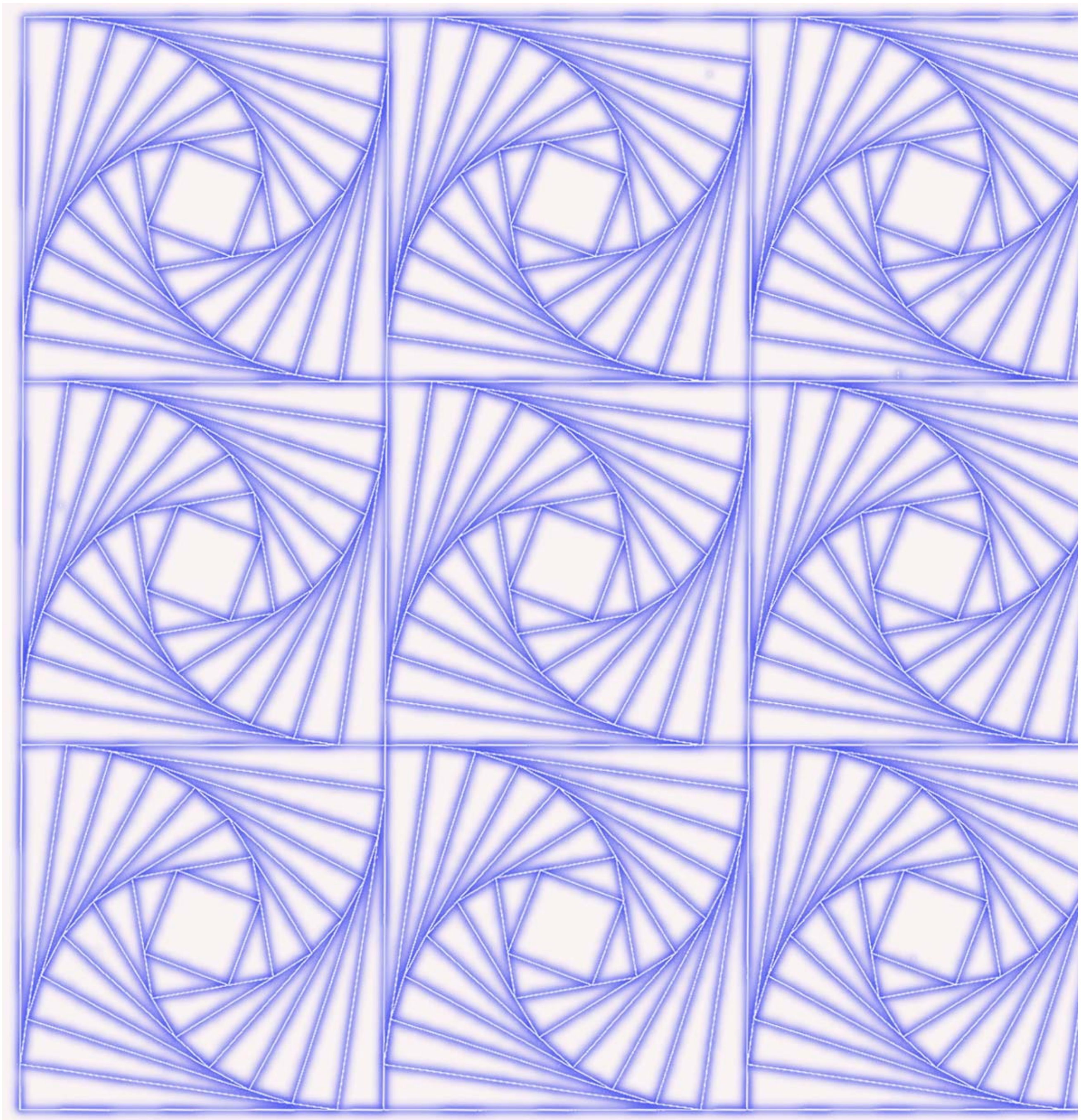
MATHEMATICS

Undergraduate Program



2015-2016

THE DEPARTMENT OF MATHEMATICS

UNIVERSITY OF SOUTH CAROLINA—COLUMBIA

Last updated June 29, 2015

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Note: *Students interested in the Master of Arts in Teaching (MAT) degree may also obtain information from the Department of Mathematics Graduate Director.*

IMPORTANT USC WEBSITES

Self-Service Carolina	**http://ssb.onecarolina.sc.edu/**
Undergraduate Bulletin	**http://bulletin.sc.edu/**
Blackboard	**https://blackboard.sc.edu/**
VIP	**https://vip.sc.edu/**
General Education: Carolina Core	**http://www.sc.edu/carolinacore/courses.php**
Student Success Center	**http://www.sc.edu/ssc/**
Supplemental Instruction	**http://www.sa.sc.edu/supplementalinstruction/**
Career Center	**http://www.sc.edu/career/**
Department of Mathematics	**http://www.math.sc.edu/**
College of Arts and Sciences	**http://www.cas.sc.edu/**
University of South Carolina	**http://www.sc.edu/**

DegreeWorks

DegreeWorks is a web-based tool for you to monitor your academic progress toward degree completion by reviewing a degree audit. It allows you and your advisor to plan future coursework. DegreeWorks reorganizes your transcript chronologically and categorically, easily identifying courses you have completed and what courses you still need in order to fulfill your degree requirements. While efforts have been made to ensure accuracy; final responsibility for meeting requirements resides with the student. As of this time, DegreeWorks is available to advisors but not directly by students. When student access is provided, it will be students will be able to access it from within Self-Service Carolina.

