CHANGE/DELETE GRADUATE PROGRAM PROPOSAL FORM

Contact Name: Martin Jones/Annalisa Calini  Email: jonesm@cofc.edu/calinia@cofc.edu  Phone: 3-5735/3-5732

Department and School Name: Mathematics, SSM
Name and Acronym of Graduate Program: Master of Science in Mathematics, MATH
Date (Semester/Year) changed/deleted program will take effect: Fall 2016

I. CATEGORY OF REVIEW (Check all that apply)

☐ Change Request (attach details):
  ☐ Add existing course or courses to requirements or electives
  ☐ Add new course(s) to requirements or electives (complete and attach COURSE FORM for each)
  ☐ Delete courses from requirements or electives
  ☑ Add new emphasis (check one): ☑ concentration  ☐ track  Total # of hours: 15
    (note: any emphasis involving more than 18 credit hours will also require CHE approval)
  ☐ Modify Admission Requirements
  ☐ Terminate Program (check one):  ☐ Degree  ☐ Certificate  ☐ Emphasis (concentration/track)
    (if checked, skip section II, IV, V, and VII below)

Are students currently enrolled in the program?  ☐ Yes  ☐ No
If yes, what semester will students complete the program?
If the program termination includes deleting courses from the inventory, a COURSE FORM must be included with this form for each course deletion.

☐ Interdisciplinary (attach evidence of acknowledgement from relevant departments)

II. DESCRIPTION OF CHANGES: If a changed program—please explain changes below; if a new emphasis—please provide the details below.

First we will change the name of the degree to Master of Science in Mathematical Sciences. Secondly, we will modify our program to include two concentrations: one in Mathematics and one in Statistics. The requirements for the Mathematics concentration will be unchanged from the degree that we currently offer. The Statistics concentration will consist of courses that we already currently offer. The two concentrations will share a common core of MATH 502, Advanced Linear Algebra.

To ensure consistency with such modifications, we will also change the admission requirements
A bachelor's degree in the mathematical sciences or its equivalent with a minimum GPA of 3.0 in the major is the usual requirement for admission. This undergraduate training should include abstract algebra, differential equations, linear algebra and advanced calculus. Students who have not had all of these courses will still be considered for the program but must make up any deficiencies.

To:

A bachelor's degree in the mathematical sciences or a major with a strong mathematical background, and a minimum GPA of 3.00 in upper division mathematics and statistics courses. Entering students are expected to have courses in multivariable calculus, linear algebra and evidence of sufficient mathematical preparation. Applicants with deficiencies in the prerequisites for required courses in their chosen concentration will still be considered for the program but must make up any deficiencies.

III. RATIONALE or JUSTIFICATION

For changes or termination, please provide a detailed justification. For a new emphasis, briefly address the goals/objectives for the new emphasis, provide evidence of student interest (i.e., has the program offered special topics courses in this area? has the program interviewed student focus groups as part of an internal assessment? etc.), and explain how the emphasis supports the liberal arts tradition and the mission of the institution.

We currently offer a Master of Science in Mathematics, however about half of our course offerings are in Statistics and Probability. Many of our students are interested in graduate-level education in statistics; in fact, since 2005 about half of our students have chosen a focus in Statistics, receiving a degree that does not formalize such focus. In addition, our undergraduate Statistics track has become one of our most popular tracks, and we expect the proposed concentration in Statistics to be attractive to some of the students in this track.

There are also many potential students in the community that would pursue a statistics degree if we were to offer one. For example, just this semester two people from the local workforce enrolled in our Statistics Certificate program in the hope to eventually earn an MS degree, should a Statistics concentration be offered. The main deterrent for those students is the heavy requirements of pure mathematics courses. The proposed modification would broaden the requirement options, making it possible for some students to focus more on statistics while gaining a broader mathematical foundation than is typical in an MS in Statistics. The proposed modification will result in a slight strengthening to the Program of Study for those students who choose to pursue the Mathematics concentration, by requiring two sequences instead of one.

