Graduate Program Prioritization Report  
Department of Mathematics  
January 2014

1. **History, Development and Expectations of the Program**

   a. Provide, to the best of your ability, a brief description of the program’s history including the evolution of the program over the years. Describe specific changes that have been made to the program curriculum, changes to student demographics and the impact of these changes on the program, and efforts to recruit students to the program. If this is a new program, describe efforts to build the program and the progress of these efforts to date. (550 words)

   As our institution started to expand its offering of graduate degrees in the late fifties and early to mid-sixties, the Department of Mathematics began to offer a Master of Science in Mathematics. We did so until 1982 at which point, the 1982-1984 catalog states that we were no longer offering an M.S. degree of any kind, but graduate level courses were still listed. From 1985 to the present, the department has been offering an M.S degree in Mathematical Education.

   Our graduate student body is primarily composed of 1) individuals who pursue the degree alongside Certification in Secondary Education, as well as 2) in-service mathematics teachers who seek to earn an M.S. degree in their discipline. The program’s mission is to produce highly-trained and knowledgeable certified teachers of grades 7-12 mathematics who are capable and well-prepared for a successful teaching career, have the potential to become leaders in the field of mathematics teaching, and are equipped to study mathematics beyond the M.S. degree.

   The greatest assets of our program are its structure and rigorous curricular content, and the graduate faculty who deliver quality instruction. The program’s challenges are the perennial student recruitment issue and the logistics (scheduling, for instance) inherent to a small program.

   Our departmental Graduate Program Committee (GPC) plays a primary role in establishing departmental policies for our graduate programs that are then implemented by the Graduate Coordinator. Although basic mathematics does not change, what to teach and how to teach it is an ever-present concern at the heart of what we do. In the last 5-7 years, the committee/department has implemented or is currently discussing the following curriculum-related actions:

   - learning outcomes were revisited and reaffirmed,
the course outline, content and catalog description for each of our seven core courses were updated,

an eighth core course, Introduction to Research in Mathematics Education, was added to the program (it will be offered for the first time within the next 2-year course rotation),

to reflect the fact that today’s students are better users of technology, we are working on combining our MAT 508/518 courses to create a single comprehensive graduate course in the teaching of mathematics using the latest technology,

rules, regulations and procedures regarding all three capstone experiences (Thesis, Comprehensive Exam, Special Project) were more formally established, and recently, the Special Project was eliminated as an option,

policies about transfer and re-validation of expired courses were revisited,

Students Handbooks for the M.S. degree and Certification program were produced.

Regarding student demographics and recruitment efforts, our enrollment numbers and the make-up of the student body we attract has held fairly steady over the years. Our best recruitment tool remains the good work and influence of our graduates at their respective schools. Although the program has not shrunk in size, we are constantly looking for acceptable ways to show flexibility and improve our enrollment numbers. Along those lines:

In conjunction with Computer Science, the MBA program and the Office of Assessment and Planning, we are putting together a Certificate in Applied Statistics and this should stimulate enrollment as well.

We looked at existing M.A.T. degrees nationwide to see the pros and cons of creating our own; we concluded it would not yield additional benefits for us (enrollment) or our students (preparedness).

b. Is there anything else you would like us to know? (Issues you might choose to discuss could include visibility of the program, relationships the program has external to the university, changes in the economic support for the program, staffing, etc.) (150 words)

For the last two years, we have been working on a 4+1 program leading to the M.S. degree with 7-12 Certification. Most of the requirements are in place and we are working on a model that will provide graduate students with hands-on experience in the newly-proposed Mathematics Emporium. (The Dean of Arts & Sciences is on board with this initiative.) Given the limited means the department and institution have to devote to recruitment, we believe our best shot
at maintaining or increasing enrollment is in holding on to the undergraduate mathematics majors we already have. We will also be looking into seeking funds from the Robert Noyce Teacher Scholarship Program.

