with regard to their career. Our assurances to them that “mathematics majors get jobs” do not totally alleviate that concern.

One specific attempt we have made to help prepare the mathematics majors for future careers is to conduct “Math Career Nights” under the auspices of the Sigma Nu Delta Math Club. Theses programs consist of having a panel of St. Norbert College mathematics alumni discuss their career paths, describe their current positions, and then answer questions from the students. These Career Nights have been popular with the students and have even led to interviews for internships and permanent positions.

Mathematics majors in fact are well prepared for a wide variety of careers, but since few of these careers include the title “mathematician,” it is understandable that they have worries while still in college. Our mathematics major alumni have had remarkable success in finding satisfying careers. In the past forty years, there have been only a few (< 5?) mathematics majors who did not find a position related to their preparation within four months of graduating from St. Norbert College. Results from our survey of alumni confirm their strong satisfaction with their career preparation.
D. Program Improvement

The Mathematics Discipline compared its course offerings to those offered by peer and aspirant institutions, as well as evaluating how well we meet the guidelines set by the broader mathematics community. We found that overall our course offerings were consistent with both of these. The Mathematical Association of America (MAA) has a subcommittee called the Committee on the Undergraduate Program in Mathematics (CUPM). Every 10 years, they produce a report that gives recommendations for undergraduate curriculum, for both majors and non-majors. In the most recent guide, published in 2004, they recommend that every mathematics major should provide its students:

… significant experience working with ideas representing the breadth of the mathematical sciences. In particular, students should see a number of contrasting but complementary points of view:

- Continuous and discrete,
- Algebraic and geometric,
- Deterministic and stochastic,
- Theoretical and applied.

Majors should understand that mathematics is an engaging field, rich in beauty, with powerful applications to other subjects, and contemporary open questions.

Recent hires have allowed the Mathematics Discipline to expand its curriculum. To stay in line with the course offerings of our peers and aspirants (see chart below), and to respond to the call in the CUPM guidelines to offer breadth in both theoretical and applied mathematics, the Discipline added a Mathematical Modeling course in Fall 2007. This popular course, which trains students to use mathematics to investigate and solve real-world, interdisciplinary problems, was originally offered as a special topics course and has been added to the college catalog as MATH 313. The charts below show that most of our peers and half of our aspirant departments offer a Mathematical Modeling course.

One of the ways the Discipline might strengthen its program is by offering a combinatorics/graph theory course. Although the Discipline, as recommended by the CUPM standards, offers coursework in both continuous mathematics (for example: real analysis, complex analysis, and the calculus sequence) and discrete mathematics (Abstract Algebra, and Linear Algebra), combinatorics and graph theory are not represented in the discrete mathematics course offerings. All but one of our peer and aspirant schools offer major level combinatorics and/or graph theory courses. Many of them offer a two-course sequence, or two courses in complementary subtopics. As a preliminary step, we may begin to integrate some graph theoretical and combinatorial themes into MATH 317, Operations Research.

With the program’s deterministic content balanced and well-represented in the curriculum, the program could be strengthened by enhancing the stochastic content in the Discipline’s course offerings. This can be done with content in the MATH 321,
Probability and Statistics that highlights the distinction between deterministic and stochastic theories and processes. Other natural inclusions exist through applications available to MATH 303, Linear Algebra and MATH 313, Mathematical Modeling.

In 2004, for the first time the CUPM gave guidelines for students taking general education or introductory collegiate courses in the mathematical sciences. They note that according to the CBMS study in 2000

“[G]eneral education and introductory courses enroll almost twice as many students as all other mathematics courses combined. They are especially challenging to teach because they serve students with varying preparation and abilities who often come to the courses with a history of negative experiences with mathematics. Perhaps most critical is the fact that these courses affect life-long perceptions of and attitudes toward mathematics for many students—and hence many future workers and citizens. For all these reasons these courses should be viewed as an important part of the instructional program in the mathematical sciences…”

The CUPM recommend that decreased emphasis on algebraic manipulation, and careful course design to meet the following goals:

- All students meeting general education or introductory requirements in the mathematical sciences should be enrolled in courses designed to
  - Engage students in a meaningful and positive intellectual experience;
  - Increase quantitative and logical reasoning abilities needed for informed citizenship and in the workplace;
  - Strengthen quantitative and mathematical abilities that will be useful to students in other disciplines;
  - Improve every student’s ability to communicate quantitative ideas orally and in writing;
  - Encourage students to take at least one additional course in the mathematical sciences.

MATH 114 (Algebra and Finite Mathematics) is a terminal course that currently serves this role in our department. The material in this course is structured around algebraic manipulation. Since it is a general education course it does always contain a WAC component, so it does address the fourth CUPM guideline. However, we would like to offer a course which is more tailored to the needs of our liberal arts students. Specifically, we want to offer techniques and tools as part of meaningful contextual situations that show the usefulness of mathematics while developing students problem-solving abilities and sparking dialogue focused on the beauty and complexity of the discipline. By presenting the subject in a way different from their high school experience, such a course should serve well a population of students who have a previous fear or dislike of mathematics.

The Discipline continually strives to meet the needs of our students. Consequently, we have been actively developing a liberal arts math class, MATH 123, with plans to begin offering the module-based course in the 2010-2011 academic year. Until then, the...
Discipline has been incorporating elements of the new course paradigm into the curriculum of MATH 114. Almost all of our peers and aspirants offer a liberal arts math class at this point. In fact, many of the departments offer more than one of these courses.

The CUPM also advises that all mathematics departments “use advising, placement tests, or changes in general education requirements to encourage students to choose a course appropriate to their academic and career goals.” In 2007, the College implemented an online version of the mathematics placement exam. However, even though the placement test asked the same questions as the paper version, we found that the online version was less effective in placing students in the correct course. In 2008 we went back to administering the placement test live during summer orientation. We continue to evaluate our placement test procedure because we suspect that it may contribute to our high withdrawal and failure rate. We are hoping to work closely with the committee which has proposed a change in the general education requirements to encourage students to take courses which will advance their goals and the mission of the College.

### Percentage of Peers and Aspirants Offering Liberal Arts Mathematics Courses

<table>
<thead>
<tr>
<th></th>
<th>Math Modeling</th>
<th>Combinatorics/Graph Theory</th>
<th>Liberal Arts Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peers</td>
<td>70%</td>
<td>90%</td>
<td>80%</td>
</tr>
<tr>
<td>Aspirants</td>
<td>50%</td>
<td>100%</td>
<td>80%</td>
</tr>
<tr>
<td>St. Norbert</td>
<td>Yes</td>
<td>No</td>
<td>(In development)</td>
</tr>
</tbody>
</table>

### Average Number of classes offered in each topic (for those school that offer them)

<table>
<thead>
<tr>
<th></th>
<th>Math Modeling</th>
<th>Combinatorics/Graph Theory</th>
<th>Liberal Arts Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peers</td>
<td>1</td>
<td>1.4</td>
<td>1.25</td>
</tr>
<tr>
<td>Aspirants</td>
<td>1</td>
<td>1.8</td>
<td>1.33</td>
</tr>
<tr>
<td>St. Norbert</td>
<td>1</td>
<td>0</td>
<td>(In development)</td>
</tr>
</tbody>
</table>

Finally, the Discipline has implemented a summer student-faculty collaborative research program. Through this program, the Discipline can build on its successful history of mentoring students on research projects, taking this collaboration to a deeper level.

### IIIa. Assessment of Student Learning Outcomes of GS 8 Portion of the Mathematics Program

#### A. Viable Assessment Plan

The mathematics discipline is heavily involved in the Quantitative Skills (GS8) area of the General Education Program. Most SNC students satisfy the GS8 requirement by taking a mathematics course (MATH 114, 115, 124, 131, or 132). Since 2000, the mathematics discipline has been assessing its effectiveness in enhancing the mathematical skills of students in general education classes. In particular, it has been
measuring the ability of students to solve certain problems before and after taking either MATH 114 or 115.

B. Direct Evidence

The table below shows aggregate data from the mathematics discipline’s six most recent GS8 assessment reports.

<table>
<thead>
<tr>
<th>Question No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td># Correct Pre-Test</td>
<td>401</td>
<td>494</td>
<td>462</td>
<td>424</td>
<td>171</td>
<td>258</td>
<td>382</td>
<td>362</td>
<td>126</td>
<td>237</td>
</tr>
<tr>
<td># Correct Post-Test</td>
<td>494</td>
<td>501</td>
<td>497</td>
<td>462</td>
<td>309</td>
<td>342</td>
<td>450</td>
<td>513</td>
<td>238</td>
<td>371</td>
</tr>
<tr>
<td># Gains</td>
<td>136</td>
<td>53</td>
<td>78</td>
<td>100</td>
<td>193</td>
<td>163</td>
<td>119</td>
<td>172</td>
<td>169</td>
<td>182</td>
</tr>
<tr>
<td># Losses</td>
<td>43</td>
<td>46</td>
<td>43</td>
<td>62</td>
<td>55</td>
<td>79</td>
<td>51</td>
<td>21</td>
<td>57</td>
<td>48</td>
</tr>
<tr>
<td>Gain Percentage</td>
<td>85%</td>
<td>79%</td>
<td>79%</td>
<td>73%</td>
<td>49%</td>
<td>54%</td>
<td>66%</td>
<td>86%</td>
<td>39%</td>
<td>56%</td>
</tr>
<tr>
<td>Loss Percentage</td>
<td>11%</td>
<td>9%</td>
<td>9%</td>
<td>15%</td>
<td>32%</td>
<td>31%</td>
<td>13%</td>
<td>6%</td>
<td>45%</td>
<td>20%</td>
</tr>
</tbody>
</table>

The number of gains reflects the number of students who answered a question incorrectly on the pre-test and correctly on the post-test. The number of losses is the number who answered correctly on the placement test but incorrectly on the post-test. The gain percentage is the percentage of those who answered a question incorrectly on the placement test but answered it correctly on the final exam. The loss percentage is the percentage of those who answered a question correctly on the placement test but answered it incorrectly on the final exam.

The average gain percentage was 67%, while the average loss percentage was 19%. This is gratifying. There may be a concern, however, about Question 9. Here students were given the relatively difficult task of solving a rational equation. It may not be surprising that only 39% of those who answered it incorrectly on the pre-test got it right on the post-test. It is curious, however, that 45% of those who answered it correctly on the pre-test did not get it on the post-test. Nevertheless, it must be pointed out that the overall gain is positive; the total number who answered it correctly on the post-test was 89% higher than the number who got it right on the pre-test.

IV. Program Demographics and Comparisons

A. Faculty

Bernadette A. Berken, M.S. (University of Wisconsin – Madison)
Professor Emeritus of Natural Science-Mathematics
Tenured
Phased Retirement 2007 – 2009
Date of First Service: 1982

John A Frohlicher, Ph.D. (Purdue University)
Associate Professor of Mathematics
Tenured
Date of First Service: 1983

Christina Carroll, Ph.D. (Georgia Institute of Technology)
Assistant Professor of Mathematics
Date of First Service: January 2009

Terry Jo Leiterman, Ph.D. (University of North Carolina – Chapel Hill)
Assistant Professor of Mathematics
Date of First Service: 2006

Katherine L. Muhs, M.S. (Purdue University – Calumet)
Assistant Professor of Mathematics
Tenured
Date of First Service: 1982

Kevin C. Murphy, Ph.D. (University of Iowa)
Assistant Professor of Mathematics
Date of First Service: 2009

Richard L. Poss, Ph.D. (University of Notre Dame)
Professor of Mathematics
Tenured
Phased Retirement 2007 – Present
Date of First Service: 1970

Arthur L. Thorsen, Ph.D. (Duke University)
Associate Professor of Mathematics
Tenured
Date of First Service: 1979

B. Number of majors and minors

There are currently 64 students declared mathematics majors and 28 declared mathematics minors.
C. Number of graduates

The numbers of mathematics majors graduating in each of the past three academic years are:

- 2004-2005: 12
- 2005-2006: 11
- 2006-2007: 16
- 2007-2008: 17

D. Ratios of graduates to majors

For the past four years (projecting 11 graduates for this year) the ratios of graduates to majors have been:

- 2004-2005: 12/53 = 0.23
- 2005-2006: 11/57 = 0.19
- 2006-2007: 16/61 = 0.26
- 2007-2008: 17/64 = 0.27

The four-year totals are 56/235 for an average of 0.24.

E. Ratios of majors to FTE full-time faculty

- 2004-2005: 53/5 = 10.6
- 2005-2006: 57/5 = 11.4
- 2006-2007: 61/5 = 12.2
- 2007-2008: 64/5.17 = 12.38

The four-year totals are 235/20.17 for an average of 11.65.

F. Course enrollments and grade distributions

Course Enrollments for the past four years:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Number of Students</th>
<th>Number of Sections</th>
<th>Average Class Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2005</td>
<td>517</td>
<td>21</td>
<td>24.62</td>
</tr>
<tr>
<td>Spring 2006</td>
<td>347</td>
<td>17</td>
<td>20.41</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>516</td>
<td>19</td>
<td>27.16</td>
</tr>
<tr>
<td>Spring 2007</td>
<td>374</td>
<td>17</td>
<td>22.00</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>549</td>
<td>21</td>
<td>26.14</td>
</tr>
<tr>
<td>Spring 2008</td>
<td>363</td>
<td>17</td>
<td>21.35</td>
</tr>
<tr>
<td>Fall 2008</td>
<td>530</td>
<td>20</td>
<td>26.50</td>
</tr>
<tr>
<td>Seven-semester totals</td>
<td>3196</td>
<td>132</td>
<td>24.21</td>
</tr>
</tbody>
</table>
Grade distributions for the past three years:

### Mathematics

#### Program Grade Distribution by Semester

<table>
<thead>
<tr>
<th>Year</th>
<th>Semester</th>
<th>A</th>
<th>AB</th>
<th>B</th>
<th>BC</th>
<th>C</th>
<th>CD</th>
<th>D</th>
<th>F</th>
<th>W</th>
<th>Sum</th>
<th>Avg. GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>Fall</td>
<td>98</td>
<td>53</td>
<td>99</td>
<td>47</td>
<td>99</td>
<td>35</td>
<td>25</td>
<td>17</td>
<td>44</td>
<td>517</td>
<td>2.680</td>
</tr>
<tr>
<td></td>
<td>Spring</td>
<td>81</td>
<td>43</td>
<td>66</td>
<td>38</td>
<td>50</td>
<td>13</td>
<td>21</td>
<td>6</td>
<td>29</td>
<td>347</td>
<td>2.855</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>179</td>
<td>96</td>
<td>165</td>
<td>85</td>
<td>149</td>
<td>48</td>
<td>46</td>
<td>23</td>
<td>73</td>
<td>864</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Distribution</td>
<td>21%</td>
<td>11%</td>
<td>19%</td>
<td>10%</td>
<td>17%</td>
<td>6%</td>
<td>5%</td>
<td>3%</td>
<td>8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>Fall</td>
<td>79</td>
<td>41</td>
<td>104</td>
<td>31</td>
<td>111</td>
<td>24</td>
<td>47</td>
<td>20</td>
<td>59</td>
<td>516</td>
<td>2.525</td>
</tr>
<tr>
<td></td>
<td>Spring</td>
<td>78</td>
<td>31</td>
<td>80</td>
<td>42</td>
<td>54</td>
<td>11</td>
<td>27</td>
<td>10</td>
<td>41</td>
<td>374</td>
<td>2.754</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>157</td>
<td>72</td>
<td>184</td>
<td>73</td>
<td>165</td>
<td>35</td>
<td>74</td>
<td>30</td>
<td>100</td>
<td>890</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Distribution</td>
<td>18%</td>
<td>8%</td>
<td>21%</td>
<td>8%</td>
<td>19%</td>
<td>4%</td>
<td>8%</td>
<td>3%</td>
<td>11%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>Fall</td>
<td>105</td>
<td>67</td>
<td>110</td>
<td>38</td>
<td>70</td>
<td>26</td>
<td>40</td>
<td>13</td>
<td>80</td>
<td>549</td>
<td>2.769</td>
</tr>
<tr>
<td></td>
<td>Spring</td>
<td>73</td>
<td>41</td>
<td>66</td>
<td>30</td>
<td>59</td>
<td>13</td>
<td>25</td>
<td>14</td>
<td>42</td>
<td>363</td>
<td>2.713</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>178</td>
<td>108</td>
<td>176</td>
<td>68</td>
<td>129</td>
<td>39</td>
<td>65</td>
<td>27</td>
<td>122</td>
<td>912</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Distribution</td>
<td>20%</td>
<td>12%</td>
<td>19%</td>
<td>7%</td>
<td>14%</td>
<td>4%</td>
<td>7%</td>
<td>3%</td>
<td>13%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grand Total</td>
<td>514</td>
<td>276</td>
<td>525</td>
<td>226</td>
<td>443</td>
<td>122</td>
<td>185</td>
<td>80</td>
<td>295</td>
<td>2666</td>
<td>2.706</td>
</tr>
<tr>
<td></td>
<td>% Distribution</td>
<td>19%</td>
<td>10%</td>
<td>20%</td>
<td>8%</td>
<td>17%</td>
<td>5%</td>
<td>7%</td>
<td>3%</td>
<td>11%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The GPA’s in Mathematics are lower than the GPA of the College at large. This may be partially explained by the fact that the 60% of the math classes are general education courses. Additionally, most students have to take a math course regardless of the strength of their background.