We will also be able to advertise both concentrations to the local community: as of now, we are losing many prospective students coming from local industries and businesses simply because the current program name and requirements falsely suggest a narrower scope. The already significant pipeline of students from local industry is expected to increase substantially, given the economic outlook of the Charleston area that is producing increased demand for graduate-level education in STEM disciplines, as documented in two recent reports Charleston IT Industry Profile and Higher Education Impact Study) commissioned by the Charleston Regional Development Alliance at http://www.crda.org/news/). Local companies that attended our April 2015 Math Graduate Program Open House, where we discussed our aspiration to offer a Statistics concentration, indicated that the proposed changes would be beneficial to them. The list of companies includes ATD, Benefit Focus, Blackbaud, Boeing, Bosch, Enterprise Analytics, and MUSC, to mention a few.
The proposed modification will further enhance the supporting role that our graduate program plays for our undergraduate majors, by increasing opportunities for higher-level courses, mixed research teams, and internships at local companies. The proposed modification would be a small step towards responding to the local demand for graduate-level training in the mathematical sciences (encompassing pure and applied mathematics, and statistics), and is central to our mission of providing high quality higher education in the Mathematical Sciences to serve the region, by training workers from local industry and businesses, and by supplying them with highly skilled employees.

IV. CURRICULUM

Provide the COMPLETE curriculum for the changed program and/or new emphasis distinguishing between required and elective courses. Note pre-requisite courses where appropriate. Note any sequencing of courses or requirements in the program, listed exactly as it should appear in the catalog.

Please see attached curriculum.

Attach the completed COURSE FORM and a sample syllabus for each new course.

Is a syllabus for each new course attached?  □ Yes  □ No

V. STUDENT LEARNING OUTCOMES and ASSESSMENT

<table>
<thead>
<tr>
<th>Program-Level Student Learning Outcomes</th>
<th>Assessment Method and Performance Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>What will students know and be able to do when they complete the program/emphasis? Attach Curriculum Map.</td>
<td>How will each outcome be measured? Who will be assessed, when, and how often? How well should students be able to do on the assessment?</td>
</tr>
<tr>
<td>1. Be able to recognize different statistical models and how to apply them.</td>
<td>1. This outcome will be assessed by means of a random selection of homework projects and in-class tests. Students are expected at the minimum to identify appropriate statistical models in a variety of situations</td>
</tr>
<tr>
<td>2. Understand the mathematical and probabilistic theory behind the construction of statistical models.</td>
<td>2. This outcome will be assessed by means of a random selection of homework projects and in-class tests. Students are expected at the minimum to show mastery of basic theoretical notions and understanding of fundamental theorems. Excellent students will be able to discuss fluently deeper or more complex theoretical constructions and to demonstrate a number of theoretical results, beyond those presented in the classroom and in the textbook, independently and using competent language.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3. Be able to understand the mathematical proofs used in the development of the theory of statistical models and be able to reproduce these ideas.</td>
<td>3. This outcome will be assessed by means of a random selection of homework projects and in-class tests. The Performance Expected is similar as in point 2.</td>
</tr>
<tr>
<td>4. Be able to use statistical models in real applications to model random phenomena.</td>
<td>4. This outcome will be assessed by means of a random selection of homework projects and in-class tests. Students are expected at the minimum to successfully apply the acquired knowledge to the modeling of random processes in a variety of key application areas. Excellent students will be able to establish connections, identify common features, and draw general conclusions about certain classes of random phenomena arising in different applications.</td>
</tr>
</tbody>
</table>

**Additional Outcomes or Comments:**
The new statistics concentration will provide students with skills that are highly sought after in business and industry, and will also provide an excellent basis for continuing education in doctoral programs in statistics. Statistical concepts and techniques are used to model financial markets and production line processes. As a result, students having completed the program will have a much higher marketability in the workplace and be much more attractive to PhD programs in Statistics.

**VI. IMPACT ON EXISTING PROGRAMS and COURSES** Please briefly document the impact of this changed/deleted program or new emphasis on other programs and courses; if changing/deleting a program—list all programs that will be impacted (and how); if adding a new emphasis—explain any overlap with existing programs or courses in the same or different departments.