2. External Demand for the Program

a. Using the data provided, review and explain the relationship between the program and external factors that impact the:
   i. number of applicants and percentage of applicants accepted
   ii. 5-year enrollment trends (450 words)

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>Program</th>
<th>Applications</th>
<th>Accepted</th>
<th>Acceptance %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2009</td>
<td>EPCERT-MAT</td>
<td>1</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>2009-2010</td>
<td>EPCERT-MAT</td>
<td>5</td>
<td>4</td>
<td>80%</td>
</tr>
<tr>
<td>2010-2011</td>
<td>EPCERT-MAT</td>
<td>3</td>
<td>1</td>
<td>33%</td>
</tr>
<tr>
<td>2011-2012</td>
<td>EPCERT-MAT</td>
<td>3</td>
<td>2</td>
<td>67%</td>
</tr>
<tr>
<td>2012-2013</td>
<td>EPCERT-MAT</td>
<td>4</td>
<td>2</td>
<td>50%</td>
</tr>
<tr>
<td>2008-2009</td>
<td>MS-MAT</td>
<td>10</td>
<td>9</td>
<td>90%</td>
</tr>
<tr>
<td>2009-2010</td>
<td>MS-MAT</td>
<td>18</td>
<td>10</td>
<td>56%</td>
</tr>
<tr>
<td>2010-2011</td>
<td>MS-MAT</td>
<td>15</td>
<td>7</td>
<td>47%</td>
</tr>
<tr>
<td>2011-2012</td>
<td>MS-MAT</td>
<td>19</td>
<td>8</td>
<td>42%</td>
</tr>
<tr>
<td>2012-2013</td>
<td>MS-MAT</td>
<td>37</td>
<td>10</td>
<td>27%</td>
</tr>
</tbody>
</table>

In many instances, candidates to our graduate programs may at times take over a year to complete their file, if at all. Some begin the application process and never continue. Others complete the application and then change their minds. The Coordinator periodically contacts applicants who have partially-completed files to see if they are still interested in the program. No candidate is rejected outright unless the GPA is clearly inadequate.

The minimum grade point average (GPA) required for all entering graduate students is 3.0, as set by the School of Graduate Studies. If an M.S. candidate’s GPA is close but below 3.0, he/she is advised to take 9 credits of coursework on a non-matriculated basis and a grade of at least a B in all courses must be achieved before admission is considered. Since fall of 2006, all candidates who have reached the department interview stage have been accepted. This is because prior to the interview, candidates who were serious about entering the program followed the Coordinators’ recommendations (e.g., taking additional courses first) and brought themselves to a satisfactory level for admission.
<table>
<thead>
<tr>
<th>Enrollments</th>
<th>Fall '08</th>
<th>Spr '09</th>
<th>Fall '09</th>
<th>Spr '10</th>
<th>Fall '10</th>
<th>Spr '11</th>
<th>Fall '11</th>
<th>Spr '12</th>
<th>Fall '12</th>
<th>Spr '13</th>
<th>Fall '1 Avg</th>
<th>Spr 'Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>20</td>
<td>13</td>
<td>14</td>
<td>13</td>
<td>13</td>
<td>16</td>
<td>13</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11</td>
<td>9</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>3</td>
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<td>4</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>22</td>
<td>18</td>
<td>14</td>
<td>17</td>
<td>21</td>
<td>20</td>
<td>21</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-Time</td>
<td>12</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Part-Time</td>
<td>19</td>
<td>15</td>
<td>13</td>
<td>9</td>
<td>11</td>
<td>10</td>
<td>13</td>
<td>8</td>
<td>13</td>
<td>13</td>
<td>14</td>
<td>11</td>
</tr>
</tbody>
</table>

Our graduate student body is heavily skewed toward part-time female students. Traditionally, the teaching of secondary mathematics has attracted more females than males. The few full-timers we have are usually financially supported by their parents. But by-and-large, our students are typically in their 20’s or 30’s (sometimes older), and they are either in-service mathematics teachers seeking a terminal degree or individuals intent on switching careers that work to support themselves and their family while going to school at night and during the summer. So far, we have been able to buck the downward trend in enrollments and we did not have to sacrifice the quality of applicants in order to “maintain our numbers”. Our students’ GPAs have held up pretty consistently over time (see item 5. below).

**b. Which employers, institutions and/or communities benefit from this program? Describe how the program meets the needs of the state (e.g., economic, cultural, civic, etc.)? (150 words)**

Our M.S. program benefits the middle schools and high schools of Connecticut, both public and private. Our graduate program completers can be found in many Mathematics Departments across the state (especially on the coastline and in the western half of the state) and many graduates have gone on to become department chairs at their high school. Faculty that supervise our student teachers have routinely received compliments on the well-preparedness of our students. When students apply to our program, Southern’s reputation is often checked as a reason for the application, a fact that undoubtedly reflects on our departmental reputation. In addition to enhancing the formation of qualified mathematics teachers, another instance of our symbiotic relationship with the State was in evidence for several years when Mathematics was a staple of the DSAP state list and we accommodated many students who sought Certification and stayed to complete an M.S. degree with us.