#### G. Advising load per full-time faculty

Mathematics faculty members are currently advising 61 students, an average of 10.17 per faculty member. This number is artificially low, however. One discipline member is in her final year of phased retirement and, consequently, has no advisees. Another is in phased retirement, and has stopped taking on new advisees; he currently has 6 advisees. Another, in his role as Director of the Honors Program has secondary advisement responsibility for all of the honors students in addition to his 10 standard advisees. One untenured member is in her third year on the faculty and has gradually increased her advisee load to 11. The other two tenured faculty members have 17 advisees each.
H. Courses taught by part-time faculty

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Number of Sections</th>
<th>Number of Sections Taught by Part-time Faculty</th>
<th>Percentage of Courses Taught by Part-time Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2005</td>
<td>21</td>
<td>6</td>
<td>28.57</td>
</tr>
<tr>
<td>Spring 2006</td>
<td>17</td>
<td>2</td>
<td>11.76</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>19</td>
<td>4</td>
<td>21.05</td>
</tr>
<tr>
<td>Spring 2007</td>
<td>17</td>
<td>2</td>
<td>11.76</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>21</td>
<td>4</td>
<td>19.05</td>
</tr>
<tr>
<td>Spring 2008</td>
<td>17</td>
<td>3</td>
<td>17.65</td>
</tr>
<tr>
<td>Fall 2008</td>
<td>20</td>
<td>4</td>
<td>20.00</td>
</tr>
<tr>
<td>Seven-semester totals</td>
<td>132</td>
<td>25</td>
<td>18.94</td>
</tr>
</tbody>
</table>

With the recent creation of a new position in mathematics, we anticipate the elimination of adjunct staffing.

I. Peer and Aspirant Comparisons

The percentages of St. Norbert College graduates who completed a mathematics major for the past three years, according to IPEDS data are:

- 2005: 12/521 = .0230 or 2.30%
- 2006: 11/479 = .0230 or 2.30%
- 2007: 16/438 = .0365 or 3.65%

With 11 senior mathematics majors this year, the ratio should again be between 2 and 3 percent. The average of the ratios for the three years, with data given by the OIE, is 39/1438 = 2.71%. This percentage is above the averages for both our peer institutions (1.96%) and our aspirant institutions (2.53%).

The 2.71% average mathematics graduation rate is additionally noteworthy upon considering that a large number of St. Norbert College students major in education or business administration, which are not normally considered to be among the liberal arts. The combined average percentage for St. Norbert College in these two majors is 30.32%. By comparison, the combined average percentage for our peer institutions is only 22.88% and for our aspirant institutions is 16.67%. If we exclude education and business administration when computing the percentage of graduates with math majors, then the corresponding figures are: St. Norbert College 3.89%, peers 2.54%, and aspirants 2.89%. Assuming that many students enroll at St. Norbert College with the intent to major in education or business administration, then we have a much higher percentage of mathematics majors among the liberal arts students than do our peer and aspirant institutions.
V. Teaching and Learning

A. Indicators of Teaching and Advising Quality

The mathematics professors are reflective and accomplished teachers who offer their students a level and quality of interaction that is rare in higher education. Three of the discipline’s faculty members have won the College’s award for outstanding teaching. Moreover, students routinely nominate members of the discipline for the College’s Educator of the Year Award. Through small class sizes above the 300 level, personal attention, opportunities for student research, the thoughtful integration of technology and application into coursework, and an array of co-curricular and community service activities, faculty members guide students in their ability to think critically and solve problems.

Particularly strong among small liberal arts colleges, St. Norbert mathematics faculty enhance student collegiate experiences through a successful program of undergraduate research and learning. The mathematics program at the College has a long history of guiding students through research that leads to presentations at the regional or national level. The first known presentation by a St. Norbert College mathematics student was in 1984 at the meeting of the Wisconsin Section of the Mathematical Association of the America. Since that time, over 250 student presentations have been given. Our students have presented at every summer national meeting of the Pi Mu Epsilon National Mathematics Honor Society since 1985. No other college or university in the country can make that claim. This is particularly significant because research presentations are not a mathematics degree requirement. At most summer national mathematics meetings, the number of St. Norbert College student speakers is first or second in the country. The St. Norbert College mathematics program has become widely known for extensive travel by its students and its commitment to mentoring student research projects. Alumni acknowledge the value of these experiences by generously supporting this travel through their gifts to the Math Club Research and Travel Fund and Endowment.

Although the mathematics program does not prepare its graduates for any one specific career, a major in mathematics is required for teaching the subject at the secondary level and is strongly recommended for those pursuing a career as an actuary. The mathematics program usually has about one graduate per year planning to be an actuary. Most of these students have passed the first actuarial exam while enrolled at the College; many have had actuarial internships. As far as can be determined, all of these students who have passed an exam prior to graduation have obtained actuarial positions. SNC actuarial alumni frequently contact the discipline to help them find potential actuaries. In addition to proving coursework and support for the successful completion of the first actuarial exam, St. Norbert College is listed by the Society of Actuaries as including the Validation by Educational Experience (VEE) in Economics, Applied Statistical Methods, and Corporate Finance. The VEE coursework is provided by the economics and business administration disciplines.

SNC mathematics graduates successfully pursue doctoral studies, conducting sophisticated, original research and eventually undertaking a wide variety of challenging
careers. An average of more than three mathematics majors per year have gone on to earn doctorates in mathematics or a related field (including operations research, computer science, finance, economics, statistics, medicine, and physics.)

An important function of St. Norbert College mathematics faculty is to prepare competent, passionate, future teachers of mathematics who will work at all levels of the educational system. Many SNC mathematics majors go on to be middle and high school mathematics. The College also have a special certification program for elementary education majors who will become middle school mathematics teachers. School districts have reported high regard for SNC mathematics education graduates, and these students have enjoyed successful placement in teaching positions after they graduate.

The Mathematics Discipline analyzed the SOOT results from the previous five even-year semesters (Fall 2004, Spring 2006, Fall 2006, Spring 2008, and Fall 2008).

Comparisons between SOOT averages in mathematics classes and College averages are given in Appendix 4. These comparisons raise some concerns. For 14 of the 21 questions, the mathematics average is at least 0.10 below the College average. Possibly the most telling response is to the question about student interest (Question 7). The mathematics average (2.63) is 0.63 below the College average (3.26).

There are several possible explanations for these results.

1. Many students enter college with an aversion to mathematics.
   “Math anxiety” is a well-known phenomenon. During summer orientation, many incoming students express a dislike, indeed an outright hatred, of mathematics. Moreover, social acceptance of poor math skills is prevalent in our culture. While some student lack of interest and overall dissatisfaction with SNC mathematics classes may indeed be a result of their experiences in those classes, it is also reasonable to infer that a significant portion of the dissatisfaction and lack of motivation to succeed is a reflection of attitudes students developed before setting foot on campus.

2. Students taking general education or service mathematics classes rate the classes lower than students in courses for mathematics majors or minors.
   The table below compares the average student responses to Questions 19 (course overall) and 20 (instructor overall) in general education and service classes to those in classes designed for mathematics majors. The differences are dramatic. The averages for the major classes compare favorably with the College overall, but the averages in the general education sections are significantly below.

3. The SOOT results are skewed downward by the average student profile in mathematics classes.
   Many other SNC classes serve the General Education Program or other non-major needs. However, the mix of majors and non-majors in mathematics classes is heavily unbalanced toward the non-majors. Forty-nine percent of students
Completing SOOTs in mathematics classes were taking their class to satisfy a general education requirement. About 39% identified themselves as mathematics majors or minors. On the other hand, in the generic SNC class, 53% of the students completing SOOTs are majoring or minoring in the subject while 32% are taking it for the general education program.

Separating the SOOT data into fall and spring semesters supports this interpretation. Of the 1,670 completed SOOTs, 1,226 were completed in the fall while 444 were done in the spring. As a result, the overall mathematics SOOT numbers disproportionally reflect the fall classes. In the fall semesters, where the student make-up is more heavily tilted toward general education students, the SOOTs are at least 0.10 below the College averages for 15 questions. On the other hand, in the spring semesters, where the mix of general education students to majors is closer to that of the average SNC class, those differences practically disappear (student interest remaining the notable exception).

Results of Questions 19 (course overall) and 20 (instructor overall), 2004-2008

<table>
<thead>
<tr>
<th>Course Codes</th>
<th>Average student overall rating of course is...</th>
<th>Average student overall rating of instructor is...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service/ general education courses</strong></td>
<td>MATH 102</td>
<td>3.29</td>
</tr>
<tr>
<td></td>
<td>MATH 114</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MATH 115</td>
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<td></td>
<td>MATH 124</td>
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<td></td>
<td>MATH 212</td>
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<td></td>
<td>MATH 243</td>
<td></td>
</tr>
<tr>
<td><strong>Courses taken by majors in mathematics and other fields</strong></td>
<td>MATH 131</td>
<td>3.77</td>
</tr>
<tr>
<td></td>
<td>MATH 132</td>
<td></td>
</tr>
<tr>
<td><strong>Courses taken primarily by mathematics majors</strong></td>
<td>MATH 233</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td>MATH 250</td>
<td></td>
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<tr>
<td></td>
<td>MATH 303</td>
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<td>MATH 317</td>
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<td>MATH 350</td>
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<td></td>
<td>MATH 376</td>
<td></td>
</tr>
<tr>
<td><strong>Mathematics Program Average (unweighted)</strong></td>
<td></td>
<td>3.67</td>
</tr>
<tr>
<td><strong>College Average</strong></td>
<td></td>
<td>3.96</td>
</tr>
</tbody>
</table>

3 We do not have SOOT data for MATH 315 and MATH 373. Since they are offered every other year, they have not occurred in a regular SOOT semester.
4. Class size may play a role in student satisfaction.
The average class size in the fall courses was 25.4. In the spring classes, where students responses were close to the SNC means, the average class size was 16.1. The more personalized attention paid in a spring class may contribute to the higher ratings.

The Mathematics Discipline did wonder whether some of the relative low SOOT ratings in general education courses were connected to the fact that many of those sections were taught by adjunct faculty. This speculation was not supported by the data; on average, the course overall and instructor overall ratings in adjunct-taught classes were not below those in sections taught by regular faculty.

The overall below average SOOT ratings in mathematics classes may be influenced by the external factors mentioned above; nevertheless, they do present a challenge which the Discipline continues to address. While “math anxiety” may never be completely overcome and negative stereotypes never conquered, the Discipline continually looks for ways to reach students more effectively and offer them a useful and positive college mathematics experience. For example, the Discipline has plans to propose a new class, MATH 123, for the General Education Program. This class, with a greater emphasis on relevance and problem solving, may be received more positively by the math averse and adverse students.

B. Scholarly/Creative Efforts

The mathematics faculty has a longstanding commitment to scholarly and creative endeavors, leadership, and service in the academy and the broader community, which creates a wide array of opportunities for students to apply their classroom learning. The work of our mathematics discipline is multi-faceted, proactive, and creative. St. Norbert College mathematics professors have demonstrated innovative ideas for making mathematics understandable. They have created unique ways for our students and the wider community to grasp mathematics’ powerful and practical applications, while still grounding our students in the classical techniques of pure mathematics.

Several mathematics faculty members have created curricular supplements for a number of the general education mathematics courses offered by the College. These include: MATH 114, Algebra and Finite Mathematics; MATH 115, Pre-Calculus Mathematics; and MATH 131, Calculus and Analytical Geometry I. A supplement for students making the transition from MATH 124, A Survey of Calculus to MATH 132, Calculus and Analytical Geometry II has also been developed to shore up these students’ understanding of trigonometry. Moreover, several abbreviated manuscripts that are used as an alternative to a conventional textbook have been written for selected upper-level mathematics courses. Manuscripts for MATH 303, Linear Algebra; MATH 373, Real Analysis; and MATH 376, Complex Analysis omit many of the proofs of theorems and explanations of examples and instead provide hints for how the omitted material should be completed. These manuscripts are constructed to support instruction that centers on in-class student presentation of course material. To best serve students of MATH 243,
Multicultural Mathematical Ideas, the course curriculum is guided by the use of an in-house textbook with reading and activities developed by a member of the mathematics discipline as well as a collection of readings from other authors.

The mathematics faculty continually reflects on the program and how its courses serve the needs of its students. Currently, the mathematics faculty is collaboratively engaged in developing a new course, MATH 123. This course will not have algebra as its main focus but instead will include a variety of contemporary topics and applications in mathematics. The audience includes students not intending to complete a degree in mathematics or a related field. The discipline is designing MATH 123 to serve the current general education program and, perhaps, any future program. Further, in Fall 2007, a course in mathematical modeling was offered in the special topics designation MATH 489. The objectives of this course hinged on making connections and forming relationships between mathematics, models, and science through the construction and analysis of mathematical models in population dynamics and mechanical vibrations. This course will be offered again in Fall 2009 with subsequent plans to be formally included in the mathematics course curriculum. Additionally, one mathematics faculty member has initiated work on course materials for an on-line version of MATH 115, Pre-Calculus Mathematics. Offering this course on-line will give students a different opportunity for learning mathematics.

Mathematics faculty routinely update their courses to reflect changing uses of technology. The use of graphing calculators has long been an important tool for instructional support in many math courses at the College. Computer software such as Minitab, Derive, and Geometer’s Sketchpad are used in a variety of courses including MATH 131, Calculus and Analytical Geometry 1, MATH 233, Calculus and Analytical Geometry 3, MATH 212, Mathematical Applications for Upper Elementary and Middle School, and MATH 321, Probability and Statistics. Maple and Mathematica are modern computing environments for scientific computing, data manipulation and visualization, well known to industry and recently available in area high schools. For years, one faculty member had SNC mathematics students using Maple extensively in such courses as MATH 315, Numerical Analysis, and MATH 317, Operations Research. Three years ago, the switch was made to Mathematica and one faculty member is exposing students to its power, complexity, and application in MATH 132, Calculus and Analytical Geometry 2, and MATH 310, Differential Equations, through demonstrations and laboratory activities. In MATH 315, Numerical Analysis, Mathematica is a central feature. It is used to explore and understand the topics of the course through computer lab assignments, classroom demonstrations, webcasts, and live online seminars. Further, Mathematica has been used to build a mathematical model during a 10-week summer research project in 2008 with two mathematics students investigating population dynamics. With a faculty member’s research interests in the field of applied mathematics, software such as Mathematica will continue to be an integral part of research collaborations with students.

As a part of MATH 489, Special Topics: Mathematical Modeling, twelve students collectively built and rode a square wheeled bicycle. Although this was a class project, nearly all of the work, which was significant, happened outside of the classroom and was
not part of the course grade. The square wheeled bicycle made its debut at the 2007 Pi Mu Epsilon Regional Undergraduate Math Conference held at the College annually since 1985. The project was recognized in The Green Bay Press, the St. Norbert College Magazine, and The Chronicle of Higher Education. The bicycle was further exhibited on campus at “Celebrating Student and Faculty Collaborations,” at The Big Event for Little Kids at the ShopKo Expo Center in Green Bay (in two subsequent years), and for the math club at Madison Area Technical College. It was also featured in Dean Marsden’s television show, “Conversations from St. Norbert.” The exhibition that generated the most attention for the group occurred at the 2008 MathFest, one of two annual meetings of the Mathematics Association of America, with the demonstration advertised in the conference program and the lecture given by the student presenter awarded a national prize. The faculty member instructing the group gave regional and national lectures on teaching mathematics using experiential, hands-on laboratory projects. With interest in both the pedagogy and the work, the faculty and students constructed a website with a live video demonstration, pictures, reflective student and instructor comments, and the detailed story behind the accomplishment.