This change will definitely increase the number of students interested in pursuing a Master of Science degree in our department. Moreover, this change will likely increase the attractiveness of our undergraduate track in Statistics (already the most popular of our tracks).
Is this changed/deleted program used by others? □ Yes  X No  
If yes, please provide a letter of support in each case.

**VII. COSTS ASSOCIATED WITH THE ACTION REQUESTED** List all of the new costs or cost savings, (including new faculty/staff requests, library or equipment, etc.) associated with the action requested.

| No new faculty lines or other new need for major resources are associated with this request. If the student numbers increase as projected, there will be some increase in costs associated with student administration, materials and supplies. We anticipate that the net gain from the program will be positive. Over a five-year period we estimate a net gain of over $300,000 from the program. (See p. 8 of the CHE Program Modification Form for relevant estimates.) |
VIII. APPROVAL and SIGNATURES

Signature of Program Director:  
[Signature]  Date: 9/14/15 9/28/2015

Signature of Department Chair:  
[Signature]  Date: 9/29/15

Signature of School Dean:  
[Signature]  Date: 9/28/15

Signature of the Provost:  
[Signature]  Date: 10/14/15

Return form to the Graduate School Office for Further Processing

Signature of Chair of the Faculty Committee on Graduate Education, Continuing Education & Special Programs:  
[Signature]  Date: 11/1/2015

Signature of Chair of the Graduate Council:  
[Signature]  Date: 11/20/15

Signature of Faculty Senate Secretary:  
[Signature]  Date: 

Date Approved by Faculty Senate: 

September 2011
Master of Science Degree in Mathematical Sciences
Curriculum

Program Requirements

The proposed Master of Science in Mathematical Sciences requires 30 hours of coursework or 24-27 hours of coursework plus a thesis. The program has two concentrations, a Concentration in Mathematics and a Concentration in Statistics. Students choose one of these concentrations when designing their program of study.

Required Core course (3 hours)

Math 502 (Advanced Linear Algebra)

Required Selection from Cross section of Mathematical Science Areas (9 hours)

Math 503 (Applied Algebra I) Math 530 (Mathematical Statistics I)
Math 511 (Real Analysis I) Math 550 (Linear Models)
Math 515 (Complex Variables) Math 555 (Bayesian Methods)

Concentration in Mathematics Requirements (25 hours)

a. Two sequences chosen from the following list:
   • Math 503-Math 604 (Applied Algebra I and II);
   • Math 511-Math 612 (Real Analysis I and II);
   • Math 511-Math 515 (Real Analysis I and Complex Variables, in either order);
   • Math 545-Math 645 (Numerical Analysis I and II);
   • Math 523-Math 623 (Partial Differential Equations I and II)

b. One additional course chosen from the following list:
   • Math 523 (Partial Differential Equations),
   • Math 545 (Numerical Analysis I),
   • Math 601 (Topology),
   • Math 607 (Discrete Mathematics),
   • Math 624 (Dynamical Systems).

c. Remaining courses selected from 500, 600 or 700-level courses.
Concentration Statistics Requirements (15 hours)

a. Two sequences chosen from the following list:
   - Math 530-Math 531 (Mathematical Statistics I and II);
   - Math 540-Math 541 (Statistical Learning I and II)
   - Math 551-Math 552 (Linear Programming and Operations Research)
   - Math 650-Math 651 (Statistical Quality Control and Design of Experiments)
   - Math 660-Math 661 (Stochastic Processes and Time Series Analysis)

b. One additional course chosen from the following list:
   - Math 540 (Statistical Learning I)
   - Math 551 (Linear Programming and Optimization),
   - Math 552 (Operations Research),
   - Math 660 (Stochastic Processes)
   - Math 661 (Time Series Analysis)
   - Math 650 (Statistical Quality Control)
   - Math 651 (Design of Experiment)

c. Remaining courses selected from 500, 600 or 700-level courses.
Sample Programs of Study

The following samples illustrate programs of study within each concentration. Students will be able to select courses beyond the core that place more emphasis on areas of mathematics or statistics within each concentration. Samples of program of studies with Thesis option (existing in the current program) are also shown.