**c. Is there anything else you would like us to know? (Issues you might choose to discuss could include competition from local, regional, and other institutions.) (100 words)**
Our M.S. degree has public and private competitors across the state. To boost enrollments, we are trying to create more unique formats that could sway undecided candidates or win them over earlier. This is the impetus behind our upcoming creation of a 4+1 B.S./Certification/M.S. package and Certificate in Applied Statistics; as far as we know, neither one of those has an equivalent in our market. We examined the possibility of creating distance learning options. Discussions with students indicate that they prefer a face-to-face classroom environment for proof-level courses. However, next year we’ll be offering MAT 525 in a hybrid format.

3. Internal Demand for the Program

a. Using the data provided, please describe how courses in your program serve students in other programs. What percentage of students in your courses come from other programs? Please provide enrollment data for graduate courses offered by your department that are required for other graduate programs. (Some of your discussion in this section may be repetitive, but is important in understanding the internal demand for the program.) (100 words)

The graduate courses offered by the Mathematics Department are not required by any other program/department at Southern (in a striking contrast to our undergraduate offerings).

b. How is enrollment for your graduate program influenced by enrollment in your undergraduate program? Is there potential for a formal pathway between the two programs? (100 words)

We require a GPA of 3.0 (and other evidence of good performance and appropriate circumstances) in order to allow a Senior Math Major to enroll in one of our graduate courses. As mentioned earlier, we are working on a formal pathway (4+1 program) that will hopefully be up and running within a couple of years.

c. How reliant are you on non-program students taking your courses? (100 words)

We have no such reliance. Occasionally, students from other programs will take a graduate Statistics class or graduate students from other schools will register for one of our other classes. But these are infrequent occurrences that cannot be relied on in any significant way.

d. Does the program produce services needed by other parts of the campus (e.g. clinics, testing services)? (100 words)
Our M.S. program does not produce any services needed by other parts of the campus.

e. Is there anything else you would like us to know? (100 words)

In summary, the strength of our program currently relies heavily on external demand as well as the satisfaction of our undergraduate math majors who return to us to complete an M.S. degree.

4. **Quality of Program Inputs and Processes**

   a. Please provide a narrative of how the qualifications and assignments of your full- and part-time faculty align with and support the program. Please include a discussion of the challenges and successes the department faces in providing qualified faculty to meet the needs of the program. In those programs where it is appropriate, please discuss the integration of adjuncts into the program’s curriculum. (450 words)

The Department of Mathematics is comprised of 21 tenured or tenure-track faculty members, 18 of who are members of the Graduate Faculty. (Of the other three, one is a recent transfer from another department and the other two are developmental math experts.) Over the last 5 years, all graduate faculty members have taught at least one course serving the M.S. or graduate certification programs. Approximately 12 faculty members are in the rotation to teach M.S. courses and/or serve as thesis advisors or examiners for comprehensive exams. We are able to staff all of our graduate-level courses with full-time faculty, and faculty members have the necessary background and expertise to deliver quality education. As we add on the Certificate in Applied Statistics, there will be a need for additional faculty members in that area. Consequently, the department is currently conducting two faculty searches in the area of Applied Statistics. In the next 5-10 years, potential retirements will most probably create a need for experts in mathematical education. Note that our graduate program does not involve any part-time faculty.

   b. Briefly describe the merits and logic of your curriculum. (250 words)

   The contents of our program courses map very well with the academic and professional needs of today’s in-service teachers in Connecticut or elsewhere. The goals of the core curriculum are to teach the mathematics content courses taught in most high schools at a theoretical level that allows our students to become curriculum leaders in their school districts, as well as to
cover a range of issues in mathematics education and pedagogy. The eight core courses are:

- MAT 574 and 530 (courses placing Algebra & Geometry in a broader context enhancing the teacher’s understanding of the mechanics behind a lot of what they teach in middle and high school),
- MAT 541 (an Analysis course that’s essential to understanding the principles behind Calculus; required for teaching AP calculus or in UConn’s Early College Experience Program),
- MAT 526 (a Statistics course providing the necessary background that goes beyond the teaching of basic descriptive/inferential statistics and that further prepares teachers to teach AP Statistics),
- MAT 508 (teaching mathematics using technology),
- MAT 514 (teaching mathematics to low-achievers and high-performing students), MAT 595 (a seminar in which students discuss both historical and current issues in mathematics education),
- MAT 580 (an introduction to research in mathematics education: better equips teachers to become life-long learners in the profession and helps prepare students that choose the thesis capstone).