One faculty member is the editor of the *St. Norbert College Journal of Mathematics*, in publication since 1994. Each spring semester, research problems are posed to small groups of students in one of the upper level mathematics courses. The students tackle the problems and, importantly, get experience in scientific writing. The journal is published annually, available for faculty and students across campus in paper and online format, and sent to selected colleagues across the state.

St. Norbert College has been hosting a Pi Mu Epsilon Regional Undergraduate Mathematics Conference every year since 1986. This is one of the oldest such conferences in the country. At this conference mathematics students from over twenty college and universities in the Midwest present their research and enjoy learning mathematics from each other and a distinguished invited speaker. This conference has received funding through grants from the National Science Foundation and the Mathematical Association of American every year since 2003. St. Norbert College was one of fifteen to receive funding during the first year of the grant program’s existence and is one of only four schools in the country to receive funding in every year.

An important mission of the mathematics program is to extend classroom learning by mentoring students in mathematics research projects and encouraging them to present their research findings at regional and national mathematics conferences. St. Norbert College is distinguished in both the quality and quantity of undergraduate research. Our students have won several prizes for best research paper at national meetings. The discipline routinely sends one of the largest contingents of student presenters to national mathematics conferences. The Pi Mu Epsilon National Mathematics Honor Society, the Mathematical Association of America, and the American Mathematical Society are among the organizations at the national conferences. For several years, students have presented papers at the Nebraska Conference for Undergraduate Women in Mathematics. Further, students have spoken at Wisconsin Section meetings of the Mathematical Association of America in addition to regional conferences at St. John’s University.
(MN), Rose-Hulman Institute of Technology (IN), and Miami University (OH). All of these are in addition to the regional Pi Mu Epsilon Conference the discipline hosts annually on campus.

The St. Norbert mathematics discipline has long supported undergraduate research in the field. Faculty have encouraged students to participate in independent study projects and summer research experiences at other institutions and nurtured those experiences by advising students as they presented their work at regional and national conferences. SNC mathematics students are among the most active in the country in presenting the results of their research. A new feature of the St. Norbert College mathematics program is its Summer Undergraduate Research Program in Mathematics. The program began in summer 2008 with two students. The program consists of ten weeks of research under the direction of a member of the mathematics faculty at the College. The students who participate in this program receive a stipend (roughly equivalent to what they might earn at minimum wage with summer employment) and paid on-campus housing. The expected outcome is a paper that students could publish or present at a regional or national conference. The St. Norbert College Research and Travel Endowment supports this program; however, one faculty member is active in attracting additional grant funding.

C. Collegial and Community Service

The St. Norbert College mathematics faculty has a stellar record of service to the professional community. Various members of the mathematics faculty have:

- served as editor of the Mathematical Association of America Wisconsin Section Newsletter,
- chaired the Wisconsin Section of the Mathematics Association of America,
- chaired the Wisconsin Section of the Mathematical Association of America’s high school mathematics competition,
- coordinated the American High School Mathematics Examination for the State of Wisconsin,
- served as Governor of the Wisconsin Section of the Mathematical Association of America,
- served as judge for the national Mathematics Association of America undergraduate research poster session,
- chaired various committees for the Wisconsin Section of the Mathematical Association of America,
- served as an officer of Pi Mu Epsilon, and
- served as editor of the Pi Mu Epsilon Journal, one of the few national journals that showcase undergraduate mathematics research.

The mathematics faculty is also committed to serving as a resource for mathematics teachers in both the public and private schools of the region. Faculty members have hosted special presentations on mathematics of interest to the local community, conducted workshops for middle and high school mathematics teachers, and presented mathematics workshops to teachers of the Green Bay Diocese at their annual educational
meeting. One mathematics faculty member serves as a liaison to high schools for the College Credit Program in mathematics.

A grant program undertaken by mathematics faculty is the Mathematics Science Partnership (January 2007 – July 2008) a joint venture with the Green Bay Public School District. This endeavor included the development of three graduate level courses that would increase the mathematics content knowledge and pedagogy of in-service teachers. This program was highly successful and, subsequently, mathematics faculty working in collaboration with the Green Bay Public School District and the Wausaukee School district have recently been awarded a NEW grant for September 2008 – September 2011.

One mathematics faculty member serves as a consultant for the AVID project which links St. Norbert College mathematics students as tutors to 7th grade students from Washington and Franklin Middle Schools in Green Bay. Frequently, parents of local high school students looking for tutors contact the St. Norbert College mathematics faculty. In turn, the discipline contacts undergraduate math majors who are placed in these well-paying positions.

One mathematics faculty member serves as the liaison between the discipline and the St. Norbert College Credit Program in mathematics, assisting the program in a variety of ways, including meeting with the high school teachers as a group in September, serving as a resource throughout the year, and writing final exams for the three math courses. The discipline approves new teachers to the CCP and discusses any issues which arise.

St. Norbert College has a strong math club and an active chapter of the Pi Mu Epsilon National Mathematics Honor Society. These organizations allow student to gain leadership experience while providing a sense of belonging to the mathematics program at St. Norbert College in addition to the wider mathematics community. The Sigma Nu Delta Math Club provides service to the College, the public, and the mathematics community in several ways. It is responsible for publicizing and recruiting donors for the American Red Cross blood drives that are held on campus. Each February the mathematics discipline, along with students of the Math Club, hosts a High School Math Meet. At this competition large numbers of students come to campus to compete with each other and themselves in the solving of mathematics problems. The Math Club, with the guidance and assistance of the faculty, develops the problem sets for the competition, administers the examinations, and grades the papers. As previously mentioned, the St. Norbert College chapter of Pi Mu Epsilon engages the wider mathematics community by hosting an annual Undergraduate Mathematics Conference. The annual conferences continue to set records for the number of students speakers and attendees. Annually, the mathematics discipline in partnership with the Math Club sponsors a mathematics career night at which persons, typically alumni, in math-related fields have an opportunity to interact with St. Norbert College students in an informal setting.

Mathematics faculty have collaboratively worked to obtain a variety of grants and scholarships opportunities. One successful endeavor is the Pride Scholarship Program (January 2007 – December 2010), a collaborative venture with the computer science
discipline. This program is funded by the National Science Foundation with its purpose to attract and retain mathematics and computer science majors. It provides scholarships (up to $10K) for up to 24 undergraduate students of mathematics or computer science. Currently, 17 students are receiving Natural Science PRIDE scholarships.

VI. Other Indicators

A. Quality of Entering Students Attracted to Major

Over the years, the discipline has made an effort to encourage students to major in mathematics. These efforts have succeeded in making the percentage of SNC students majoring in mathematics consistently higher than the national average.

Many students entering SNC show mathematical aptitude and enjoy math; however, they may not have considered pursuing a major or minor. Individual faculty members try to identify such students in their calculus and pre-calculus classes and encourage them to take more mathematics.

The opportunity to work with faculty members on research projects has certainly been an effective way of mentoring bright existing and prospective majors. Even those who do not work on projects may be attracted by the opportunity to attend national and regional student conferences.

In 2007 the College was awarded a $500,000 grant from the National Science Foundation for a program called Natural Science PRIDE. This program uses scholarships as well as educational and social events to attract and retain promising mathematics and computer science students. The 3.00 GPA requirement for continued participation in the program ensure that PRIDE scholars are high quality students. PRIDE scholars appreciate what the program offers, but we are still investigating methods for better informing prospective SNC students of the opportunities PRIDE provides.

B. Contributions to College Programs

The most significant contribution that the mathematics discipline makes to other College programs is to the General Education Program. Students must satisfy Area 8, Quantitative Skills, as part of that program, and almost all students satisfy this requirement by taking a course in mathematics. Courses in mathematics that satisfy Area 8 are MATH 114, Algebra and Finite Mathematics; MATH 115, Pre-Calculus; MATH 124, A Survey of Calculus; MATH 131, Calculus and Analytic Geometry I; and MATH 132, Calculus and Analytic Geometry II. The mathematics discipline also offers at least one semester each year a remedial half-course, MATH 102, Basic Algebra, for students who are not sufficiently prepared to take a course that will satisfy Area 8.

The mathematics discipline provides courses that serve several other major programs. Physics majors are required to take MATH 131; MATH 132; MATH 233, Calculus and
Analytic Geometry III; and MATH 310, Differential Equations. Most majors within the Natural Sciences Division take MATH 131, and some continue with MATH 132 and higher. Pre-law students are encouraged to take both MATH 131 and MATH 132. Business administration majors, accounting majors, and economics majors are required to take MATH 124 (or MATH 131). Computer science majors with either a business information systems concentration or a graphic design and implementation system concentration are also required to take MATH 124 (or MATH 131). Computer science majors with a computer science concentration are required to take MATH 131, MATH 132, and MATH 250, Advanced Foundations of Mathematics. Psychology majors, sociology majors, business administration majors, accounting majors, computer science majors with a business information systems concentration, and economics majors may take MATH 321, Probability and Statistics, to satisfy their statistics requirement if they have completed the prerequisite MATH 233, Calculus and Analytic Geometry III. Business administration majors may use MATH 317, Operations Research, to satisfy one of their advanced major electives. Education students seeking early childhood-middle childhood certification are required to take a second mathematics course beyond the one that fulfills their General Education Area 8 requirement. Finally, the mathematics discipline provides three courses for the mathematics teaching certification program minor for elementary education majors: MATH 124 (or MATH 131); MATH 212, Mathematical Applications for Upper Elementary and Middle School; and MATH 243, Multicultural Mathematics Ideas.

C. Uniqueness/Distinctiveness of Program

One unique feature of the mathematics program at St. Norbert College is our long history of guiding students through research that leads to presentations at regional or national conference. The first known presentation by a St. Norbert College mathematics student was in 1984 at the meeting of the Wisconsin Section of the Mathematical Association of America. Since that time, 85 different students have given 233 presentations. Our students have presented at every summer national meeting of the Pi Mu Epsilon National Mathematics Honor Society since 1985. No other college or university in the country can make that claim. At most summer national mathematics meetings, the number of St. Norbert College student speakers is first or second in the country. The St. Norbert College mathematics program has become widely known for the extensive travel by its students. St. Norbert College mathematics alumni have supported this travel through their gifts to the Math Club Travel Fund and Endowment.

St. Norbert College has been hosting a Pi Mu Epsilon Regional Undergraduate Mathematics Conference every year since 1986. This is one of the oldest such conferences in the country. This conference has received funding through grants from the National Science Foundation and Mathematical Association of America every year since 2003. St. Norbert College was one of fifteen to receive funding during the first year of the grant program’s existence and is one of only four schools in the country to receive funding in every year.
Another feature of the St. Norbert College mathematics program is its new Summer Undergraduate Research Program in Mathematics. A faculty member started this program with two students during the summer of 2008. The program consists of ten weeks of research under the direction of a member of the St. Norbert College mathematics faculty member. The students who participate in this program receive a stipend (roughly equivalent to what they might earn with summer employment) and free housing on campus. The expected outcome is a paper that the students could publish or present at a regional or national conference. The St. Norbert College Student Research and Travel Endowment also supports this program.

St. Norbert College has a special scholarship program for students majoring in Mathematics or Computer Science. This Natural Science PRIDE Scholarship Program (funded by the NSF), is designed to encourage more students to major in math or computer science.

Another distinctive feature of the program stems from the discipline’s philosophy of allowing all faculty members to teach as many different courses as they feel comfortable doing. Members of the discipline are familiar with almost all the courses taken by majors. As a result, faculty can continually make connections between material covered in current courses and material of past courses, reminding students in upper-level courses on virtually a daily basis of concepts they have learned in the past and breaking down the artificial boundaries separating courses from each other. In a real sense the mathematics program is a program, and not just a collection of discrete, unrelated courses.

**D. Contributions to Diversity Goals**

In the past few years, the College has hired two female tenure-track faculty in mathematics, creating a gender balance in role models for mathematics students. As of Fall, 2009, 46% of the SNC mathematics faculty are female. By contrast, according to the National Science Foundation, only 29.6% of Ph.D.s awarded in mathematics in 2006 were awarded to women.

In MATH 350, students are required to write papers on historical figures in mathematics; many of these are women. The Natural Science PRIDE program attracts first-generation, under-represented populations to mathematics and computer science. Students have attended and presented at the Nebraska Women’s Conference in mathematics.

**F. Evidence of Integrating Strategic Planning into Practice**

Staffing has risen to a level that eliminates the need for adjuncts as was indicated in the Strategic Plan.

**G. Efforts to Attract Grant Funding**

- National Science Foundation for Natural Science PRIDE,
• Math/Science Partnership Grant with Green Bay Area Public School District and Wausaukee Public School District,
• Mathematical Association of America and National Science Foundation for Pi Mu Epsilon Conference
• Mathematical Association of America for student travel to give talks at MAA conferences and Mathfest

H. Success Indicators for Career Preparation

Although the mathematics program does not prepare its graduates for any one specific career, a major in mathematics is required for teaching the subject at the secondary level and is strongly recommended for those pursuing a career as an actuary.

In the past three academic years, a total of thirteen students graduated with a mathematics major and secondary education certification. All of these students obtained jobs in education.

Usually about one graduate per year plans to be an actuary. Most of these graduates have passed the first actuarial exam; many have had actuarial internships. As far as can be determined, all of these students who have passed an exam prior to graduation have obtained actuarial positions. SNC actuarial alumni frequently contact the discipline to help them find potential actuaries.

VII. Follow Up to Recommendations from 2004 Program Review

Below are the recommendations the Curriculum and Educational Policy Committee made in the 2005 program review with updates.

Recommendation: Develop a more active research agenda for each faculty member.

Update: In its 2004 program review report, the Curriculum and Educational Policy Committee expressed a concern that “[t]he research agenda of some scholars is not as active as it ought to be,” and gave a recommendation to “[d]evelop a more active research agenda for each faculty member.”

The question of what contributions individual faculty members make to a program is better addressed through the divisional associate dean’s periodic faculty reviews. On the programmatic level, a better question is whether the program as a whole is performing the activities and receiving the benefits that are frequently associated with, but don’t necessarily follow from, active research agendas. Below is a list of such activities and benefits and explanations of how the St. Norbert College Mathematics Program is providing them.

1. Scholarship is Being Produced
   Some of the mathematics faculty are at the stage where primary research has a particularly heavy emphasis. Others focus more of their energies on teaching a wider range of classes. This variety of individual emphases has complemented each other, resulting in a program that offers a wide array of quality classes while maintaining professional activity. Over the last five years, the Discipline has
produced five professional publications (with another in preparation), twenty-two presentations, and nine successful external grant applications.

2. **Course Offerings and Pedagogies are Current.**
The specialties of the mathematics faculty are fairly broad and includes a good mix of pure and applied mathematics. As a result, the program is able to offer an appropriate variety of courses without depending upon a specific individual to teach a particular course. Having different individuals teaching the same class has a cross-pollinating benefit; by sharing their experiences and innovations, multiple instructors can learn how to be more effective teachers. As a result of this, as well as individual study and initiative, the members of mathematics faculty maintain a comprehensive understanding of entire program while keeping course content current and pedagogical methods up-to-date.

3. **The Program Provides Students with Research Experiences.**
Given the fierce competition to recruit talented students, it is becoming increasingly necessary for the College to be able to provide meaningful experiences outside the classroom. One important such experience is the student/faculty research project. The St. Norbert College mathematics program has a long and successful history of helping students identify appropriate research topics and mentoring them as they discover solutions. These projects have borne fruit in the form of student presentations at conferences as well as some publications in national undergraduate or professional journals.

4. **The Mathematics Program is Recognized Regionally and Nationally.**
St. Norbert College’s mathematics program is well-known regionally and nationally. Several of the mathematics faculty have held leadership positions in professional organizations. They have spoken or participated in panels at conferences, sometimes by invitation. The fact that the mathematics faculty have received national grants is additional evidence of the recognition of the College and its mathematics program. Furthermore, by presenting their work at professional and undergraduate meetings, our students serve as living examples of the program’s effectiveness.