A GUIDE FOR UNDERGRADUATE MAJORS
IN
MATHEMATICS

WHAT IS MATHEMATICS

Did you ever notice those little whirlpools, or vortices, that are swept downstream from the piers of a bridge, or that spin off the end of your oar when you are rowing a boat? That same thing happens in the slipstream of a car or an airplane, or in the wind blowing past a tall building. In some instances, it may be a small effect, but at higher velocities, they may affect the drag on a car or an airfoil and in extreme cases, the resonance produced may be large enough to bring down bridges or the cooling towers of a power station. In studying the case of a wind tunnel or any other situations, a scale model has to be built and modified every time changes are desired.

Here is where the mathematics comes in; we build a mathematical model. The only real construction that goes on here is in our minds. By formulating the mathematical equations that govern the process, we can attempt to solve them mathematically to obtain a description of what will happen in the real world. This is not always an easy process. Often the models have to be so complicated to take into account all the factors involved that solving them explicitly is impossible. However, sophisticated mathematical techniques can be used to generate approximate solutions on high-speed computers. The mathematics allows us to build the model, to go as far as we can with theoretical means to solve it, to organize it in a suitable form for computer processing, and to analyze the results. Frequently, the results obtained provide new insights into the mechanisms involved, thereby enabling the mathematical model to be improved.

The process is called computer simulation. It is used extensively in the design of automobiles and airplanes, in energy resource discovery and recovery, and to understand complex industrial processes such as chemical reactions or the reactions that occur inside a nuclear reactor. This is mathematics at work. Remember that the computer only does what it is told to do (very quickly, of course), and so highly trained mathematical scientists, teamed with specialists from other areas, are essential to the success of such ventures. Industry is increasingly turning to mathematical modeling and computer simulation as the primary tools in its research and development operations, particularly since the advent of the supercomputer.

Does all of mathematics require the use of a computer? Not at all, but the process of discovery in any area of mathematics is similar to that in modeling and simulation. The problem is formulated in mathematical terms, modeled, analyzed, perhaps only partially resolved, modified, analyzed again, and so on, until a solution is obtained. And all of science is so inherently mathematical that expertise in mathematics is essential nowadays in virtually every branch of science and engineering, and even in business administration and the social sciences. Mathematics is indeed the language of science, the universal means of expression, and the source of communication between diverse disciplines.

CAREER OPPORTUNITIES IN MATHEMATICS

In today's world of rapidly expanding technology, there are many career opportunities for the well-qualified mathematician. Business, government, and industry have strong needs for mathematicians in areas such as operations research, optimization, numerical analysis, computer programming, systems analysis, communications, statistics, and information and actuarial science. Whether it be in operations research, systems analysis, computer software and hardware development, modeling and simulation, numerical analysis, development and test of algorithms, cryptology, or teaching, some familiarity with computers and the mathematics of computation is usually essential. The mathematics degree, at the baccalaureate, masters, or doctoral level, provides the grounding in analytical thinking and the scientific skills necessary to function in today's interdisciplinary environment. The Bachelor of Science degree is a sound preparation for graduate study in mathematics or any of the mathematical sciences, but also for advanced degrees in business administration and some of the quantitative social sciences. A bachelor's degree in mathematics can also provide entry to careers in fields such as management, engineering, banking, insurance, government service, the military, and geology.

An excellent source for information about careers in the mathematical sciences is the Mathematical Association of America (MAA). The pamphlets "Careers in the Mathematical Sciences" and "More Careers in the Mathematical Sciences" provide an indication of the variety of careers available to persons with interest and preparation in the mathematical sciences. Copies may be obtained from the Department of Mathematics Undergraduate Office in LeConte College 413. The following websites are excellent sources of career information in mathematics, applied mathematics and actuarial science:

www.maa.org/students/careers/	www.beanactuary.com
www.ams.org/careers/	www.whydomath.org
www.siam.org/careers/	weusemath.com

The following is a partial list of employers who were recruiting math majors on campus during recent years:

Accenture	Mass Mutual	Texas Instruments
AT&T	Microsoft Corporation	United States Air Force
Blue Cross/Blue Shield of South Carolina	National Security Agency	United States Bureau of Labor Statistics
Central Intelligence Agency	Naval Air Systems Command	United States Bureau of the Census
Colonial Life	Naval Surface Weapons Center	United States Coast Guard
Computer Services Corporation (CSC)	National Cash Register (NCR)	United States Department of Energy
Computer Task Group	South Carolina Department of Education	United States General Accounting Office
Duke Power Company	Southern Teachers Agency	United States Office of Comptroller of the Currency
Gildan Branded Apparel	Spring Industries	Westinghouse
Hawkes Learning Systems	State Farm Insurance	Xerox
Kennedy Space Center	TCube Solutions	