Some electives complete the coursework. The student opts for either a Comprehensive Examination (includes a mandatory writing component in Mathematics Education) or a thesis; either capstone track is summative in nature.

c. How dynamic is your program? Please identify and describe what procedures are in place to provide continued, regular evaluation and review (include formal and informal activities). Describe the impact of the review on the program and curriculum (e.g., FAAR data may be used as evidence, as well as other documentation of changes to the curriculum). (300 words)

The Graduate Coordinator chairs our departmental Graduate Program Committee (GPC) which handles all curricular and logistical matters relating to our M.S. program. The committee meets once a month during the academic year. It discusses and manages course content and outlines, pedagogy, course rotation, rules & regulations for all graduate processes, recruitment efforts, and program creation or re-structuring. We completed our last Program Review in December of 2011, and the committee routinely discusses means to reach our last report’s short-term and long-term goals. Some of the recent changes made to our program (delineated in Criterion 1 above) were a direct result of this self-study. Graduate advisement of students is centralized in the hands of the Graduate Coordinator who tracks their progress through the program. (The Certification Coordinator also advises graduate students who
Twice a year, the Graduate Coordinator reports to the whole department on the state of our M.S. program. As a result, our program's content and inner workings are constantly scrutinized and are kept up-to-date (or are on their way to being so). Program challenges such as recruitment are a fixture of our departmental concerns.

d. Is there anything else you would like us to know? (Issues you might discuss could include the quality of your incoming students, or a comparison of your curriculum, courses, assessments, experiences to similar programs. How does your program better serve students than similar programs offered elsewhere?) (200 words)

Please see item 9c. below.

5. Quality of Program Outcomes

a. How does your program use assessment data to ensure quality of student outcomes? Describe the quality of your program outcomes. (e.g., G.P.A., Student Opinion Surveys, course evaluations, alumni surveys, professional assessment/evaluation, other assessments, participation in groups or organizations that focus on pedagogy or andragogy. Insert a table listing your program outcomes. Note that the table does not count in the word limit). (900 words)

**General Student Outcomes:** It is expected that each graduate student in mathematics will be able to:

<table>
<thead>
<tr>
<th>(1) Achieve mastery of a rich and diverse set of mathematical ideas.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) Use acquired mathematical skills to undertake independent learning and to be a contributing member of a problem solving team.</td>
</tr>
<tr>
<td>(3) Demonstrate the ability to write mathematical proofs.</td>
</tr>
<tr>
<td>(4) Communicate effectively by being able to explain mathematics both verbally and in writing.</td>
</tr>
<tr>
<td>(5) Utilize appropriate technology to develop models for solving problems and analyzing new situations.</td>
</tr>
<tr>
<td>(6) Think analytically and critically as evidenced by the ability to formulate problems, solve them, and interpret their solutions.</td>
</tr>
</tbody>
</table>

i. Outcome (1) is measured by overall coursework and the student's culminating activity (thesis or comprehensive oral examination). Outcome
(2) is measured through collaborative activities and projects in courses such as MAT 508, *Technology Enriched Mathematics Instruction I* and MAT 526, *Probability and Statistics II*. Outcome (3) is measured through examinations in theoretical courses such as MAT 530, *Foundations of Geometry*, MAT 541, *Real Analysis*, and MAT 574, *Algebraic Structures II*. Outcome (4) is measured in all coursework, and specifically through the student's capstone, as well as MAT 595, *Seminar in Mathematics Education*, where students give presentations to their peers. Outcome (5) is demonstrated through projects in MAT 508. Finally, Outcome (6) is measured through the projects in applied courses such as MAT 526, and also through projects in MAT 508.

ii. Students’ GPAs indicate that students are performing at a very adequate level that is above graduate school standards. Although summer GPAs are not accounted for here, averages for the last 5 years are in the 3.8-4.0 range.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Fall '08</th>
<th>Spr '09</th>
<th>Fall '09</th>
<th>Spr '10</th>
<th>Fall '10</th>
<th>Spr '11</th>
<th>Fall '11</th>
<th>Spr '12</th>
<th>Fall '12</th>
<th>Spr '13</th>
<th>Fa ll Av g</th>
<th>Spr Av g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>31</td>
<td>22</td>
<td>18</td>
<td>14</td>
<td>17</td>
<td>16</td>
<td>21</td>
<td>17</td>
<td>20</td>
<td>21</td>
<td>21</td>
<td>18</td>
</tr>
<tr>
<td>Overall</td>
<td>3.45</td>
<td>3.86</td>
<td>3.75</td>
<td>3.90</td>
<td>3.79</td>
<td>3.87</td>
<td>3.82</td>
<td>3.93</td>
<td>3.52</td>
<td>3.63</td>
<td>3.67</td>
<td>3.84</td>
</tr>
</tbody>
</table>

iii. For Student Opinion Surveys, we observe a dip during the academic year 2010-2011; otherwise, averages are mostly in the high 80’s or low 90’s. More specifically, the average and median of all table entries are 81.8 and 85 respectively.