A. M.Sc. Degree in Mathematical Sciences: Concentration in Mathematics

General Interest in Mathematics Option 1

Fall
Math 502 Advanced Linear Algebra
Math 511 Real Analysis

Spring
Math 503 Applied Algebra I
Math 515 Complex Analysis

Summer
Math 601 Topology

Fall
Math 523 Partial Diff. Eqs. I
Math 545 Numerical Analysis I
Math 604 Applied Algebra II

Spring
Math 607 Discrete Structures
Math 612 Real Analysis II

General Interest in Mathematics Option 2

Fall
Math 502 Advanced Linear Algebra
Math 511 Real Analysis

Spring
Math 503 Applied Algebra I
Math 515 Complex Analysis

Summer
Math 601 Topology

Fall
Math 523 Partial Diff. Eqns. I
Math 545 Numerical Analysis I
Math 604 Applied Algebra II

Spring
Math 623 Partial Diff. Eqns. II
Math 624 Dynamical Systems
Mathematics with Thesis Option

**Fall**

Math 502 Advanced Linear Algebra  
Math 511 Real Analysis

**Spring**

Math 503 Applied Algebra I  
Math 515 Complex Analysis

**Summer**

Math 604 Applied Algebra II

**Fall**

Math 523 Partial Diff. Eqns. I  
Math 545 Numerical Analysis I  
Math 700 Thesis

**Spring**

Math 700 Thesis  
Math 624 Dynamical Systems

Mathematics (Applied Mathematics Emphasis)

**Fall**

Math 502 Advanced Linear Algebra  
Math 511 Real Analysis  
Math 551 Linear Programming/Opt

**Spring**

Math 503 Applied Algebra I  
Math 552 Operations Research

**Summer**

Math 660 Stochastic Processes

**Fall**

Math 523 Partial Diff. Eqns. I  
Math 545 Numerical Analysis I

**Spring**

Math 515 Complex Variables  
Math 645 Numerical Analysis II
B. M.Sc. Degree in Mathematical Sciences: Concentration in Statistics

General Interest in Statistics

Fall
Math 502 Advanced Linear Algebra
Math 530 Mathematical Statistics I

Spring
Math 531 Mathematical Statistics II
Math 552 Operations Research

Summer

Math 660 Stochastic Processes or Math 661 Time Series Analysis

Fall
Math 550 Linear Models
Math 540 Statistical Learning I
Math 551 Linear Programming

Spring
Math 555 Bayesian Methods
Math 541 Statistical Learning II

Statistics with Thesis Option

Fall
Math 502 Advanced Linear Algebra
Math 530 Mathematical Statistics I

Spring
Math 531 Mathematical Statistics II
Math 555 Bayesian Methods

Summer

Math 660 Stochastic Processes

Fall
Math 550 Linear Models
Math 540 Statistical Learning I
Math 700 Thesis

Spring
Math 700 Thesis
Math 541 Statistical Learning II

Statistics (Quality Control Emphasis)

Fall
Math 502 Advanced Linear Algebra
Math 530 Mathematical Statistics I
Math 551 Linear Programming

Spring
Math 531 Mathematical Statistics II
Math 552 Operations Research
Summer

Math 661 Time Series Analysis

Fall

Math 550 Linear Models
Math 650 Statistical Quality Control

Spring

Math 555 Bayesian Methods
Math 651 Design of Experiments
### Comparison Chart:

**Current Mathematics MS versus Proposed Mathematical Sciences MS**

<table>
<thead>
<tr>
<th>Core Requirements</th>
<th>Current MS Program</th>
<th>Proposed MS Program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Math 502 (required for all)</td>
<td>Math 502 (required for all)</td>
</tr>
<tr>
<td></td>
<td>Three out of:</td>
<td>Three out of:</td>
</tr>
<tr>
<td></td>
<td>Math 503, 511, 515, 530</td>
<td>Math: 503, 511, 515, 530</td>
</tr>
<tr>
<td></td>
<td>Math: 550, 555</td>
<td></td>
</tr>
<tr>
<td>Depth Requirements</td>
<td>1 sequence (from amongst 3 sequences)</td>
<td>2 sequences from two sets of 5 sequences (one set per concentration)</td>
</tr>
<tr>
<td>Additional focus requirement</td>
<td>None</td>
<td>3 credits</td>
</tr>
<tr>
<td>Comments on Requirements</td>
<td><em>Emphases of core requirements are: algebra (503), and analysis (511, 515, 530)</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>530 is Mathematical Statistics (analysis based probability)</em></td>
<td><em>Emphases of core requirements are: algebra (503, 550), and analysis (511, 515, 530).</em></td>
</tr>
<tr>
<td></td>
<td><em>555 is a blend of core topics and is method-based</em></td>
<td></td>
</tr>
<tr>
<td>Sample Plan of Study: focus on Statistics</td>
<td>Recent Graduate (S15): 502, 511, 515, 530, 531, 540, 541, 550, 555, 699</td>
<td>May change to: 502, 530, 531, 540, 541, 550, 555, 660, 661, 699</td>
</tr>
<tr>
<td></td>
<td>--less emphasis on pure algebra and pure analysis</td>
<td>--more emphasis on analysis done in context</td>
</tr>
<tr>
<td></td>
<td>--more emphasis on analysis done in context</td>
<td>--core requirements change by a maximum of 2 courses</td>
</tr>
<tr>
<td></td>
<td>-- require more depth in pure/applied mathematics focus (due to the 2-sequence requirement)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-- core requirements typically do change for students interested in pure/applied mathematics</td>
<td></td>
</tr>
</tbody>
</table>
Why is this a Program Modification and not a New Program?


A. Policy for New Programs

1. New degree programs are:
   a) offerings in any academic degree program that conclude with the conferral of a degree at any level in any field or major not previously offered;
   b) courses constituting 50 percent or more of a program of study not previously approved by the Commission offered on-campus or off-site by any instructional modality within a three-year period for associate’s, baccalaureate, specialist, or master’s programs, or within a five-year period for doctoral programs;
   c) any program offered at one degree level proposed to be offered at another level (e.g., the institution offers a B.A. and wants to offer an M.A.);
   d) new teacher programs including add-ons or endorsements;
   e) the addition of concentrations in educator preparation programs that lead to initial certification; or
   f) any existing program which changes to such an extent that a change in CIP code is required or for which a change to the CIP code is requested.

Comments on:

a) The proposal does not lead to any new degree nor new major, it just adds a concentration structure to the existing program. Programs of study will not undergo any major change: core requirements in POSs may change up to two courses; and there is an additional sequence requirement (which strengthens the program). Note that we recently added a Statistics track to our BS: this proposal aims to create a track/concentration structure for the MS.

f) Our CIP code is the most general code for Mathematics degrees. It remains the same.

B. Policy for Program Modifications

1. Program modifications are:
   a) the extension or transfer of an existing, approved program to a site that is different from the location(s) or site(s) already authorized, including out-of-state or out-of-country sites, where instruction is delivered in primarily traditional format or in a combination of traditional and distance education formats, where
over 50 percent of the curriculum is offered at the site(s) within a period of three years for associate’s, baccalaureate, specialist, master’s and doctoral-professional practice programs, or within a five-year period for doctoral-research/scholarship programs.
b) the addition of new concentrations, tracks, options, specializations, emphases, or cognates offered within an existing major that total more than 18 credit hours for undergraduate programs or more than 12 credit hours for master’s, specialist, and doctoral programs (except in the case of adding new concentrations to programs that prepare teachers and other school professionals for initial certification, which are to be treated as a new program);
c) a change which takes an existing concentration and makes it a new program if the new program is to be offered under a similar CIP code;
d) substantive changes in program goal, purpose, curriculum, or target audience that do not require a change in the CIP code;
e) a change in the degree designation of a program when this change involves a significant shift in the program’s purpose (e.g., B.A. to B.F.A.; M.A. to M.F.A.; or M.S. to M.B.A.; or B.A. to B.S.; M.A. to M.S.; or A.A. to A.S.); or
f) the reconfiguration of a number of existing related degrees into a single degree (e.g., B.A. in French; B.A. in German; and B.A. in Spanish collapsed into a B.A. in Modern Languages).