**Recommendation:** Develop a specific plan for reducing the reliance on adjuncts and for hiring more faculty with terminal degrees.

**Update:**
To reduce the reliance on adjuncts, the Mathematics Discipline requested and was granted an additional tenure-track position. At the present time, we have seven full-time faculty members in the fall semester and six full-time faculty members in the spring semester since one of our faculty members is on phased retirement. With this additional faculty member, we have significantly reduced our dependence on adjuncts. We thought we were fully staffed for the fall semester, but during summer orientation two sections of MATH 102 were added based on the large number of low grades earned by incoming first year students on the Mathematics Placement Exam. These two sections are being taught by an adjunct.

**Recommendation:** In order to better analyze SOOTs data, General Education data needs to be separated from data on math majors.

**Update:**
The Mathematics Discipline did separate SOOT data from service and general education courses from those from major courses. See Section V A. for the findings.
Recommendation: Address the dissatisfactions expressed in the Student Surveys.
Update: See Section III.C. for an update.

Recommendation: Implement a fully integrated Assessment plan.
Update: The Discipline has revised the in-house portion of its Assessment Plan. See Section III.B. for the most recent results.

Recommendation: Work with the Teacher Education program to strengthen the Middle School math curriculum.
Update: Members of the Mathematics Discipline have worked over the past six years to strengthen the Middle School Math Certification Minor. This minor presently consists of three mathematics courses, one statistics course, one computer science course, and one applied course such as economics, physics, etc. The students who declare this minor think they have a mathematics minor when, in fact, only three of the courses have the MATH designation with only one of these above an elementary level. The Mathematics Discipline is concerned about the reputation of both the Mathematics Discipline and that of the College when students represent themselves as “mathematics specialists” when, in fact, they have taken no MATH-designated course beyond an elementary level except Calculus.

After investigating what courses are part of such a minor at other institutions, we found our impressions to be correct, that other institutions demand more mathematics of any elementary education major specializing in mathematics.

After a lengthy discussion in May 2006 with two members of the Teacher Education Discipline, including the Director, our recommendation for the Mathematics Certification Minor was sent to the Teacher Education Discipline in August 2006. It consisted of:

MATH 131 Calculus and Analytic Geometry I
MATH 250 Advanced Foundations of Mathematics
MATH 350 Modern Geometry
SSCI 224 Basic Statistics

Two of the following:
MATH 132 Calculus and Analytic Geometry II
MATH 212 Mathematical Applications for Upper Elementary or Middle School Teachers
MATH 243 Multicultural Mathematics

This recommendation was met with strong opposition and rejected.

Back to the drawing board…

Attempting to find a compromise between rigor and courses the Teacher Education faculty thought their majors could handle, one member of the Mathematics Discipline has worked
extensively with a member of the Teacher Education Discipline to strengthen the Middle School Mathematics certification minor.

For the stronger mathematics students in Elementary Education, we actively encourage them to earn the Mathematics Teaching Minor which enables them to teach mathematics through Algebra I. This minor consists of five mathematics courses (MATH 131 and 132, Calculus and Analytic Geometry I and II, MATH 250, Advanced Foundations of Mathematics, MATH 306, Abstract Algebra, and MATH 321, Probability and Statistics or MATH 350, Modern Geometry) and one computer science course (CSCI 110, Introduction to Computer Programming).

For those interested in focusing on mathematics in upper elementary or lower middle school grades, we propose the Mathematics Certification Minor to change from the above mentioned to the following:

- MATH 123 a Liberal Arts Mathematics course to be proposed
- MATH 131 Calculus
- MATH 212 Applications of Mathematics
- MATH 220 Principles of Geometry
- SSCI 224 or BUAD 284 Statistics
- CSCI 110 Introduction to Computer Programming or CSCI 150 Applications of Discrete Structures.

As previously mentioned, this has been discussed with one member of the teacher education discipline, and the belief is that it has been discussed by the teacher education faculty, but the Mathematics Discipline has yet to meet with the entire Teacher Education Discipline about this proposal.
Appendix 1

Mathematics Assessment Plan
Revised March 29, 2000

I. Mission and Goals of St. Norbert College

A. As a Catholic liberal arts college in the Norbertine tradition, the mission of St. Norbert College is to provide a superior education that is personally, intellectually, and spiritually challenging. Respected for academic quality, the St. Norbert community is recognized for sustaining an environment that encourages students of all religions to develop their full potential in understanding and serving their world. (The Mission Statement)

B. In the intellectual realm, it is the goal of the College to make the students self-educating people. It seeks to develop in students the ability to synthesize knowledge from various sources, and to train students in methods of scholarly inquiry. (from The Goals and Objectives of St. Norbert College)

C. St. Norbert College's writing-across-the-curriculum is grounded in the belief that writing facilitates effective learning. Since writing is essential to learning in the classroom and to communicating in the world at large, students need to master their writing skills and take responsibility for their written work. (St. Norbert College Writing Across the Curriculum Program)

II. Goals of the Mathematics Major

To help the student achieve the goals of the College, the primary goals of the mathematics major are:
1. To provide students with a solid foundation in the methodology and applications of mathematics, and
2. To train professional mathematicians for graduate school, teaching, or other careers.

III. Outcomes of the Mathematics Major Program

A. Each student should have a firm grounding in calculus, set theory, logic, and strategies of mathematical proof and problem solving.

B. Each student should have a working knowledge of at least five of the following mathematical areas: linear algebra, abstract algebra, differential equations, numerical analysis, operations research, probability and
statistics, modern geometry, real analysis, complex analysis. The precise combination of areas will depend on the student's particular interests and career objectives.

C. Each student should understand the connections and the differences between pure and applied mathematics. Students should be able to reason rigorously in mathematical arguments, and students should be able to use mathematical models and algorithms to solve problems.

D. Each student should master the language, symbology, and form used in mathematical proof, and develop the ability to communicate mathematics clearly.

E. Each student should develop the ability to use technology to reason numerically, symbolically, graphically, and verbally. Students should be able to write computer programs or use appropriate software to solve mathematical problems.

F. Each student should develop the ability to be a self-learner in mathematics in order to maximize the student's future success as a professional mathematician, an actuary, a high school teacher, a computer scientist, etc.

IV. Means of Assessment

A. Portfolio
The discipline plans to maintain a portfolio for each major. This portfolio will contain samples of the student's mathematical work over the course of several years, beginning with Mt 250, Advanced Foundations of Mathematics. Items in the portfolio will be selected by members of the mathematics discipline. The objective of this means of assessment is to measure whether students are developing sophistication, rigor, and precision in mathematical knowledge, technique, and communication as they progress through the program. Members of the mathematics discipline will meet at appropriate intervals to evaluate the contents of portfolios and to draw conclusions regarding the success of the mathematics program in this regard.

B. Comprehensive Examination
The mathematics discipline will administer a comprehensive examination near the end of each student's senior year to test the student's acquisition of mathematical knowledge. Constructed in-house, this examination would consist of two parts. The first part would have approximately 10-15 items from the calculus sequence (Mt 131, Mt 132, and Mt 233) and from the Advanced Foundations of Mathematics course (Mt 250). The second part would contain questions from each of the nine 300-level courses regularly
offered in the program. The student would be expected to answer questions from three of these advanced classes. The student will choose the classes from which to answer questions, but at least one of the classes must be from among Mt 303, Mt 306, Mt 350, Mt 355, Mt 373, and Mt 376. The students would take the exam to satisfy a new required zero-credit course. After the administration of each exam, the discipline will meet to discuss the results and to draw inferences regarding the program.

C. Alumni Data
Alumni data will be used to track the careers and satisfaction of graduates. Two years after graduation, majors will be surveyed to determine their level of satisfaction with the mathematics program. The mathematics discipline expects that at least \( \left( \frac{100e}{\pi} \right) \% \approx 86.525598\% \) of those surveyed will indicate that they are at least "satisfied" with the program. (After a few years of evaluating data, the discipline may revise the target number.)

V. Costs of Assessment
The discipline does not know the exact cost of assessment. Most of the cost would be in terms of labor, rather than dollars. It will take time for the discipline to institute the portfolio system and to implement the comprehensive examination in the newly required course.
## Appendix 2

### Current Student Surveys

#### MATHEMATICS PROGRAM

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| Total Number of Students | N=36 | N=33 | N=38 | N=32 | N=16 | N=28 | N=23 | N=983 |
Appendix 3
Current Student Survey, 2008, Alumni Portion

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| 2) Quality of Curriculum   | Very satisfied:               | 50% | 38% | 25% | 48% |
|                            | Satisfied:                    | 25% | 56% | 75% | 50% |
|                            | Dissatisfied:                 | 25% | 6%  | 0%  | 2%  |
|                            | Very dissatisfied:            | 0%  | 0%  | 0%  | 0%  |
|                            | Uncertain:                    | 0%  | 0%  | 0%  | 0%  |

| 3) Range of Courses Offered| Very satisfied:               | 50% | 18% | 50% | 30% |
|                            | Satisfied:                    | 25% | 62% | 50% | 61% |
|                            | Dissatisfied:                 | 25% | 18% | 0%  | 9%  |
|                            | Very dissatisfied:            | 0%  | 2%  | 0%  | 1%  |
|                            | Uncertain:                    | 0%  | 0%  | 0%  | 0%  |

| 4) Quality of Course Content| Very satisfied:               | 50% | 36% | 75% | 51% |
|                            | Satisfied:                    | 25% | 57% | 25% | 48% |
|                            | Dissatisfied:                 | 25% | 6%  | 0%  | 1%  |
|                            | Very dissatisfied:            | 0%  | 1%  | 0%  | 1%  |
|                            | Uncertain:                    | 0%  | 0%  | 0%  | 0%  |

| 5) Quality of Advisement   | Very satisfied:               | 75% | 47% | 100% | 49% |
|                            | Satisfied:                    | 25% | 41% | 0%   | 41% |
|                            | Dissatisfied:                 | 0%  | 10% | 0%   | 6%  |
|                            | Very dissatisfied:            | 0%  | 2%  | 0%   | 4%  |
|                            | Uncertain:                    | 0%  | 0%  | 0%   | 0%  |

| 6) Career Preparation      | Current Job Preparation       |
|                            | Very satisfied:               | 25% | 26% | 25% | 38% |
|                            | Satisfied:                    | 75% | 52% | 75% | 51% |
|                            | Dissatisfied:                 | 0%  | 15% | 0%  | 9%  |
|                            | Very dissatisfied:            | 0%  | 5%  | 0%  | 3%  |
|                            | Uncertain:                    | 0%  | 0%  | 0%  | 0%  |

<p>| 7) Graduate School Preparation | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th>Very satisfied:</th>
<th>Satisfied:</th>
<th>Dissatisfied:</th>
<th>Very dissatisfied:</th>
<th>Uncertain:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0%</td>
<td>26%</td>
<td>25%</td>
<td>35%</td>
<td>0%</td>
</tr>
<tr>
<td>8) Overall Major Program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td>39%</td>
<td>25%</td>
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<td>1%</td>
<td>0%</td>
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<td>0%</td>
</tr>
<tr>
<td>9) Acquire Depth of Knowledge in Major Field</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25%</td>
<td>37%</td>
<td>25%</td>
<td>40%</td>
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<td>6%</td>
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<tr>
<td></td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Total Number of Students</td>
<td>N = 4</td>
<td>N = 249</td>
<td>N = 4</td>
<td>N = 131</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 4
Comparison of Mathematics and College SOOT Averages
For each question, the second line indicates College averages.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Agg. Mean</th>
<th>Diff</th>
<th>Fall Mean</th>
<th>Diff</th>
<th>Spring Mean</th>
<th>Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Objectives</td>
<td>3.33</td>
<td>-0.14</td>
<td>3.28</td>
<td>-0.18</td>
<td>3.46</td>
<td>-0.01</td>
</tr>
<tr>
<td>2) Enthusiasm</td>
<td>3.51</td>
<td>-0.18</td>
<td>3.46</td>
<td>-0.22</td>
<td>3.65</td>
<td>-0.04</td>
</tr>
<tr>
<td>3) Instructor-Prepared</td>
<td>3.45</td>
<td>-0.07</td>
<td>3.41</td>
<td>-0.12</td>
<td>3.58</td>
<td>0.05</td>
</tr>
<tr>
<td>4) Student-Prepared</td>
<td>3.18</td>
<td>-0.08</td>
<td>3.17</td>
<td>-0.08</td>
<td>3.21</td>
<td>-0.07</td>
</tr>
<tr>
<td>5) Clarity</td>
<td>3.01</td>
<td>-0.33</td>
<td>2.92</td>
<td>-0.42</td>
<td>3.29</td>
<td>-0.08</td>
</tr>
<tr>
<td>6) Questions</td>
<td>3.19</td>
<td>-0.20</td>
<td>3.11</td>
<td>-0.26</td>
<td>3.39</td>
<td>-0.02</td>
</tr>
<tr>
<td>7) Student Interest</td>
<td>2.63</td>
<td>-0.63</td>
<td>2.52</td>
<td>-0.71</td>
<td>2.92</td>
<td>-0.37</td>
</tr>
<tr>
<td>8) Climate</td>
<td>3.34</td>
<td>-0.18</td>
<td>3.28</td>
<td>-0.22</td>
<td>3.50</td>
<td>-0.04</td>
</tr>
<tr>
<td>9) Respect</td>
<td>3.51</td>
<td>-0.12</td>
<td>3.48</td>
<td>-0.14</td>
<td>3.57</td>
<td>-0.05</td>
</tr>
<tr>
<td>10) Participation</td>
<td>3.04</td>
<td>-0.17</td>
<td>3.01</td>
<td>-0.20</td>
<td>3.12</td>
<td>-0.10</td>
</tr>
<tr>
<td>11) Evaluation</td>
<td>3.33</td>
<td>-0.05</td>
<td>3.29</td>
<td>-0.08</td>
<td>3.45</td>
<td>0.06</td>
</tr>
<tr>
<td>12) Consistency</td>
<td>3.39</td>
<td>-0.03</td>
<td>3.36</td>
<td>-0.06</td>
<td>3.49</td>
<td>0.06</td>
</tr>
<tr>
<td>13) Challenge</td>
<td>3.34</td>
<td>-0.12</td>
<td>3.30</td>
<td>-0.14</td>
<td>3.43</td>
<td>-0.03</td>
</tr>
<tr>
<td>14) Student Part</td>
<td>3.17</td>
<td>-0.12</td>
<td>3.16</td>
<td>-0.14</td>
<td>3.22</td>
<td>-0.08</td>
</tr>
<tr>
<td>15) Availability</td>
<td>3.43</td>
<td>-0.05</td>
<td>3.39</td>
<td>-0.09</td>
<td>3.54</td>
<td>0.06</td>
</tr>
<tr>
<td>16) Understanding</td>
<td>3.14</td>
<td>-0.30</td>
<td>3.07</td>
<td>-0.37</td>
<td>3.33</td>
<td>-0.12</td>
</tr>
<tr>
<td>17) Resources</td>
<td>3.21</td>
<td>-0.03</td>
<td>3.20</td>
<td>-0.06</td>
<td>3.23</td>
<td>0.01</td>
</tr>
<tr>
<td>18) Workload</td>
<td>2.09</td>
<td>0.02</td>
<td>2.10</td>
<td>0.03</td>
<td>2.07</td>
<td>0.00</td>
</tr>
<tr>
<td>19) Course Overall</td>
<td>3.53</td>
<td>-0.42</td>
<td>3.42</td>
<td>-0.52</td>
<td>3.83</td>
<td>-0.14</td>
</tr>
<tr>
<td>20) Instructor Overall</td>
<td>3.77</td>
<td>-0.39</td>
<td>3.63</td>
<td>-0.50</td>
<td>4.13</td>
<td>-0.05</td>
</tr>
<tr>
<td>21) Student Overall</td>
<td>3.54</td>
<td>-0.29</td>
<td>3.50</td>
<td>-0.31</td>
<td>3.64</td>
<td>-0.20</td>
</tr>
<tr>
<td>Avg. Class Size</td>
<td>Aggregate</td>
<td>2071</td>
<td>1670</td>
<td>5.6</td>
<td>49.0</td>
<td>32.4</td>
</tr>
<tr>
<td>Fall Semesters</td>
<td>1525</td>
<td>1226</td>
<td>5.7</td>
<td>53.5</td>
<td>28.2</td>
<td>5.6</td>
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<tr>
<td>Spring Semesters</td>
<td>546</td>
<td>444</td>
<td>5.3</td>
<td>36.6</td>
<td>44.0</td>
<td>8.7</td>
</tr>
</tbody>
</table>
Name: Bernadette Anne Berken

Spouse's Name: Anthony

Date of Birth: 1/13/47

Date of Appointment to St. Norbert College Faculty: 8/27/82

Current Rank and Date Received: Assistant Professor of Natural Science, 5/14/96

Tenure Date: 8/27/90

Educational Background (include other postgraduate study):
University of Wisconsin-Milwaukee, M.S. Curriculum and Instruction, 1971.
National Computer Educators Institute, Central State University, Oklahoma, Advanced Pascal And Data Structures, summer, 1985.
Audited courses in FORTRAN and CS110 at St. Norbert College, 1984.
University of Wisconsin-Oshkosh, Mathematics, summer, 1974.