<table>
<thead>
<tr>
<th>Course Information Survey</th>
<th>AY 08/09</th>
<th>AY 09/10</th>
<th>AY 10/11</th>
<th>AY 11/12</th>
<th>AY 12/13</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Statement</strong></td>
<td>SA/A</td>
<td>SA/A</td>
<td>SA/A</td>
<td>SA/A</td>
<td>SA/A</td>
</tr>
<tr>
<td>Methods of instruction have helped me understand the subject matter.</td>
<td>84%</td>
<td>82%</td>
<td>41%</td>
<td>86%</td>
<td>88%</td>
</tr>
<tr>
<td>Reading the assigned material has helped me understand this subject.</td>
<td>92%</td>
<td>64%</td>
<td>70%</td>
<td>95%</td>
<td>77%</td>
</tr>
<tr>
<td>Exams and out-of-class assignments have helped me understand the subject matter.</td>
<td>84%</td>
<td>88%</td>
<td>52%</td>
<td>86%</td>
<td>91%</td>
</tr>
<tr>
<td>Number of exams &amp; other graded assignments has been sufficient to evaluate my progress.</td>
<td>84%</td>
<td>76%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My experiences in this class make me want to learn more about this subject.</td>
<td>85%</td>
<td>41%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would rate the quality of instruction in this course as high.</td>
<td>87%</td>
<td>82%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I would rate the overall quality of this course as high.  84%  82%
This course helped me meet the learning goals.  67%  81%  91%
This course evaluated how well I met those learning goals.  74%  88%  97%
My experience in this course helped me appreciate this subject.  70%  86%  85%
The instructor provided regular feedback on my performance in this course.  93%  95%  85%
The instructor had high standards for student achievement.  85%  92%  91%
The instructor encouraged me to take responsibility for my own learning.  78%  100%  94%

iv. The most recent alumni survey results were collected for the December 2011 Program Review. Our department particularly values the opinions of our program completers because by the time they offer feedback, they have had a chance to take a step back, reflect, and give a less emotional and more global account of their experience with their program. Most student suggestions tended to be of two kinds: curricular and logistical. They have prompted us to

- frequently revisit our course rotation,
- reflect on our pedagogy to better connect the advanced mathematics with the curriculum our students are teaching in high school (particularly in MAT 574 and MAT 541),
- adjust course content to reflect new technologies our students use or new standards they face in their own middle school and high school classrooms,
- strive to find candidates for GSGA positions and ensure representation on the GSAC whenever invited to do so,
- continue to look for ways to better provide a sense of belonging and a desire for participation in our students, despite the complexities of their lives.

The last two items have proven more elusive in part because of the make-up of our student body (part-time students who are full-time workers).

In terms of numerical data, 23 surveys were sent out and 12 individuals responded. The survey contained our 6 objective/outcome-related items already mentioned and 3 additional Certification outcomes. For each outcome, program completers were asked to rate where they stood prior to entering the program and after completing it. The elements were rated on a scale from 1 (low) to 10 (high). On average, respondents report an increase in
knowledge/skills of 2.7 points out of 10 with an average level of significance of 0.0016. (A significance level of 0.05 or less represents a change in scores that is unlikely to be due to chance.)

Note that at the time, current students were also surveyed and asked to reflect on those 9 items. For those respondents, the reported average increase in knowledge reached 3.26 points out of 10 with an average level of significance of 0.016.

The results showed a significant increase in knowledge and skills on all items which indicates that, according to alumni and current students, the Mathematics Department is meeting its general Master’s and Certification student outcomes. The survey also contained 10 additional questions relating to faculty performance (competence, up-to-date, engaging teaching methods, effective communication skills, openness, helpfulness, accessibility, etc). For those, at least 92% of alumni agreed or strongly agreed with the statements. Finally, for the two summative questions

*My program has helped me to accomplish my educational goals,* 92% agreed or strongly agreed, and

*I would recommend this program to people interested in this field of study,* 100% agreed or strongly agreed.