Comments:

b) The proposal fits this case well.

d) The proposal does not change any of these categories in any substantial way. The student target population remains the same: students from and aspiring to go into industry, students getting ready for doctoral programs, students from and aspiring to go into high school, and 2- and 4-year college teaching. The effect of the Concentration in Statistics and the change in requirements will increase the students coming from local industry. There are strong potential students out there who we are missing out because of the current requirements.
College of Charleston DegreeWorks (PDF): Student View

<table>
<thead>
<tr>
<th>Student View</th>
<th>as of 11/11/2015 at 11:45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student ID</td>
<td>12345</td>
</tr>
<tr>
<td>Level</td>
<td>Graduate</td>
</tr>
<tr>
<td>Classification</td>
<td>Graduate Master's</td>
</tr>
<tr>
<td>Major</td>
<td>MATH</td>
</tr>
<tr>
<td>Concentration</td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td></td>
</tr>
<tr>
<td>Catalog Year</td>
<td>2013-2014</td>
</tr>
<tr>
<td>Degree</td>
<td>MASTER OF SCIENCE</td>
</tr>
<tr>
<td>Transfer Hours Earned</td>
<td>0</td>
</tr>
<tr>
<td>C of C Hours Earned</td>
<td>30</td>
</tr>
<tr>
<td>Overall Hours Earned</td>
<td>30</td>
</tr>
<tr>
<td>Academic Standing</td>
<td>Good Standing</td>
</tr>
<tr>
<td>Overall GPA</td>
<td>3.950</td>
</tr>
</tbody>
</table>

Legend
- Complete
- Complete except for classes in progress
- Near complete - see Registrar
- Indicates a pre-requisite exists for the course
- (TR) Transfer class
- (PR) Presently registered
- (G) Three YR Option
- (PT) Pending transcript
- (R) Repeat Include GPA
- (X) Repeat Exclude Hours, GPA

Master of Science

Program Requirements

<table>
<thead>
<tr>
<th>Mathematics - MS</th>
<th>GPA</th>
<th>Catalog Year</th>
<th>2013 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Linear Algebra</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 502 Adv Linear Algebra</td>
<td>A</td>
<td>3 2013 Fall</td>
<td></td>
</tr>
<tr>
<td>MATH 511 Real Analysis I</td>
<td>B+</td>
<td>3 2013 Fall</td>
<td></td>
</tr>
<tr>
<td>Three Additional Courses from Core Curriculum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 515 Complex Variables</td>
<td>A</td>
<td>3 2014 Spring</td>
<td></td>
</tr>
<tr>
<td>MATH 530 Mathematical Statistics I</td>
<td>A</td>
<td>3 2013 Fall</td>
<td></td>
</tr>
<tr>
<td>MATH 540 Statistical Learning I</td>
<td>A</td>
<td>3 2014 Fall</td>
<td></td>
</tr>
<tr>
<td>MATH 541 Statistical Learning II</td>
<td>A</td>
<td>3 2015 Spring</td>
<td></td>
</tr>
<tr>
<td>MATH 550 Linear Models</td>
<td>A</td>
<td>3 2014 Fall</td>
<td></td>
</tr>
<tr>
<td>MATH 555 Bayesian Statistical Methods</td>
<td>A</td>
<td>3 2014 Spring</td>
<td></td>
</tr>
<tr>
<td>MATH 699 Independent Study In Math</td>
<td>A</td>
<td>3 2015 Spring</td>
<td></td>
</tr>
<tr>
<td>MATH 502 Adv Linear Algebra</td>
<td>A</td>
<td>3 2013 Fall</td>
<td></td>
</tr>
<tr>
<td>MATH 511 Real Analysis I</td>
<td>B+</td>
<td>3 2013 Fall</td>
<td></td>
</tr>
<tr>
<td>MATH 515 Complex Variables</td>
<td>A</td>
<td>3 2014 Spring</td>
<td></td>
</tr>
<tr>
<td>MATH 530 Mathematical Statistics I</td>
<td>A</td>
<td>3 2013 Fall</td>
<td></td>
</tr>
<tr>
<td>MATH 531 Mathematical Statistics II</td>
<td>A</td>
<td>3 2014 Spring</td>
<td></td>
</tr>
<tr>
<td>MATH 540 Statistical Learning I</td>
<td>A</td>
<td>3 2014 Fall</td>
<td></td>
</tr>
<tr>
<td>MATH 541 Statistical Learning II</td>
<td>A</td>
<td>3 2015 Spring</td>
<td></td>
</tr>
<tr>
<td>MATH 550 Linear Models</td>
<td>A</td>
<td>3 2014 Fall</td>
<td></td>
</tr>
<tr>
<td>MATH 555 Bayesian Statistical Methods</td>
<td>A</td>
<td>3 2014 Spring</td>
<td></td>
</tr>
<tr>
<td>MATH 699 Independent Study In Math</td>
<td>A</td>
<td>3 2015 Spring</td>
<td></td>
</tr>
</tbody>
</table>