Teaching Experience (schools and dates of appointments):
St. Norbert College, De Pere, WI, 1982-Present.

Other Employment (including dates):
Writer and book reviewer for Dr. Mungo Miller, a Milwaukee psychologist, summer, 1970.
University of Wisconsin-Green Bay, Green Bay, WI, teaching assistant and research assistant in the Chemistry Department, 1965-1967.
Publications: (*Means peer-reviewed or invited; **means editor-reviewed)


Hmong Textiles: Mathematics in the Cloth: A 90-minute instructional television program. CESA-7 Instructional Learning Services, Green Bay, WI, May, 2000.*


Revised February, 2006

**Professional Presentations: (*Means peer-reviewed or invited)**


“Developing the Text and Labels for the Exhibit *Culture Counts: People, Patterns, and Pi (π)* In English, Spanish, and Hmong,” Student and Faculty/Staff Collaborations Day of Celebration, March 23, 2004.


“Got math!” Division of Natural Sciences Fall Research Symposium November 22, 2003.


“Learning Mathematics at the Museum,” Wisconsin Section of the Mathematical Association of America, April, 2002.


“Culture Counts: People, Patterns, and Pi (π)”: Presentation to the Neville Public Museum Corporation Board of Directors, November 21, 2000.

Revised February, 2006
“Hmong Textiles and Mathematics,” Guest presentation in two pre-service education classes at the University of Wisconsin-Oshkosh, April, 2000.
"Activities and Technology for College Algebra," Wisconsin Section of the MAA, April 12, 1997.
"Math Activities that Promote the NCTM Math Standards," Green Bay Diocese Total Education Congress, October 18, 1996.
"Symmetry and Mathematics of Strip Patterns," Green Bay Diocese Total Education Congress, October 18, 1996.
"Math Olympics" in conjunction with the "Take our Daughters to Work Day," April 25, 1996.
"Mathematical Patterns All Around Us," Total Catholic Education Congress, October 15, 1993.
"Diversity in the Curriculum," Lilly Grant SNC Faculty Retreat, May, 1992.


Wisconsin Department of Public Instruction Statewide Precollege Conference Panel Participant, November 29, 1990.*

Wisconsin Department of Public Instruction Statewide Precollege Conference, Presentation: "Resources for a Summer Enrichment Program: People and Dollars," November 29, 1990.*


Workshop Leader-Statistics, Wisconsin Mathematics Council, Fall, 1987.*

**Grant History (including unfunded proposals):**

U.S. Department of Agriculture: National Resources Conservation Service through Earth Team for student bus transportation for 4 field trips to local watersheds for data collection for Math/Biology pilot course, Fall, 2005.

ESEA Title II Higher Education Grant Program, Continuation Grant $17,644, 2004-2005.

ESEA Title II Higher Education Grant Program, $81,795, unfunded, 2003.

ESEA Title II Higher Education Grant Program, Continuation Grant $32,644, 2003-2004.


The Isidore and Carol Kwaterski Family Foundation, $5000, 2002.

SUMMS: Strengthening Under-represented Minorities in Mathematics and Science Grant, In review, Part of a $2.3 grant request, 2002.

Collaborative Grant between the Natural Science Division and the Education Division under the Federal Set-Asides Program, $400,000, 2002.

Clare Booth Luce Foundation Grant, $100,000, 2001-2002.

Sabbatical Grant: Ethnomathematics, Spring, 2000.

Wisconsin Humanities Council Grant, $9972, unfunded, 2000.

Augustine Stewardship Fund, $7353, 2000, unfunded.

Faculty Development Summer Grant, $1750, 1999.


National Science Foundation; $208,164, 1998, preliminary proposal accepted.

National Science Foundation: preproposal, $453,300, 1997, unfunded.

WFIC Grant to Annenberg Foundation: $3,759, 1996.


Lilly Grant/SNC: Curriculum Development Grant, $2,000, 1993.

*Revised February, 2006*
Augustine Stewardship Program, $10,000, 1989; $10,000, 1990; $5,000, 1991; $5,000, 1992; $5,000, 1993.
Dr. Scholl's Foundation, $10,000, 1990-1991.
State of Wisconsin-Precollege Minority Scholarship Program, $12,674, 1989; $2,210, 1990; $1,800, 1991; $6,000, 1992; $11,000, 1993: $2,000, 1994; $2,000, 1995; $2,000, 1996.
IBM Corporation, hardware, software, personnel contribution, estimated value in excess of $11,000, 1990; $11,000, 1991; $11,000, 1992; $5,000, 1993; $5,000, 1994.
Faculty Development Fund Grant to attend Special AISES Meeting of CEP Directors, Washington, D.C., November, 1992.
Oneida Tribe of Wisconsin, $250, 1989; $2,000, 1990.
NSF Young Scholars Program Grant Proposal, 1990, unfunded.
NSF Summer Science Camps Program of Human Resources Division Grant Proposal, 1992, unfunded.
NSF Summer Science Camps Program of Human Resources Division, Grant Proposal, Submitted November 30, 1992, unfunded.

Memberships in Professional Associations; offices held and recent meetings attended (with years):
Wisconsin Mathematics Council, 1990-Present.
Charter Member, Pi Mu Epsilon, 1985-Present.
Mathematical Association of America, 1982-Present.
International Study Group on Ethnomathematics, 1995-Present.
Regularly attend regional meetings of the Mathematical Association of America, 1982-Present.
Project Einstein, 1990-Present; Chairperson for Evaluation Committee; Member of Board of Directors, 1991-2004.
Executive Board of the Wisconsin Section of MAA, 1989-1991.

Revised February, 2006
Committee Service at St. Norbert College (with years):
Service Learning Advisory Committee, 2005-present
Faculty Development Committee, 2004-present
JMS Building Renovation Summer Committee, 2005
Mission and Heritage Advisory Council, 2004-2005
Faculty Advisory Council, 2002-2004.
Natural Science Divisional Chair Search Committee, Co-Chair, 2001.
Curriculum and Educational Policy Committee, 1997-1999.
Awards Banquet Sub-Committee, 1999.
Ad hoc Committee on OARS Survey, 1998.
Faculty Advisory Council, Chair-person, 1997.
Ad Hoc Committee on Gender Equity at SNC, Co-chair, 1996-1998.
Faculty Development Committee, 1992-1995.

Other Service to the College (administrative, advisor to student organization, etc.):
Search Committee, Mathematics Position, 2005-2006
Assessment Reporter/Liaison for Mathematics Discipline, 2004-present
General Education Workshop Participant, spring, 2002.
Participant in SNC Math/Science Content Meeting, May 14, 2002
Search Committee, Co-Chair: Natural Science Division Chairperson, 2001-2002.

Revised February, 2006
TI Graphing Calculator Workshop Presentations for new tutors and teaching assistants, numerous times, 1994-present.
Search committee for Information Systems Position for the Business Administration discipline, Fall, 1996.
Search Committee: Director of Professional Continuing Education and Services, 1996.
“Take our Daughters to Work Day”, St. Norbert College, April, 1996.
Admission's Phon-A-Thon and calling efforts, each year as needed.
New faculty mentor, 1994-1996.
Interview member for several candidates for math/science education position, 1993.
Initial facilitator to get Topical Discussion Group on Cultural Diversity going in October, 1993. (Group Member)
Facilitator, College Community Conference, August 27, 1993.

Professional Activities in the Local/National Community (with years):
Guest Curator, Culture Counts: People, Patterns, and Pi ($\pi$), Neville Public Museum of Brown County, 2000-2004.
ESEA Title II Higher Education Grant Review Panel, December 6-7, 2002.
“Mathematical Sculpting With Bagels” Workshop, St. Norbert College, November 1, 2002.
Einstein Project EPEAC Meeting, October 24, 2002.
Gallery Tour Leader: Culture Counts: People, Patterns, and Pi ($\pi$), Neville Public Museum, October 3, 2002.
Math and Science Camp for Teachers, Co-Facilitator, July, 2002.

“Story Dance, Talking Cloth,” Learning in Retirement Series, Neville Public Museum, March 21,

Revised February, 2006


*A Study of Malaria and Sickle Cell Anemia* Review, Sandefur and Dance, 1997-98.

CORE Committee: Renew 2000, for St. Elizabeth Seton Parish, 1998-present.


Mathematics Review Panel for the National Science Foundation's Young Scholars Program, 1994.


**Awards and Honors (with years):**

Bishop Robert F. Morneau Community Service Award, 2005

SNC Educator of the Year Award, 2003-2004.

Einstein Project Appreciation Award, 2003.


Certificate of Excellence, CESA 7 Interactive Learning Services, May 30, 2002


Sabbatical Award, spring, 2000.

Student-Faculty Development Endowment Grant with Lee Kong, $1000, 2000-2001.

Nominated for the Ernest A. Lynton Award for Faculty Professional Service and Academic Outreach, 1999.

Student Faculty Development Summer Grant, summer, 1996, 1999.

Student-Faculty Development Endowment Award, 1995.

Distinguished Service Award from the Wisconsin Section of the Mathematical Association of America, 1994.

Appreciation Award from the American Indian Science and Engineering Society, 1992.

Teaching Assistant of the Year, 1972.

Commended by the University of Wisconsin Chemistry Department for excellence as a teaching assistant, 1971-1972.


Phi Kappa Phi, 1969.

Mortar Board National Honor Society for Women, 1969.

Graduated from college with "Distinction in Major," 1969.

Revised February, 2006
Received various scholarships and awards during college including Scholarships, Inc., Knapp Scholar, Leadership Award, and the Leadership Service Award.

**Special Competencies/Professional Licenses/Certifications/Registrations:**
Certification in chemistry, physical science, and mathematics, grades 7-12.
Certification in vocational and adult education: various math and science courses.

**Participation in the Intellectual Life of the College (workshops, discussion groups, colloquia, speakers programs, fine arts programs):**
Study Group on Vocation, 2005-present.
Panel Discussant: The Role of Mathematics in the Liberal Arts Curriculum, Faculty Development Conference, January, 2002
St. Norbert College Faculty-Staff Showcase, May 3, 1999.
Regular Participant in faculty book discussion groups.

**Courses Taught on Regular Basis:**
Mt 114, Mt 124, Mt HO2, Mt 243, Mt 115

**New Courses Developed:**
Developed and piloted an interdisciplinary Math/Biology course with Deborah Anderson, Fall, 2005.
Mt 243: Multicultural Mathematical Ideas
Ed 589: Understanding and Learning Mathematics by Embracing Diversity
Ed 589: Curriculum Development: Interdisciplinary Multicultural Mathematics

**Administrative Activities:**
Project Director, Understanding and Learning Mathematics by Embracing Diversity, 2002-present.
Project Director, Mathematics Achievement and Performance in Science (MAPS) for Native American Young Scholars Project, 1994-1997.

**Revised February, 2006**
Project Coordinator, M³ Summer Science Camp, 1994.
Christina C. Carroll

409 Main Ave. Apt. U
De Pere, WI 54115
(920) 530-9701

Education

○ Georgia Institute of Technology: Atlanta, GA
  Graduate Minor: Theoretical Computer Science
  Thesis Title: Enumerable Combinatorics of Posets

○ University of Nebraska: Lincoln, NE
  M.S. in Mathematics: May 2002.

○ Kenyon College: Gambier, OH
  B.A. magna cum laude with high honors in Mathematics: May 1998.

Employment

○ St. Norbert College
  · Assistant Professor of Mathematics, Spring 2009-Current

○ Georgia Institute of Technology
  · Lead Instructor, Research Assistant, Recitation Instructor

○ University of Nebraska-Lincoln
  · Interim Lecturer for Graduate/Undergrad Graph Theory
  · Lead Teaching Assistant (supervisory role)
  · Lead Instructor, Recitation Leader

○ R.R. Bowker, New Providence NJ
  · Data Analyst, Electronic Data Interchange Department, 1999-2000

○ Kenyon College, Gambier Ohio
  · TA and Lab Assistant, 4 semesters

Papers

○ Teena Carroll, G.O.H Katona; Bounds on Maximal Families of Sets Not Containing Three Sets with \( A \cap B \subset C, A \not\subset B \).

○ Teena Carroll, David Galvin, Prasad Tetali; Matchings and Independent Sets of a Fixed Size in Regular Graphs.

Honors

○ Project NeXT Fellow, Mathematical Association of America, 2009

○ CETL/BP Outstanding Teaching Assistant Award, Georgia Inst. of Tech. 2007
  Each department nominates one candidate for campus wide competition.

○ NSF VIGRE Graduate Trainee, Georgia Inst. of Tech., 2002
  A five year fellowship including travel funds and research support.

○ The Outstanding First Year Graduate Student Award, University of Nebraska-Lincoln, 2001

○ Othmer Fellow, University of Nebraska, 2000
  3 year fellowship, the highest award available in a university-wide competition.
Service

- **Textbook Selection Committee**, Georgia Tech Math Department, Fall 2007.
  I served on a committee to select a new textbook for the Linear and Discrete Mathematics course. We decided to work with Pearson Publishing to design a custom book for the course.

- **Graduate Student Representative**, Georgia Tech Math Department, 2005-06.
  This is an elected position to the graduate committee which makes decisions and policy regarding all aspects of graduate student careers in the department.

- **Graduate Women’s Council**, Georgia Tech Women’s Resource Center
  This group works with the Director of the Women’s Resource Center to enhance and improve the experience of female graduate students on campus, as well as retention and recruitment.

- **Organizing Committee Member** Nebraska Undergraduate Women’s Conference, 2002
  This unique conference attracts several hundred undergraduate women to network, present, and learn mathematics.

- **Leader for Graduate Student Teaching Orientation** I was chosen to attend a workshop held by Solomon Friedberg, author of *Case studies for Today’s Classroom* on training Teaching Assistants in mathematics. I have run case study discussion sessions as part of the graduate teaching assistant orientation at Georgia Tech.

- **Focus Group Participant** Fall 2005
  I was part of a focus group held by Georgia Tech’s Center of Teaching and Learning (CETL) to evaluate departmental teacher training programs and to assess how CETL could best serve graduate teaching assistants.

- **Project Designer** University of Nebraska Spring 2001
  With another lecturer, I designed a “real world statistical” project for University of Nebraska-Lincoln’s writing based Contemporary Mathematics class. With the assistance of an engineer at the Dept. of Roads, we designed a traffic study to evaluate the safety of various intersections in Lincoln, NE. This project was assigned in all six sections of the course offered that semester, and remains in the project archive for continued use.

- **Panelist**
  - “Balancing Graduate Life;”
    GA Tech Math department International graduate student orientation, 2003-06
  - “Introducing Minority students to the Graduate School Experience;”
    GA Tech FOCUS program 2007
  - “What to Expect in your first semester as a Teaching Assistant;”
    GA Tech Math department TA training Seminar 2003-06.

Undergraduate Programs

- **1997; Kenyon College Summer Science Scholars**
  Kenyon College, Gambier, OH. Researched the dynamics of Newton’s method and higher-order iterative root finding methods. Presented results in a poster session.