v. The department constantly keeps its ear to the ground through faculty participation and/or involvement in key organizations and committees in the discipline. All Mathematics Education faculty are active members of the NCTM (National Council of Teachers of Mathematics), an influential organization that sets curricular guidelines and explores best practices in the teaching of elementary and secondary school mathematics, and its affiliate ATOMIC (Associated Teachers of Mathematics in Connecticut). Also, for three decades now, our department has had active representation on the MBSCC (Mathematics Basic Skills Committee of Connecticut), a group that brings together representatives from Connecticut’s public institutions of higher education to discuss and exchange information about programmatic, pedagogical and technological matters in the discipline.

b. Is there anything else you would like us to know? (Issues you may choose to discuss could include preparing your students for employment or further scholarly pursuits. Where possible provide data driven examples, e.g., number of students who pass the licensing exam). (300 words)

i. According to reported data for the 2006-2011 period, 83% of our program completers were employed full-time, 8% held part-time employment, and 8%
were unemployed. Of those employed, 83% were in a position directly related to their graduate program.

ii. There are no licensing exams or formal outside accreditation in the field of mathematics. (Naturally, students seeking certification at the graduate level must still pass the Praxis II content area exam.) We are NCATE-approved in all matters relating to Certification.

iii. The department is discussing constructive ways to collect additional data from program completers on a more regular basis.

6) Size, scope and productivity of the program

a. How many credit hours does the program generate? (table generated by OMIR)

<table>
<thead>
<tr>
<th>Credits Generated</th>
<th>AY 08/09</th>
<th>AY 09/10</th>
<th>AY 10/11</th>
<th>AY 11/12</th>
<th>AY 12/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Academic Credits</td>
<td>122</td>
<td>99</td>
<td>89</td>
<td>103</td>
<td>160</td>
</tr>
<tr>
<td>Major Credits</td>
<td>110</td>
<td>93</td>
<td>79</td>
<td>87</td>
<td>130</td>
</tr>
<tr>
<td>Total Students</td>
<td>36</td>
<td>30</td>
<td>27</td>
<td>30</td>
<td>45</td>
</tr>
</tbody>
</table>

b. What degrees or certificates are awarded? (This is a simple list of degrees and will list only one degree or certificate unless you are one of the programs approved to report your data in combination)(in table form with item c)

Please see below.

c. How many degrees or certificates have been awarded (five year data)?

<table>
<thead>
<tr>
<th>Degrees Conferred</th>
<th>AY 08/09</th>
<th>AY 09/10</th>
<th>AY 10/11</th>
<th>AY 11/12</th>
<th>AY 12/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-Mathematical Education</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

d. Using the data provided, present and discuss the record of the graduate faculty in research/creative activity. (200 words)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Book, Chapter in Scholarly Book-New</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
In the Department of Mathematics, creative activities are of a varied nature, ranging from curriculum-oriented matters to Mathematics Education, History of Mathematics and of course Pure and Applied Mathematics. Faculty members keep abreast of developments in their disciplines through conference attendance and presentations at the regional, national, and in some cases international levels, and by publishing research, survey papers or article reviews. Recent activities also include the writing of free (open-source) textbooks. Since 2008, eight members of the department have received sabbatical leaves.
e. What types of student or student/faculty research or creative activity have been developed and or produced (e.g., include theses, dissertations, special projects)? (100 words)

Sample theses:

- “A Study of the Relationship of Secondary School Course Taking and Achievement to Post-Secondary Statistics Course Work” (Robert Benjamin),
- “Self-Reported Methods of Mathematics Curriculum Selection in Home-Schooling Families” (Catherine Peterson),
- “Single Gender Math Classes: Their Various Purposes throughout the History of the United States and A Comparison of Middle School Students in Such Classes” (William Trapp).

Sample Special Projects:

- “A Unit Plan on Personal Finance and Mathematics” (Catherine Peng),
- “A Portfolio of Precalculus Materials for a Low-level Class” (Lori Rubino-Connelly),
- “Geometry Projects in an Honors Option Program” (Patricia Rice),
- “Japanese Lesson Study” (Jennifer Wilson).

f. In your narrative discuss how all these data impact or have impacted the size, scope or productivity of your program. (200 words)

Over the last five years, the graduate course rotation has been modified to increase class size and minimize cancellations. We offer our courses on a two-year rotation so that an incoming student can complete the M.S. degree in two years. However, due to our students’ work and personal lives, they are not always able to take courses when they are offered. As a result, students are often disappointed with the pace at which course offerings come around. For years, this has negatively impacted our rate of admissions as we discuss plans of study with potential candidates. At times, we have resorted to offering independent studies to students in order to ensure a timely graduation.
g. Is there anything else you would like us to know (this might include a discussion of equipment purchased solely for the purposes of the graduate program). (100 words)

As parenthetical remarks to #6e, more than a third of our students select the Comprehensive Exam as a capstone option. As stipulated on their planned programs, students who select a writing capstone option must present their work in a seminar or at a regional professional meeting.