Math Electives

Summary of Courses Applied to Degree

Disclaimer
### Student View as of 11/11/2015 at 11:47

<table>
<thead>
<tr>
<th>Student ID</th>
<th>Major</th>
<th>Catalog Year</th>
<th>Degree Year</th>
<th>Transfer Hours Earned</th>
<th>C of C Hours Earned</th>
<th>Overall Hours Earned</th>
<th>Academic Standing</th>
<th>Overall GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MATH</td>
<td>2012-2013</td>
<td>MASTER OF SCIENCE</td>
<td>0</td>
<td>30</td>
<td>30</td>
<td>Good Standing</td>
<td>4.000</td>
</tr>
</tbody>
</table>

### Legend
- Complete
- Complete except for classes in progress
- Nearly complete - see Registrar indicates a pre-requisite exists for the course
- (TR) Transfer class
- (G) Three YR Option
- (R) Repeat Include GPA
- (PR) Presently registered
- (PT) Pending Transcript
- (X) Repeat Exclude Hours, GPA
- @ Any course number

### Program Requirements

#### Mathematics - MS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>GPA</th>
<th>Catalog Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 502</td>
<td>Adv Linear Algebra</td>
<td>A</td>
<td>2013 Fall</td>
</tr>
<tr>
<td>MATH 503</td>
<td>Applied Algebra I</td>
<td>A</td>
<td>2014 Spring</td>
</tr>
<tr>
<td>MATH 511</td>
<td>Real Analysis I</td>
<td>A</td>
<td>2013 Fall</td>
</tr>
<tr>
<td>MATH 515</td>
<td>Complex Variables</td>
<td>A</td>
<td>2014 Spring</td>
</tr>
</tbody>
</table>

#### MATH SEQUENCE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>GPA</th>
<th>Catalog Year</th>
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<tbody>
<tr>
<td>MATH 511</td>
<td>Real Analysis I</td>
<td>A</td>
<td>2013 Fall</td>
</tr>
<tr>
<td>MATH 515</td>
<td>Complex Variables</td>
<td>A</td>
<td>2014 Spring</td>
</tr>
<tr>
<td>MATH 523</td>
<td>Partial Differential Equat I</td>
<td>A</td>
<td>2013 Fall</td>
</tr>
<tr>
<td>MATH 585</td>
<td>Topics In Pure Math</td>
<td>A</td>
<td>2014 Fall</td>
</tr>
<tr>
<td>MATH 601</td>
<td>General Topology</td>
<td>A</td>
<td>2014 Spring</td>
</tr>
<tr>
<td>MATH 699</td>
<td>IS Calculus on Manifolds</td>
<td>A</td>
<td>2013 Summer</td>
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#### Math Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>GPA</th>
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<tbody>
<tr>
<td>MATH 502</td>
<td>Adv Linear Algebra</td>
<td>A</td>
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</tr>
<tr>
<td>MATH 503</td>
<td>Applied Algebra I</td>
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<tr>
<td>MATH 511</td>
<td>Real Analysis I</td>
<td>A</td>
<td>2013 Fall</td>
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<tr>
<td>MATH 515</td>
<td>Complex Variables</td>
<td>A</td>
<td>2014 Spring</td>
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<td>A</td>
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</tr>
<tr>
<td>MATH 585</td>
<td>Topics In Pure Math</td>
<td>A</td>
<td>2014 Fall</td>
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<tr>
<td>MATH 601</td>
<td>General Topology</td>
<td>A</td>
<td>2014 Spring</td>
</tr>
<tr>
<td>MATH 699</td>
<td>IS Calculus on Manifolds</td>
<td>A</td>
<td>2013 Summer</td>
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<tr>
<td>MATH 699</td>
<td>Independent Study in Math</td>
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#### Summary of Courses Applied to Degree