- **1996; Summer Mathematics Program for Women**
  Carleton and St. Olaf Colleges, Northfield, MN One of twenty undergraduate women chosen from a national applicant pool, I spent a month at Carleton studying coding theory and functional analysis.
Selected Travel

2009, Faculty Development Grant Awarded to attend the 22nd annual Cumberland conference on Combinatorics, Graph Theory and Computing, Bowling Green, KY.

2008 and 2009, SMPosium, Northfield MN
A conference designed to enrich recent female PhD recipients and provide mentoring to current participants in the Carleton Summer Math Program (SMP) for Women in Mathematics.

2006, EMS Summer School; Horizons of Combinatorics, Renyi Institute, Budapest Hungary
A week of graduate student summer school featuring lectures by internationally renowned Combinatorialists, followed by a week long conference.

2006, Microsoft Theory Group, Redmond, WA
A week-long invited visit for collaboration with researchers in residence.

2005, Markov Chains in Algorithms and Statistical Physics, MSRI Berkeley, CA
One week of lectures focused on Markov Chains and their applications.

2005, DIMACS/RENYI Working Group on Extremal Combinatorics, Charles University, Prague, Czech Republic
A weekend focused on problems in Extremal Combinatorics.

2003, Combinatorics, Probability and Algorithms Workshop Centre de Recherches Mathematiques, Montreal Canada
A three week concentration period with mini-courses in six topics including Markov chains and threshold phenomenons.

2003, IMA Combinatorics and its Applications Workshop
Georgia Institute of Technology, Atlanta, GA
A three-week long Graduate Summer School Program focusing on posets, extremal graph theory, discrete algorithms, and probabilistic methods.

2001; Rocky Mountain Math Consortium
University of Wyoming, Laramie, WY
Two weeks of intensive classes and conference focused on Matrix Analysis.

2000; Rocky Mountain Math Consortium
University of Wyoming, Laramie, WY
Two weeks of intensive classes and conference focused on Probabalistic Combinatorics.

Talks Given

Bounding the size of Induced V-free Boolean families
Contributed talk given at Cumberland conference on Combinatorics, Graph Theory and Computing, Bowling Green, KY, May 2009

Counting things that are ‘Hard to Count’
A talk given at SMPosium to a mixed audience of undergraduate women and math PhDs

Enumerating Fruit Salads

Graph Entropy and the Laminar Decomposition of Kahn and Kim
A two talk sequence given as part of Georgia Tech’s Graph Theory seminar

Maximum independent sets of axis aligned rectangles
Georgia Tech, A survey talk on known results, Fall 2005

A combinatorial proof for a continuous probabilistic property
Presented at the Ohio MAA sectional meeting, 1997
Grant Writing  ○  NSF Grant #DMS-0701043
Under the direction of my advisor, I wrote the student research section of the grant; funded by NSF in 2006.
Faculty Information

John A. Frohliger
1861 Shelley Lane
De Pere, WI 54115
(414) 336-3756

Personal Information
Birthdate: March 2, 1954
Birthplace: Indianapolis, Indiana
Spouse: Cheryl
Children: 2

Education
B.A. Indiana University  May, 1976  Mathematics and Physics
M.S. Purdue University  Dec, 1978  Mathematics
Ph.D. Purdue University  Aug, 1983  Mathematics

Dissertation
"Maximal Homotopy Lie Subgroups of Maximal Rank"

Major Professor: Reinhard Schultz

Academic Interests
General Topology
Algebraic Topology

Rank and Date Received
Assistant Professor, August, 1983
Associate Professor, August, 1991

Administrative Position
Associate Dean, Natural Science Division, St. Norbert College, 2002 - 2007
Teaching Experience

Undergraduate Teaching Assistant, Indiana University, 1975-6
Graduate Teaching Assistant, Purdue University, 1976-82
Lectured for courses ranging from pre-calculus through second-semester calculus
Conducted recitation classes
Participated in evaluation of incoming teaching assistants

St. Norbert College, 1983-present

Courses taught:
- Basic Algebra (MATH H02)
- Algebra and Finite Math (MATH 114)
- Pre-Calculus Mathematics (MATH 115)
- Survey of Calculus (MATH 124)
- Calculus and Analytic Geometry I (MATH 131)
- Calculus and Analytic Geometry II (MATH 132)
- Calculus and Analytic Geometry III (MATH 233)
- Advanced Foundations of Mathematics (MATH 250)
- Linear Algebra (MATH 303)
- Abstract Algebra (MATH 306)
- Differential Equations (MATH 310)
- Modern Geometry (MATH 350)
- Real Analysis (MATH 373)
- Complex Analysis (MATH 376)
- Topology (MATH 355)

Independent study courses directed:
- Algebra and Finite Math (MATH 114), Summer 1985
- Differential Equations (MATH 310), 1985, 1990
- Advanced Linear Algebra, 1987
- Fractal Geometry, 1992
- Complex Analysis (MATH 376), 1993
- Introduction to Algebraic Topology, 1994

Online courses taught:
- Pre-Calculus Mathematics (MATH 115)
  I generated all of the materials for this course.

Conventions and Workshops Attended

Mathematical Association of America (MAA) Wisconsin
- Fall Workshop, Madison, WI, 1983
- Annual Meeting of the American Mathematical Society (AMS),
  Louisville, KY, 1984
- Atlanta, GA, 1997
- San Antonio, TX, 1999 (joint AMS MAA meeting)
- San Antonio, TX, 2006 (joint AMS MAA meeting)
Annual Pi Mu Epsilon Conferences, held in conjunction with Annual Conferences on Math and Statistics, Oxford, OH, 1985, 1986
Short Course on Algorithms for Discrete Mathematics, Milwaukee, WI, 1986
Rose-Hulman Conference on Undergraduate Mathematics, Terre Haute, IN, 1993

Grants
National Science Foundation Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) Award No. 0630863: $500,000 grant for Natural Science PRIDE program to attract and retain mathematics or computer science majors. 2007-present

Talks
"Maximal Homotopy Lie Subgroups of Maximal Rank," 1984 Annual Meeting of the AMS
"Fractals," Regional Gathering of Mensa, 1990
“A Mathematical Walk through The Seventh Guest,” Spring Meeting of the Wisconsin Section of the Mathematical Association of America, 1999
“Finding the Odd Weight,” Spring Meeting of the Wisconsin Section of the Mathematical Association of America, 2001
“Finding the Odd Weight,” Madison Area Technical College (Math Club), November 19, 2001
“Worms, Blocks, and Harmony,” Madison Area Technical College (Math Club), October 2, 2003
Invited to participate in, “Undergraduate Research in Mathematics: All You Want to Know - a Panel Discussion,” Spring Meeting of the Wisconsin Section of the Mathematical Association of America, 2004
“Honey, Where Shall We Sit?” Madison Area Technical College (Math Club), January 19, 2005
“One Potato, Two Potatoes,” Madison Area Technical College (Math Club), March 10, 2006
Invited to participate in, “Advising Graduate Students and Senior Projects,” a panel discussion, Joint Mathematics Meetings, Washington, D.C., January 7, 2009
Papers
“Honey, Where Shall We Sit?” (Note with student coauthor Brian Hahn), Mathematics Magazine, Vol. 78, No. 5, December 2005

Study Guides
Student Study Guide for Algebra for College Students (with co-authors Bernadette Berken and Katherine Muhs), WCB, 1990
Student Study Guide for Intermediate Algebra (with co-authors Bernadette Berken and Katherine Muhs), WCB, 1990

Other Published Work
Problem 1452 (with co-author Adam Zeuske (student)), Problems Section of Mathematics Magazine, Vol. 67, No. 3, June 1994

Other Professional/Scholarly Work
Reviewed chapters of textbook, Visual Precalculus, for Houghton Mifflin, December, 1994
Reviewed chapters of textbook, Calculus and its Applications, for Houghton Mifflin, Summer, 1995
Program Chair of 1998 spring meeting of the Wisconsin Section of the MAA. (This was in conjunction with my position as Chair-Elect of the Section.)
Directed SNC Research Fellows project: The Mathematics behind Sudoku (and Other Games) with students Jonathan Daun and Stephanie Schauer, 2006-2008. (This work resulted in presentations at SNC’s Day of Celebration of Student & Faculty/Staff Collaboration in 2007, 2008.)
Served, with Su Doree of Augsburg College, as an outside evaluator for the Simpson College Mathematics Department’s program review, 2007.
Contributed a problem to the MAA-Wisconsin Section’s high school math contest, 2007.
Served on National Science Foundation panel that reviewed proposals for S-STEM grants, September 2008.

Memberships and Offices in Professional Societies
American Mathematical Society
Mathematical Association of America (MAA)
Offices in Wisconsin Section of the MAA
Member of Executive Board, 1987-91
Wisconsin coordinator of American High School Mathematics Examination (AHSME), 1987-92
Chair-Elect of Section, 1997-1998
Chair of Section, 1998-1999
Past Chair of Section, 1999-2000
Committee Service at St. Norbert College

Faculty Welcoming Committee, 1984-85
Student Life Committee, 1984-86
Faculty Grievance Committee, 1985-88, 1998-2001
Nomination and Election Committee, 1986-89 (Chair, 1987-88), 2009-present
Faculty Review Committee, 1989-92
Wellness Committee, 1989-90
Goals Impact Committee, 1989-90
Health Benefit Committee, 1990-92
College Community Relations Board, 1990-91, 95-97
Faculty Personnel Committee, 1992-95 (Chair, 1994-95)
Coordinating Committee (originally called the Fall Conference Planning Committee), 1994 - 95
Academic (Honor) Court, 1995-97, 2008-present
Academic Affairs Long Range Planning Task Force (Governance Team), 1995
Curriculum and Educational Policy Committee, 1997-1999
General Education and Honors Committee, Spring 2000-2007
Library Advisory Committee, 2002-2007

Other Collegial Activities

Participated in Science Day, 1992
Participated in Mentor Program, 1991-97
Faculty Presenter at SNC Faculty Development Conference, 1991
Task Force for Defining Scholarship at SNC, 1991
Math Discipline liaison with Education Discipline, 1993 - present
Beacon Article: "Pith Helmet Mathematics", 1994
Presenter in panel discussion for New Faculty Orientation Program, 1994
Discovery Day participant, 1993
Presented "Course 101" for Admissions Office (Friday Focus Program), 1994, 1995, 1996
Presentation for Fall Open House for Admissions Office, 1996, 1997
Natural Science Chair Search Committee, 1996-7
Physics Search Committee, 1998
Common Prayer Reflection (on science, math, and rainbows), December 3, 2003. The reflection was published in the Spring, 2005 edition of St. Norbert College Magazine
Participated in “What Does It All Add Up To?” math and computer science dinner sponsored by the Program of Faith, Learning and Vocation, November 13, 2007
Served as Faculty Mentor for Younis Zaiden, 2007-2008
Served as Faculty Mentor for Teena Carroll, 2008-present
Awards
Executive Board Service Award from Wisconsin Section of Mathematical Association of America, 1992
Leonard Ledvina Award for Excellence in Teaching, 1994

Miscellaneous
Member of Phi Beta Kappa
Member of Delta Epsilon Sigma
Charter Member of Delta Chapter of Pi Mu Epsilon (Honor society for students in mathematics)
Referee for Pi Mu Epsilon Journal, 1991-92
Member of Old St. Joseph Church Parish Council, 1984-85, 1998-present
Presented workshop, "Mathematics of Nines and Lines", for Wisconsin Center for Academically Talented Youth (WCATY), 1994
Presented workshop, "Mathematics of Points and Lines", for Wisconsin Center for Academically Talented Youth (WCATY), 1995
Editor of annual in-house The St. Norbert College Journal of Undergraduate Mathematics, 1994-present
In charge of gathering and collating data for GS8 assessment in Mt 114 and Mt 115, 2000-present
TERRY JO LEITERMAN
Assistant Professor of Mathematics

St. Norbert College
Mathematics, Department 24
100 Grant Street
DePere, WI 54115

Email: terryjo.leiterman@snc.edu
Phone: 920.403.2952
Fax: 920.403.4098

EDUCATION

Ph.D. in Mathematics, University of North Carolina, Chapel Hill, NC, August 2006
Thesis title: “Mixing properties of exact and asymptotic low Reynolds, time-varying solutions for spinning nano-rods and biological applications to ciliary function”
Advisors: Dr. Richard M. McLaughlin & Dr. Roberto Camassa
B.S. in Mathematics, University of Wisconsin, Oshkosh, WI, May 1999

HONORS

Project NExT Fellow, August 2006–Present
Selected as a national fellow for the professional development program supported by the Mathematical Association of America.

Nominated for The Educator of the Year Award, 2007, 2008, 2009
Recognized by one MATH 115 Pre-Calculus student (2007), three MATH 310 Differential Equations students (2008), and another MATH 310 student (2009) as a candidate for the annual SNC honor.

GRANTS AND SUPPORT

Alumni Support for Summer Research Program in Mathematics, May 2008–Present
Received over $40,000 in gifts and pledges to support summer research (stipends, housing, and travel) by undergraduates in mathematics at St. Norbert College.
SNC Instructional Support, September 2009
Received $400 to purchase project materials for MATH 313.

SNC Faculty Development Fund Award, August 2009
Received $550 for travel to the MathFest Meeting in Portland, OR to give a research presentation.

SNC Faculty Development Fund Award, January 2009
Received $500 for travel to the Joint Mathematical Meetings in Washington, DC to present research poster and judge undergraduate poster session.

National Science Foundation RUMC Grant, November 2007, November 2008, November 2009
Granted $2000 in 2007 and 2008 and $2250 in 2009 from the National Science Foundation to support the SNC Regional Pi Mu Epsilon conference. The 2007 and 2008 grants were co-directed with Dr. Rick Poss.

SNC Faculty Development Fund Award, April 2008
Received $350 for travel to the MAA WI Section Meeting in Madison, WI to give a research talk, a teaching talk, and attend two mentored student presentations.

SNC Faculty Development Fund Award, January 2007
Received $500 for travel to the Joint Mathematical Meetings in New Orleans, LA to present research poster, attend workshops, and judge undergraduate poster session.

SNC Instructional Support, September 2008
Received $1350 to purchase equipment for fluid mechanics laboratory lessons in MATH 310.

Fundamentals of Grant Seeking Workshop, St. Norbert College, Summer 2007
Attended SNC workshop co-directed by Jeremy Minor & Kelly Bahl-Stahl and received $200 in professional development funds.

Publications


**PRESENTATIONS**

**Mathfest**, Portland, OR, August 2009 (*General Contributed Paper*)

**MATC Math Club Lecture Series**, Madison, WI, February 2008 (*Invited*)
“How We Roll: The Theory and Construction of a Square Wheel Bicycle.”

**Young Mathematican’s Network Poster Session at the Joint Mathematics Meeting**, Washington, D.C., January 2008 (*Poster*)
“Modeling Diatom Growth in Trout Lake.”

**Mathfest**, Madison, WI, August 2008 (*Accepted in Special Session: “Projects and Demonstrations that Enhance a Differential Equations Course”*)
“Getting Your Hands Wet in a Differential Equations Course.”

**Mathfest**, Madison, WI, August 2008 (*General Contributed Paper*)
“The Ultimate Class Project . . . and No Grade!”

**Mathfest**, Madison, WI, August 2008 (*Exhibition Hall*)
“SNC Square Wheeled Bicycle”

**Mathematical Association of America Wisconsin Section Meeting**, Madison, WI, April 2008
“The Ultimate Class Project . . . and No Grade!”

**Mathematical Association of America Wisconsin Section Meeting**, Madison, WI, April 2008
“The Blakeslet Singularity.”

**Colloquium Lecture Series**, University of Wisconsin - Oshkosh, WI, November 2007 (*Invited*)
“Spinning Rods: Experiments and Theory.”

**Mathematical Association of America Wisconsin Section Meeting**, Eau Claire, WI, April 2007
“Singularity Theory for the Motion of a Slender Body in a Viscous Fluid.”

**Young Mathematican’s Network Poster Session at the Joint Mathematics Meeting**, New Orleans, LA, January 2007 (*Poster*)
“Spinning Rods: Experiments and Theory.”

**American Physical Society March Meeting**, Baltimore, MD, March 2006
“Experimental and theoretical studies of mixing and transport due to the motion of a slender body sweeping out a cone.”
Physical Mathematics Seminar, Massachusetts Institute of Technology, Cambridge, MA, March 2006
“Spinning Rods: Experiments and Theory.”