Human resources in the department are adequate to cover the credit hours and the work related to capstone options that our program generates. Moreover, whatever equipment/technology we use also serves our needs for our undergraduate population.

7) Revenue and other resources generated by the program

a. What are the sources and how much revenue does the program generate through student enrollments?

<table>
<thead>
<tr>
<th>Program</th>
<th>Fiscal Year</th>
<th>Tuition &amp; Fees</th>
<th>Other Revenue</th>
<th>Total Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-MAT</td>
<td>2010</td>
<td>223,300</td>
<td>57,548</td>
<td>280,848</td>
</tr>
<tr>
<td>MS-MAT</td>
<td>2011</td>
<td>242,695</td>
<td>54,961</td>
<td>297,656</td>
</tr>
<tr>
<td>MS-MAT</td>
<td>2012</td>
<td>243,383</td>
<td>97,939</td>
<td>341,322</td>
</tr>
</tbody>
</table>

b. What are the sources and how much additional revenue does the program generate through fees such as laboratory or special user fees? (50 words)

None

c. What are the sources and how much revenue does the program generate by services (e.g., external or to other programs)? (50 words)

None

d. In the narrative on this section discuss how the revenues and other resources impact the size, scope and productivity of your program? (100 words)
Because of the nature of the discipline, the financial dynamic of our M.S. program is rather straightforward. It generates revenue through tuition & fees and “Other Revenue”. The department does not produce additional revenue through any related activities such as laboratories, clinics, services to other programs, etc.

e. Is there anything else you need us to know? (You may wish to discuss grant activity, gifts to the University, etc.) (100 words)

Our department receives gifts in the form of scholarship funds for meritorious undergraduates. There are no such funds for graduate students. Grants are internal to the institution in nature and do not pertain specifically to the graduate program.

8) Costs and other expenses

a. What are the total costs of the program? (table)

<table>
<thead>
<tr>
<th>Program</th>
<th>Fiscal Year</th>
<th>Employee Compensation</th>
<th>Operating Expenses</th>
<th>Allocated Indirect Costs</th>
<th>Total Costs</th>
<th>Net Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-MAT</td>
<td>2010</td>
<td>(66,277)</td>
<td>(330)</td>
<td>(79,932)</td>
<td>(146,539)</td>
<td>134,309</td>
</tr>
<tr>
<td>MS-MAT</td>
<td>2011</td>
<td>(77,431)</td>
<td>(208)</td>
<td>(83,514)</td>
<td>(161,153)</td>
<td>136,503</td>
</tr>
<tr>
<td>MS-MAT</td>
<td>2012</td>
<td>(81,433)</td>
<td>(314)</td>
<td>(92,339)</td>
<td>(174,086)</td>
<td>167,236</td>
</tr>
</tbody>
</table>

b. What is the ratio of costs to revenues? (table)

<table>
<thead>
<tr>
<th>Billing Credit Hours</th>
<th>Rev per Credit Hr</th>
<th>Costs per Credit Hr</th>
<th>Net Income / (Loss) per Billing Credit Hr</th>
<th>% Costs to Revenues</th>
<th>Ratio of Costs to Revenues</th>
<th>Average Ratio for Physical Sciences</th>
<th>Ratio of Program to Discipline Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>496</td>
<td>566.6</td>
<td>270.9</td>
<td>0.52</td>
<td>1.00</td>
<td>0.52 : 1.00</td>
<td>0.61 : 1.00</td>
<td>0.85</td>
</tr>
<tr>
<td>511</td>
<td>583.1</td>
<td>267.4</td>
<td>0.54</td>
<td>1.00</td>
<td>0.54 : 1.00</td>
<td>0.59 : 1.00</td>
<td>0.92</td>
</tr>
<tr>
<td>546</td>
<td>625.1</td>
<td>306.3</td>
<td>0.51</td>
<td>1.00</td>
<td>0.51 : 1.00</td>
<td>0.56 : 1.00</td>
<td>0.91</td>
</tr>
</tbody>
</table>