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Catalog Year</th>
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<tbody>
<tr>
<td>MATH 700</td>
<td>Thesis</td>
<td></td>
<td>2015 Spring</td>
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</table>

### Exceptions

<table>
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<tr>
<th>Type</th>
<th>Description</th>
<th>Date</th>
<th>Who</th>
<th>Block</th>
<th>Enforced</th>
</tr>
</thead>
</table>

Mathematics, M.S. Program of Study

The Master of Science in Mathematics requires 30 hours of coursework or 27 credit hours of coursework and a thesis.

Complete 3 credit hours

MATH 502 Advanced Linear Algebra (3)

Complete 9 credit hours from the following core curriculum courses:

MATH 503 Applied Algebra I (3)

MATH 511 Real Analysis I (3)

MATH 515 Complex Variables (3)

MATH 530 Mathematical Statistics I (3)

Complete one of the following sequences (6 credit hours):

Mathematical Statistics I & II MATH 530 (3) and MATH 531 (3)

OR

Applied Algebra I & II MATH 503 (3) and MATH 504 (3)

OR

Real Analysis I & II MATH 511 (3) and MATH 512 (3)

OR

Complex Variables & Real Analysis I MATH 511 (3) and MATH 515 (3)

Complete 12 - 15 credit hours from MATH course at the 500-level or higher.

Note: The frequency with which courses are offered is determined primarily by student needs and a balanced program. Following each course description is a code indicating the Department of Mathematics plans to offer the course: F-every fall; S-every spring; O - odd year fall; E - even year fall; Ss - odd year spring; Es - even year spring; sSu - odd year summer; eSu - even year summer. Schedule is subject to change based on student interests, faculty availability, curriculum changes and other factors. Courses without a code are offered when there is sufficient interest from students and faculty.
# MS in Mathematics Current Course Offerings

<table>
<thead>
<tr>
<th>Mathematics</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 502 Advanced Linear Algebra</td>
<td>Math 502 Advanced Linear Algebra</td>
</tr>
<tr>
<td>Math 503 Applied Algebra I</td>
<td>Math 530 Mathematical Statistics I</td>
</tr>
<tr>
<td>Math 511 Real Analysis I</td>
<td>Math 531 Mathematical Statistics II</td>
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<tr>
<td>Math 515 Complex Variables</td>
<td>Math 540 Statistical Learning I</td>
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<tr>
<td>Math 523 Partial Differential Equations I</td>
<td>Math 541 Statistical Learning II</td>
</tr>
<tr>
<td>Math 545 Numerical Analysis I</td>
<td>Math 550 Linear Models</td>
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<tr>
<td>Math 601 General Topology</td>
<td>Math 551 Linear Programming</td>
</tr>
<tr>
<td>Math 604 Applied Algebra II</td>
<td>Math 552 Operations Research</td>
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<tr>
<td>Math 607 Discrete Mathematics</td>
<td>Math 555 Bayesian Methods</td>
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<tr>
<td>Math 612 Real Analysis II</td>
<td>Math 650 Quality Control</td>
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<td>Math 623 Partial Differential Equations II</td>
<td>Math 651 Design of Experiments</td>
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<tr>
<td>Math 624 Dynamical Systems</td>
<td>Math 660 Stochastic Processes</td>
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<tr>
<td>Math 645 Numerical Analysis II</td>
<td>Math 661 Time Series</td>
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<tr>
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