Association for Women in Mathematics Workshop at the Joint Mathematical Meetings, San Antonio, TX, January 2006 (Accepted Poster)
“Spinning Rods: Experiments and Theory.”

American Physical Society Division of Fluids Dynamics Annual Meeting, Chicago, IL, November 2005 (Gallery of Fluid Motion Poster)
“Fluid Phenomenon induced by Spinning Rods.”

Virtual Lung Meeting, University of North Carolina, Chapel Hill, NC, March 2005
“Tangential and normal stresses for spheres and spheroids under uniform translations and rotations.”

American Physical Society Division of Fluids Dynamics Annual Meeting, Seattle, WA, November 2004 (Gallery of Fluid Motion Poster)
“Micro-fluidic mixing: Experiments with spinning nano-rods and an exact 3D time-varying hydrodynamic solution.”

Southeastern Atlantic Mathematical Sciences Workshop, College of Charleston, Charleston, SC, September 2004
“An exact solution for the motion of a slender body sweeping a cone in a viscous fluid”

Virtual Lung Meeting, University of North Carolina, Chapel Hill, NC, September 2004
“An exact solution for the motion of a slender body sweeping a cone in a viscous fluid”

American Mathematical Society Sectional Meeting, University of North Carolina, Chapel Hill, NC, October 2003 (Poster)
“An adaptive fast solver for the modified Helmholtz equation in two dimensions”

Teaching Experience

Assistant Professor, Mathematics Discipline, St. Norbert College, DePere, WI, August 2006–present.

Courses Taught:

- Pre-Calculus Mathematics Fall 2006, Spring 2007, Spring 2008, Fall 2008, Fall 2009
- Calculus and Analytic Geometry I Fall 2006, Fall 2007
- Calculus and Analytic Geometry 2 Fall 2008, Spring 2009
- Numerical Analysis Spring 2007, Spring 2009
- Special Topics: Mathematical Modeling Fall 2007, Fall 2009
- Differential Equations Spring 2008, Spring 2009
- Complex Variables Fall 2008
- Independent Study (2): Math Ecology Fall 2008

Graduate Teaching Associate Orientation Leader, Center for Teaching and Learning, University of North Carolina, Chapel Hill, NC, Summer 2003 and 2004

Planned and ran discussion sections for the university’s orientation seminar.
Senior Teaching Fellow, Department of Mathematics, University of North Carolina, Chapel Hill, NC, August 2001–December 2003
Supervised first time mathematics instructors and ran discussion sections for the Mathematics Department TA training class.

Professional Service

Review research submissions and make recommendations for publication.

Institutional Representative, Wisconsin Space Grant Consortium (WSGC), September 2008–Present.
Member of the advisory council for the “face of NASA” in the State of Wisconsin and selected for the Elijah Balloon Launch Task Force.

Reviewed articles submitted by undergraduates for publication.

Reviewed and ranked undergraduate poster entries in a national prized session.

Session Co-Organizer, MathFest, San Jose, CA, August 2007.
Co-organized a two-hour session on “Teaching Time Savers” with panelists from Harvey Mudd College, Franklin and Marshall College, and Georgia College and State University through the Project NExT workshop.

Collegial Service

Honors Program Committee, St. Norbert College, August 2009–May 2012
Elected member of faculty committee which serves the College’s honor students.

Faculty Advisory Council, St. Norbert College, August 2008–May 2010
Elected member of faculty committee which serves as a resource for the faculty.

Faculty Development Committee, St. Norbert College, August 2007–May 2010
Elected member of faculty committee which shapes, implements, monitors, and evaluates the Faculty Development Program.

College Community Relations Board, St. Norbert College, August 2008–May 2010
Elected member of campus-wide committee which renders decisions in disciplinary matters referred to it.

Information Services Committee, St. Norbert College, January 2008—May 2009
Elected member of campus-wide committee which functions as a users group and forum for input.

Student Life Awards Committee, St. Norbert College, Spring 2008; Spring 2009
Participated in campus-wide committee which recognized student contributions in Spring 2008 and co-chaired the committee with Mike Peckham in Spring 2009.
Mentor Mixer Panel, Office of Faculty Development, St. Norbert College, November 2008, September 2009
Offered comments and asked questions at an informal mentor training social.

WWHEL Book Discussion Leader, Wisconsin Women in Higher Education Leadership, St. Norbert College, November 2008
Volunteered to organize second meeting of the group which is open to all faculty and staff on campus.

Math and Computer Science Vocation Dinner, St. Norbert College, November 2007
Shared with math and computer science minors and majors the experiences that shaped my decision to become an applied mathematician.

New Faculty Orientation Panel, St. Norbert College, August 2007
Discussed “Surviving the First Few Weeks & Advise for the First Year” with a panel of colleagues.

Mission Statement Focus Group, St. Norbert College, Spring 2007
Volunteered conversation on reforming the SNC Mission Statement.

Faculty Development Book Discussion, St. Norbert College, February 2007
Lead discussion with faculty peers on W. Brad Johnson’s “On Being a Mentor.”

Academic Advising

Supervise and organize activities with undergraduate members.

Academic Support Services “Consultant”, St. Norbert College, Fall 2008–Present
Worked with Carole Basak to enhance the training of mathematics tutors at SNC by organizing and leading a new and updated training session held in two parts, one per semester, annually.

General Education Program Orientation, St. Norbert College, August 2009
Discussed Area 8 of the General Education Program in three one-hour sessions for incoming first year students.

Michels Hall 3 Ships Program Advisor, St. Norbert College, Fall 2008 - Spring 2009
Faculty sponsor of a team of 8 undergraduate students, self-named “The Dream Team,” with a service project through AmeriCorps VISTA and The Boys and Girls Club.

Faculty Calling Program, St. Norbert College, March 2007; February 2008; February 2009
Contacted and recruited accepted high school students that indicated an interest in the mathematics and related fields at SNC.

Advisor Training, St. Norbert College, September 2007
Attended webinar “Academic Advising: The Pivotal Point in Assisting Students to Attain Educational and Career Goals”.

First Year Experience (FYE) Panel, St. Norbert College, September 2007 and October 2009
Answered questions regarding academic and intellectual development from first year students.
COMMUNITY SERVICE

Math Volunteer, Wrightstown Elementary School, WI, Fall 2008-Spring 2008
Work with elementary students, one hour each week in small group settings, to pique their interest and strengthen their abilities in mathematics.

Assistant Soccer Coach, Wrightstown, WI, Summer 2008; Summer 2009
Assistant coach for boys K-2 soccer team.

Catechist, Our Lady of Lourdes Parish, De Pere, WI, January 2008–Present
Taught two years of first grade and one year of second grade religious education classes by planning lessons from assigned chapters in a provided text.

The Big Event for Little Kids, Green Bay, WI, April 2008; April 2009
Organized and led a square wheeled bicycle exhibit with students from MATH 489 of Fall 2007 and the Math Club.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Mathematical Society (AMS)
Association for Women in Mathematics (AWM)
Mathematical Association of America (MAA)
Pi Mu Epsilon Honorary Society (PME)
Wisconsin Women in Higher Education Leadership (WWHEL)
KATHERINE L. MUHS

Date of Appointment to St. Norbert College Faculty: 8/82

Current Rank and Date Received: Assistant Professor, May, 1997

Tenure Date: 9/17/90

Educational Background

M.A.T., Purdue University, August 1980, Mathematics
B.A., St. Norbert College, December 1972, Mathematics, French

Teaching Experience

Northeastern Wisconsin Technical College, Green Bay, WI, June-August, 1983
Moraine Valley Community College, Palos Hills, IL, January 1981-June 1982
Mother McAuley High School, Chicago, IL, August 1974-March 1979
St. Thomas More School, Chicago, IL, August 1973-June 1974

Publications

Student Study Guide for Algebra for College Students (with co-authors Bernadette Berken and John Frohliger), WCB, 1990
Student Study Guide for Intermediate Algebra (with co-authors Bernadette Berken and John Frohliger), WCB, 1990

Professional Presentations

NEW Mathematics Partnership, Wisconsin DPI conference, Wisconsin Dells, October, 2009
NEW Mathematics Partnership, Wisconsin DPI conference, Wisconsin Dells, October, 2008
Women of Science Program, Neville Public Museum, January 18, 2003
"Fun with Mathematics", Holy Family School, March, 2002
"Mathemagician", Holy Family School, April, 2001
"Mathematical Magic", Holy Family School Third Grade, March, 1999
Workshop on Activities and Technology for Algebra, Wisconsin Mathematics Council Conference, Green Lake, May 2, 1998
"The Magic of Mathematics, Holy Family School Fifth Grade, April, 1998
"New Methods of Scoring for the Classics Festival", Northeastern Wisconsin Piano Teachers Forum, March 27, 1998
"Activities and Technology for College Algebra", Wisconsin Section of the MAA, April, 1997
"Math Olympics", in conjunction with "Take our Daughters to Work" Day, April 25, 1996
"Women in Business and Mathematics", Panel Discussion, April 22, 1996

Memberships in Professional Associations; offices held and recent conferences attended

Mathematical Association of America, 1982-Present
  Editor of Wisconsin Section of MAA newsletter, 2001-2006
  Member of Executive Board of Wisconsin Section of MAA, 1989-1991, 2001-2006
  Site coordinator, Wisconsin Section Spring conference, April, 2001
Member of Selection Committee, Distinguished Teacher of Wisconsin, 1994-2000
Chair of Selection Committee, Distinguished Teacher of Wisconsin, 1996-2000
Member of Nominating Committee of Wisconsin Section of MAA, 1988-1992
Member of Test Writing Committee for Wisconsin High School Math Contest, 1982-1994
Co-chairperson of the Wisconsin High School Math Examination, 1989-1994

National Council of Teachers of Mathematics, 1994-present
Wisconsin Math Council, 1990-Present
Pi Mu Epsilon - Charter Member, 1985-Present

Conferences attended:
  Mathfest 2001,(joint meetings of MAA,PME), August, 2001
  Annual meetings of the Wisconsin Section of the MAA, 1982-present
  Spring Meeting of Wisconsin Math Council, 1999
  Joint National Meetings of MAA and American Mathematical Society, January 8-11, 1997
  Annual Fall Meetings of Pi Mu Epsilon, 1991-present
  Fall Meeting of Wisconsin Math Council, 1991

Recent Grants

Faculty Development Summer Grant, 2009, to write new course "Principles of Geometry". Wisconsin Department of Public Instruction Mathematics and Science Program Partnership Grant
  Green Bay Area Public Schools, Wausaukee Public Schools, and St. Norbert College, 2008-2011
Wisconsin Department of Public Instruction Mathematics and Science Program Partnership Grant
  Green Bay Area Public Schools and St. Norbert College, 2006-2008
Faculty Development Student-Faculty grant to develop a quantitative course for Natural Science Majors, 2001-2002.
Faculty Development Summer Grant, 1997, to write an Activity Manual for College Algebra and Finite Mathematics.
Faculty Development Summer Grant, 1994, to write new course "Mathematical Applications for Upper Elementary and Middle School".
Committee Service at St. Norbert College

JMS Building Committee, 2001-present
Harassment Committee, 2007-2009
Student Life Committee, 2007-2009
Chair of the Search Committee for Mathematics, 2005-2006
Search Committee for Education, 2006-2007
Search Committee for Philosophy, 2006-2007
Search Committee for Associate Vice President of Enrollment Management, 2005 - 2006
Heidgen Chair Advisory Group, 2005 - 2008
General Education and Honors Committee, 2001-2003
Admissions Committee, 2003-2005
Mission and Heritage Advisory Council, 2001-2004
Harassment Resource Committee, 2001-2003
Steering Committee for North Central Reaccredidation, 1999-2001
Search Committee for Geology, 1999-2000
Chair of the Family and Medical Leave Committee, 1998-2000
College Community Relations Board, 1997-1999
Teacher Education Council, 1992-2001
Faculty Compensation Committee, 1996
Curriculum and Educational Policy Committee, 1995-1997
Academic Affairs Long-Range Plan Committee - Academic Programs and Activities, 1995-1996
Faculty Advisory Council, 1993-1995; Chair, 1994-1995
Admissions Committee, 1992-1994
College Long-Range Planning Committee, 1993-1994
Student Life Committee, 1992-1993

Other Service to the College

Mentor new mathematician, 2009- present
Liaison between Math Department and College Credit Program, 1989-1990, 1991-present
   (involves meeting with High School Mathematics Teachers to discuss Mt 115, Mt 131, and Mt 132, sending materials to them via the College Credit Office, writing final exams for the students, updating curriculum, and various others needs of the Office)
United Way Coordinator for Cofrin Hall, 1996-2003
Helped with Sigma Nu Delta Math Competition, 1997-present
Coordinator, Summer Orientation Math Placement Exam, 1993-1996, 1999-present
Administration of Math Placement Exam, 1993-present
Interview member for several candidates for math/science education position, 1993, 2003
Admissions Mentor, 1992-1999
Trustee Scholarship Interviews, 1993-1994
Site visits to observe student teachers, 1992, 1994
Host to new faculty members, 1984, 1994

Awards
Distinguished Service Award from Wisconsin Section of the Mathematical Association of America, 1995

Courses Taught

Regularly: Algebra & Finite Math (MATH 114), PreCalculus (MATH 115), Survey of Calculus (MATH 124), Calculus & Analytic Geometry I (MATH 131), Calculus & Analytic Geometry II (MATH 132), Calculus & Analytic Geometry III (MATH 233), Mathematical Applications for Upper Elementary and Middle School (MATH 212)

Occasionally: Modern Geometry (MATH 350), Probability and Statistics (MATH 321), Mathematics Content and Applications (Educ 589), Teaching Mathematics (Educ 589), Integrating Mathematics and Science Applications (Educ 589)

New Courses Developed

Principles of Geometry (MATH 220)
Mathematical Applications for Upper Elementary and Middle School (MATH 212)
Mathematics Content and Applications (EDUC 589)
Teaching Mathematics (EDUC 589)
Integrating Mathematics and Science Applications (EDUC 589)

Manuscripts Reviewed

A Study of Malaria and Sickle Cell Anemia, Sandefur and Dance, 1997-98
Prescribing Medications: Complicating Factors I and II, Sandefur and Dance, 1997-98
College Algebra Using the Graphing Calculator, Burzynski, PBS Publishing Company, 1995
Curriculum Vitae

Kevin Murphy

Department of Mathematics
The University of Iowa
15 MacLean Hall
Iowa City, IA 52242–1419

Office Phone: (319) 335-0714
Home Phone: (319) 400-4325
E-mail: kcmurphy@math.uiowa.edu
Webpage: http://www.math.uiowa.edu/~kcmurphy

Education

2003–present University of Iowa, Iowa City, Iowa
Ph.D. in Applied Mathematics expected May 2009
Thesis Advisor: Professor William Klink

B.A. in Mathematics, Cum Laude
Departmental Honors in Mathematics and Physics, Phi Beta Kappa

Research

- Point Form Quantum Field Theory vacuum and bound state problems.

Presentations

- Vacuum and Bound State Calculations in Point Form Quantum Field Theory, AMS Session on Quantum Theory and Fluid Mechanics, Joint Mathematics Meetings, Washington DC, January 2009
- The Lanczos Algorithm: A Heartland Talk, Columbia College, December 2008
- The Effects of Parameters on Finite Mode Ground States, Mathematical Physics Seminar, University of Iowa, March 2007
- The Koch Curve and its Symmetries, Mathfest, University of Wisconsin-Madison, August 2001

Teaching Experience

Graduate Teaching Assistant, University of Iowa, August 2003 – present

- Instructor
  - Basic Algebra II, Fall 2006
  - Elementary Functions, Spring 2007, Fall 2007

- Discussion Leader
  - Mathematics for Business, Fall 2004
  - Calculus and Matrix Algebra for Business, Spring 2005
  - Calculus I, Fall 2005
  - Calculus II, Spring 2006
  - Engineering Math II: Multivariable Calculus, Spring 2008

- Math Lab Tutor
Curriculum Vitae

Kevin Murphy

**Publications**
Klink, W., Murphy, K. “Gluons in Point Form QCD” submitted October 2008 for the proceedings of the 20th Bled Conference.