c. What investment in new resources does the program require? (200 words) 200

As students inquire about our program, they commonly ask “How long will it take me to graduate?” They apply because of our reputation for providing solid content, but they are concerned about their ability to progress through
the program, assuming they might need to repeat a course or occasionally miss out on a course offering. For programs such as ours that are neither large nor tiny, students’ perception of smooth logistics and convenience has a considerable impact on word of mouth and reputation. Although we have managed to maintain our program enrollment numbers, individual course enrollments tend to fluctuate quite a bit. To make matters worse, students typically register at the last minute making graduate courses easy victims of early cancellations. A direct form of support to the program that will keep it attractive to students (prospective and current) would be, when the need occurs, to allow courses to run (within reason) at what the institution would otherwise consider subpar enrollments and to avoid early graduate course cancellations. Also, institutional assistance in advertising and promoting the program is always helpful and will be even more important as we try to reach an audience that is potentially interested in Applied Statistics.

d. What demonstrable efficiencies exist in the way the program is operated (e.g., summer courses; cross-listed courses, etc.)? (100 words)

Our program is not a large one and so a balance between efficiency of scheduling and accessibility to courses is essential. Every graduate course is now on a two-year rotation and three of our core courses are offered in the summer. Our M.S. students for the most part are full-time workers, and they cannot take more than two classes per semester, so summer courses are needed to allow a comfortable two-year program completion. Admittedly, full-time students who seek to speed up the clock get impatient at times, and they bemoan the financial disadvantage of summer offerings.

9) Impact, justification, and overall essentiality of the program

a. How does this program connect to the University’s mission statement and/or the Graduate School’s mission statement? (100 words)

As highlighted in SCSU’s mission statement, the structure and content of our program and the dedication of our qualified faculty contribute to providing our students with a quality graduate education in a very essential discipline. A strong understanding of mathematics is crucial to physics, chemistry and the various engineering fields. By producing well-rounded and competent mathematics educators, we contribute to the betterment of society and the preparation of tomorrow’s skillful workforce.

b. How does this program respond to societal needs that the institution values? (e.g., producing a critical thinking, educated
citizenry; improving the state’s workforce; meeting health care needs of the community, etc.? (100 words)

Please see 9a.

c. To what extent does this program help the institution differentiate itself from similar programs at peer institutions? (100 words)

Our degree is an M.S. in Mathematics Education that provides a blend of solid mathematical content and pedagogical strategies in the mathematics classroom. Our peer institutions in the region either offer a Master’s degree in mathematics or an M.A.T. degree, which is comprised more of pedagogy than mathematics content. For example, CCSU offers an M.A. & M.S. in mathematics and an M.A.T degree, WCSU offers an M.A. in mathematics, Fairfield U. offers an M.S. in mathematics, while ECSU, University of Bridgeport, UNH, Sacred Heart U. and Quinnipiac U. do not offer any graduate degrees in mathematics or mathematics education.

d. Is there anything else you would like us to know? (100 words)

It is difficult to provide an adequate measure of essentiality of our graduate program to the institution’s mission, but it certainly provides an excellent service to the Connecticut academic community and society in general that is very much in the spirit of that mission. Moreover, the program operates at a reasonable profit.

10) Opportunity analysis of the program

a. Describe the external opportunities for strengthening your program. (300 words)

At a national level, in order to face scientific and technological challenges and prepare an adequate workforce, the U.S. has to do a better job of promoting quantitative reasoning and preparing middle school and high school students to study the STEM disciplines. We are seeing an increase in initiatives and partnership programs at both the state and federal levels that are geared toward these goals. More than ever, it is essential to prepare mathematics teachers that can live up to these challenges. They will in turn help educate our future undergraduate population. We believe this external pressure will continue to feed the need for a quality graduate program in
Mathematics Education. Mathematics is a challenging subject, and we have chosen to uphold standards and require hard work on the part of our M.S. candidates. Without compromising quality, we are constantly investigating flexible programmatic practices that take into consideration the way graduate students live and work.

Also, seizing on a demand from the industry for a workforce with better skills in applied statistics (highlighted in a recent report by the Office of Assessment and Planning), we believe that offering a Certificate in Applied Statistics will not only boost enrollments in statistics classes, but it will also have a residual impact on our current offerings.

b. Describe the internal opportunities for strengthening your program. (300 words)

The new Mathematics Emporium that has been proposed will help us provide in-house opportunities for hands-on experience for our graduate students. A semester-long teaching experience in the emporium would be available to the entire graduate population, and it would be a requirement for those seeking their M.S. degree through the 4+1 program currently in development. This proposal will help address a suggestion made by some of our alumni and current students that M.S. candidates should be exposed to a field experience where they can experiment with the strategies studied in their mathematics education courses in a monitored environment.