**University Seminars Attended**
- Mathematical Physics Seminar, Fall 2006 – present

**Honors and Awards**
- University of Iowa Presidential Fellowship, 2003 – present
- AMCS Summer Merit Fellowship, 2007

**Service**
- Midwest Mathematical Modeling Competition, Organizing Committee and Paper Judge (2008)
- Mathematical Contest in Modeling, Team Mentor (2008)
- Sonia Kovalevsky Day, Volunteer (2008)
- The University of Iowa High School Mathematics Competition, Volunteer (2007)
- Prospective Graduate Student Visit weekend, Volunteer (2004)

**Professional Memberships**
- American Mathematical Society
- Mathematical Association of America
- Society for Industrial and Applied Mathematics
Curriculum Vitae

Kevin Murphy

Department of Mathematics
The University of Iowa
15 MacLean Hall
Iowa City, IA 52242–1419

Office Phone: (319) 335-0714
Home Phone: (319) 400-4325
E-mail: kcmurphy@math.uiowa.edu
Webpage: http://www.math.uiowa.edu/~kcmurphy

Education

2003–present  University of Iowa, Iowa City, Iowa
Ph.D. in Applied Mathematics expected May 2009
Thesis Advisor: Professor William Klink

B.A. in Mathematics, Cum Laude
Departmental Honors in Mathematics and Physics, Phi Beta Kappa

Research

• Point Form Quantum Field Theory vacuum and bound state problems.

Presentations

• Vacuum and Bound State Calculations in Point Form Quantum Field Theory, AMS Session on Quantum Theory and Fluid Mechanics, Joint Mathematics Meetings, Washington DC, January 2009
• The Lanczos Algorithm: A Heartland Talk, Columbia College, December 2008
• The Effects of Parameters on Finite Mode Ground States, Mathematical Physics Seminar, University of Iowa, March 2007
• The Koch Curve and its Symmetries, Mathfest, University of Wisconsin-Madison, August 2001

Teaching Experience

Graduate Teaching Assistant, University of Iowa, August 2003 – present

• Instructor
  o Basic Algebra II, Fall 2006
  o Elementary Functions, Spring 2007, Fall 2007

• Discussion Leader
  o Mathematics for Business, Fall 2004
  o Calculus and Matrix Algebra for Business, Spring 2005
  o Calculus I, Fall 2005
  o Calculus II, Spring 2006
  o Engineering Math II: Multivariable Calculus, Spring 2008

• Math Lab Tutor
Curriculum Vitae                                       Kevin Murphy

**Publications**
Klink, W., Murphy, K. “Gluons in Point Form QCD” submitted October 2008 for the proceedings of the 20th Bled Conference.

**University Seminars Attended**
- Mathematical Physics Seminar, Fall 2006 – present

**Honors and Awards**
- University of Iowa Presidential Fellowship, 2003 – present
- AMCS Summer Merit Fellowship, 2007

**Service**
- Midwest Mathematical Modeling Competition, Organizing Committee and Paper Judge (2008)
- Mathematical Contest in Modeling, Team Mentor (2008)
- Sonia Kovalevsky Day, Volunteer (2008)
- The University of Iowa High School Mathematics Competition, Volunteer (2007)
- Prospective Graduate Student Visit weekend, Volunteer (2004)

**Professional Memberships**
- American Mathematical Society
- Mathematical Association of America
- Society for Industrial and Applied Mathematics
Name: Richard L. Poss

Spouse's Name: Cynthia

Date of Birth: 8/21/44

Date of Appointment to St. Norbert College Faculty: August, 1970

Current Rank and Date Received: Professor, 1994 (promoted to Associate Professor in 1977)

Tenure Date: 1974

Educational Background (include other postgraduate study)

Ph.D. University of Notre Dame, 1970, Mathematics
M.S. University of Notre Dame, 1969, Mathematics
B.S. St. Procopius College, 1966, Mathematics
(Benedictine University)

Teaching Experience (schools and dates of appointments)

St. Norbert College - 1970-Present
University of Notre Dame - Teaching Assistant, 1966-70

Other Employment (including dates)

Publications

"Weak Forms of the Axiom of Constructibility," July, 1971, NDJFL.
Professional Presentations

Invited Speaker – Sonoma State University (CA) M*A*T*H Colloquium Series, February 2006 “Advising in an Undergraduate Setting,” invited presentation at Project NExT Workshop in conjunction with the MAA-PME 2005 Mathfest, Albuquerque, NM. Funded by the Exxon Mobil Foundation

Pi Mu Epsilon Visiting Lecturer – Andrews University, MI, April 2005. “An Eclectic Overview of Undergraduate Mathematics Research,” invited address at the April, 1998, meeting of the Wisconsin Section of the MAA, UW-Stevens Point


"Organizing a Student-Run Math Competition," at the January, 1993, meeting of the MAA, San Antonio, TX.

"MAA Student Chapters: Should Our School Have One?" at the April, 1991, meeting of the Wisconsin Section of the MAA, Oshkosh, WI.

Invited Speaker - Yunnan University (China), June, 1989, "Patterns and Error Correcting Codes."

Invited Speaker - Hunan Normal University (China), May, 1989, "Mathematics Education in the United States."

Northeastern Wisconsin Mathematics Seminar Series:
December, 1987 - "An Introduction to Integer Programming"
January, 1986 - "CAT-Scan X-rays and Mathematics"
November, 1984 - "Introduction to Error-Correcting Codes"
October, 1980 - "There's More Than One Way to Hook a Rug"

Invited Speaker - Green Bay Rotary Club, January, 1987 - "Math Majors Can Do Anything"
Invited Speaker - Bethany Lutheran College, October, 1987; Mankato State University, October, 1987

Invited Speaker - Wisconsin Mathematics Council Meeting, Spring, 1987
Invited Speaker - Wisconsin Mathematics Council, Oshkosh, WI - "Discrete Mathematics: An Alternative to Calculus?," October, 1984

Invited Speaker - Mathematics Section of the Associated Colleges of the Chicago Area, March, 1984

"Counting Non-isomorphic Permutations," at the March, 1980, meeting of the Wisconsin Section of the Mathematical Association of America, Milwaukee, WI.

"Generalized Mathematical Induction," at the April, 1972 meeting of the Wisconsin Section of the Mathematical Association of America, Stevens Point, WI.

"Weak Forms of the Axiom of Constructibility," at the January, 1971, meeting of the Association for Symbolic Logic in Atlantic City, NJ.

Grant History (including unfunded proposals)

NSF-RUMC grant renewed at $1500 level in 2006.
NSF-RUMC grant renewed at $1500 level in 2005.
NSF-RUMC grant renewed in 2004.
NSF-RUMC (Regional Undergraduate Mathematics Conferences) grant to support the St. Norbert College Regional Undergraduate Mathematics Conference, funded in the amount of $2000, 2003. The grant (NSF Grant DMS-0241090) is administered through the MAA.

NSF, Science Faculty Professional Development, 1977 (unfunded proposal)

Memberships in Professional Associations; offices held and recent meetings attended (with years)

Governor of the Wisconsin Section of the MAA, 2002 - 2005
Past-President of Pi Mu Epsilon National Honorary Mathematics Society, 1999 – 2002
Panelist at Nebraska Conference for Undergraduate Women in Mathematics on topic "Opportunities in Mathematics for Undergraduates," February 3, 2001, at the University of Nebraska, Lincoln.
President of Pi Mu Epsilon National Honorary Mathematics Society, 1996 - 99
President-Elect of Pi Mu Epsilon National Honorary Mathematics Society, 1993 - 96.
Member of MAA Committee on Undergraduate Student Activities and Chapters, 1995-2002.
Editor of Pi Mu Epsilon Journal, 1990-1993
Coordinator of Student Activities for the Wisconsin Section of the MAA, 1990 - 95
Chair of Wisconsin Section of the Mathematical Association of America, 1983-84
Executive Committee of WSMAA, 1982-85, 1990 – 95, and 2002 - 2005
Joint Committee of WSMAA and Wisconsin Mathematics Council to Alleviate Shortage of Teachers in Mathematics, 1983
Program Director of WSMAA Spring Meeting at West Bend, WI, 1983
Organized a workshop on "Discrete Mathematics and its Role in the First Two Years of the Undergraduate Curriculum," sponsored by the Wisconsin Section of the MAA, UW-Madison, October, 1983.
Member of Mathematical Association of America
Member of Pi Mu Epsilon
MAA Pi Mu Epsilon summer meeting: 1982-2006.

Committee Service at St. Norbert College (with years)

Search Committee of Divisional Associate Dean – Natural Sciences, 2006
Faculty Personnel Committee, 2003 - 06
Dean Search Committee, 2002 - 03
Advisor for Peace and Justice Minor, 2000 - 2004
Dean of Admission and Enrollment Management Search Committee, 1997-98
Advisement Assessment Committee, 1996- 97
Academic Affairs Long Range Planning Task Force, 1995
College Community Relations Board, 1989-91
Admissions Committee, 1986-88
General Education Committee, 1983-86
Faculty Grievance Committee,1982-85
Natural Science Divisional Chairman Search Committee, 1983
Faculty Advisory Council, 1981-82
Nominations & Elections Committee, 1979-81 (Chair, 1980-81)
Faculty Personnel Committee, 1976-79
Committee on Curriculum & Educational Policy, 1974-76
Education-by-Objectives, 1973-76
Data for Decisions Committee (ACE), 1972-73
Subcommittee on Goals & Objectives, 1972-73

Other Service to the College (administrative, advisor to student organization, etc.)

On-site coordinator for meeting of Wisconsin Mathematics Council, October 8,1994
Initiated Wisconsin Delta Chapter of the Pi Mu Epsilon National Honorary
Mathematics Society, May, 1985. (Chapter advisor since that time.)
Organizer, with Pi Mu Epsilon, of the Annual St. Norbert College Regional
Pi Mu Epsilon Undergraduate Mathematics Conference, 1986 - present
Organizer, with Sigma Nu Delta, of the Annual St. Norbert College High School Math Meet, 1984 - present
Moderator of Sigma Nu Delta Math Club, 1982 - present
Faculty Chair, 1981-82
Faculty Parliamentarian, 1976-78
Coordinator of Education-by-Objectives Program (Freshman Seminar), 1975-76

Professional Activities in the Local Community (with years)

Presented a "Workshop in Discrete Mathematics" to middle school mathematics
Coordinator of the State Mathematics Meet, sponsored by the WMC at St. Norbert
Local Coordinator of the "Workshop in Statistics" held at St. Norbert College in June, 1986, and
sponsored by the Wisconsin Department of Public Instruction.
Corresponding secretary of Northeastern Wisconsin Talented and Gifted, Inc. (NEWTAG), 1980-81.
Awards and Honors (with years)

C. C. MacDuffee Award for Distinguished Service from Pi Mu Epsilon, 2002
Outstanding Advisor Award from Student Life at St. Norbert College, 1989-90
Led delegation of Wisconsin mathematicians on a professional exchange visit to China in May-June, 1989.
Honorary Fellow in Industrial Engineering - UW-Madison, 1979
Leonard Ledvina Outstanding Teacher Award - St. Norbert College, 1978
NSF Traineeship - University of Notre Dame, 1966-70

Special Competencies/Professional Licenses/Certifications/Registrations

Passed first exam of the Society of Actuaries

Sabbatical Leaves and Leaves of Absence (Projects and Dates)

Took courses in Operations Research, UW-Madison, Spring, 1979

Participation in the Intellectual Life of the College (workshops, discussion groups, colloquia, speakers programs, fine arts programs)

Co-leader in book discussion for Critical Masses, sponsored by Faculty Development Office, spring, 1995
Speaker at Food For Thought (with Cynthia Poss) September 12, 1989, "China: Exchanges and Changes."

Courses Taught on Regular Basis

Mt 102 - Basic Algebra
Mt H56 - Algebra and Functions
Mt H58 - Functions and Finite Mathematics
Mt 114 - Algebra & Finite Math
Mt 115 - Precalculus Mathematics
Mt 124 - Survey of Calculus
Mt 131 - Calculus & Analytic Geometry I
Mt 132 - Calculus & Analytic Geometry II
Mt 233 - Calculus & Analytic Geometry III
Mt 250 - Advanced Foundations of Mathematics
Mt 303 - Linear Algebra
Mt 306 - Abstract Algebra
Mt 310 - Differential Equations
Mt 317 - Operations Research
Mt 321 - Probability & Statistics
Mt 350 - Modern Geometry  
Mt 373 - Real Analysis  
Mt 376 - Complex Analysis

**New Courses Developed**

Mt H02 - Basic Algebra  
Mt H56 - Algebra and Functions  
Mt H58 - Functions and Finite Mathematics  
ID 101 - Freshman Seminar (with E. Elfner, R. Vandenburgt, and K. Zahorski)

**Other**

I currently have 23 advisees.

I am the Graduate School Advisor for the Mathematics Discipline.

I am an advisor to pre-actuarial students.

(With Bonnie McVey) I work with two students in Freshman Fellowships program at St. Norbert College.

During every summer since 1985, I have traveled with student speakers to the summer national mathematics meetings.
OIE Review of Discipline Efforts to Assess Student Learning for CEPC
Program Review

MATHEMATICS
(updated for Revised Program Review 11/02/09)

Overview

- Does the discipline/program have a viable assessment plan?
  Yes. Modified in 2002, the plan is appropriately undergoing some revision.

- Does the plan include intended student learning outcomes?
  Yes, although it is not always clear how these outcomes are addressed by the instruments chosen or the mode of analysis. Criticisms of the portfolio data may be linked to a lack of clarity about how the portfolio data inform the intended outcomes.

- Does the plan include direct as well as indirect measures of student learning?
  Yes.

- Are the sources of evidence for student learning appropriate?
  Yes, but see #2 above. While the number of majors exceeding the 50th percentile nationally is useful, an item or subscale analysis of where students are struggling would better inform program improvement.

- Is data collection and analysis ongoing?
  Yes.

- Are all program faulty/staff appropriately engaged in assessment?
  Yes.

- Has the program made or proposed changes/improvements (intended to enhance student learning) based on learning outcomes data?
  Yes.
The Curriculum and Educational Policy Committee (CEPC) reviewed the revised Mathematics Program on November 19, 2009. Dr. Rick Poss was present on November 19, 2009, to provide an overview of the Program and answer questions from the members of the Committee. This report provides a summary of the observations, continued concerns and recommendations of the revised Program Review as identified by the CEPC.

**Strengths**

In addition to the strengths that were previously identified in the program review report dated February 12, 2009, the CEPC has identified the following strengths:

- The Program has made an effort to define best practices in the field of mathematics, which provide the basis for the curriculum. (I)
- The Program has improved efforts to bring the curriculum in line with benchmarks and outcomes identified by professional societies, graduate schools and career fields. (I)
- The Program has shown improvements in using the assessment plan to address student learning outcomes. (III)

**Observations**

- Analysis of data was provided for Program demographics and comparisons. (IV)
- The Program has included SOOT and alumni survey data. (V)
- The Program does not identify and credit faculty with SNC collegial service within the report. (VI)

**Continued Concerns**

- The Program has only partially addressed the increased emphasis on applied mathematics within the curriculum. (III)
- The rubric used in the assessment process, mentioned in both versions of the program review, was still not provided. (III)
- Although grade averages are presented, the data for grades are still not disaggregated for general education and majors/minors/service to other majors nor is grade distribution addressed. (IV)
- Trend data for majors/minors is only partially provided. (IV)
- There was no discussion of strategic planning in the Program Review. (IV)

**Recommendations**

- Include a strategic plan for enhanced student success, addressing specifically significant drop out and failure rates in general education courses. (IV)
• Continue to implement best practices in mathematics. (I)
• More clearly explain how the curriculum for the major/minor is determined. (I)
• Provide a more detailed explanation of the increased emphasis on applied mathematics within the curriculum as per best practices. (III)
• Provide more in-depth analysis of assessment data as it relates to student learning outcomes. (III)
• Include the rubric used in the assessment process with an explanation of its use. (III)
• Disaggregate the data related to general education courses and the data related to majors/minors/service to other majors, and address grade distribution. (IV)
• Provide more complete trend data for majors/minors. (IV)
• Identify and credit faculty contributions to SNC collegial service within the report. (VI)
• For the next five-year report, provide more easily accessible graphs.