The Undergraduate Program webpage, www.math.sc.edu/undergraduate/, includes an electronic version of this document with active hyperlinks to employment information at many of the above corporations and agencies. Be sure to visit the "Career advice for math majors" link. The US Department of Labor, Bureau of Labor Statistics, maintains an Occupation Outlook Handbook at http://www.bls.gov/ooh/. This is an excellent source of general information about almost any career.

Job prospects depend on your educational background and personal interest. Mathematics majors are encouraged to take several courses in a field that uses or is closely related to mathematics. Popular choices include education, statistics, biology or other physical science, business, finance, and computer science. A double major in mathematics and computer science, or mathematics and statistics, is particularly attractive to employers. The actuarial emphasis combines a major in mathematics with a strong background in statistics and business (accounting, economics, and finance). This program is particularly suited for students interested in becoming an actuary or other finance-related career.

MATHEMATICS AT USC

The University of South Carolina is fast evolving into one of the premier mathematics research centers in the Southeast. The distinguished faculty has attracted national and international recognition through the quality of its research program. The Department has particular strengths in mathematical analysis, discrete mathematics, linear algebra, differential geometry, commutative algebra, logic, number theory, topology, and numerical analysis. It is thus uniquely poised to provide undergraduate and graduate students with the broad background in pure and applied mathematics necessary to perform in today's high-tech environment, whether in an industrial, business, governmental, or academic setting. The Department also maintains a strong commitment to excellence in teaching and proudly counts a number of award-winning teachers among its ranks.

Department computing facilities are excellent. In addition to various University mainframe and workstation computers available via the campus network and in numerous satellite laboratories, the Department houses a number of computer-equipped classrooms and open computer labs. A large collection of mathematical and statistical software is installed on these computers for use in courses and research.

DEGREE PROGRAMS

The Department of Mathematics offers the Bachelor of Science degree in Mathematics. The major is completed with 120 semester hours of overall coursework. The BS in Mathematics requires 27 semester hours (9 courses) of mathematics beyond calculus. Four of these courses are required of all students, the other five can be chosen to best fit each student's interests and desires. Four common pathways to complete the mathematics electives are:

- **General Mathematics –** Requires 24 semester hours of mathematics courses beyond calculus (comprising the required core of 15 semester hours and nine semester hours of mathematics electives). Students interested in pursuing a graduate degree in mathematics should complete chose their mathematics electives to include at least one of the two-course sequences in algebra or analysis and often complete the B.S. in Mathematics in Distinction (described below).
- **Mathematics Education –** Leads to a bachelor's degree in mathematics, with a 12-semester hour education cognate. Certification is obtained upon completion of the Master of Teaching degree program in Secondary Education. In addition to the four core courses, the pathway includes courses in number theory and geometry.
- **Applied Mathematics –** Offers specialization in applied or computational mathematics. Students are encouraged to select a diverse set of mathematics electives in such disciplines as differential equations and modeling, discrete mathematics, financial mathematics and probability, optimization and computation, and analysis. Applied mathematics majors are encouraged to select a cognate, minor, or second major that complements their mathematical interests; common choices include computer science, statistics, one of the physical sciences, and engineering.
- **Actuarial Mathematics –** Offers a program of study designed to prepare students for the actuarial profession in the insurance and financial securities industries. In addition to the required core mathematics courses, this pathway includes mathematics courses in probability, differential equations, discrete mathematics, and optimization. In addition to several Statistics courses, students should complete courses in Accounting, Economics, and Finance that satisfy the requirements for a minor in Risk Management and Insurance. Some actuarial students chose to pursue double majors in Mathematics and Statistics (and the minor in Risk Management and Insurance).

In addition to the major requirements, each student is required to complete a minor (18 hours of courses related to a common topic) or a cognate (12 hours of integrated courses from a single department) in a discipline related to, but distinct from the major. Note that the Actuarial and Education pathways include a cognate and/or minor.

The **B.S. in Mathematics with Distinction** is awarded to students who complete an additional 12 semester hours of approved upper-division mathematics courses, an undergraduate research experience, and an undergraduate thesis.

The department also offers a five-year program of study leading to a Bachelor of Science degree and a Master of Science degree in Mathematics. The program is designated to permit an outstanding student to obtain both a bachelor's degree and a master's degree in mathematics in five years.

ADVISING

When you enroll as mathematics major, the Director of Undergraduate Studies will initially advise you. You will have a Lower-Level Advisor until you have completed the three-semester calculus sequence (MATH 141, 142, and 241). An Upper-Level Advisor will be assigned to you as you make the transition to upper division mathematics courses (by taking MATH 300). Your advisor will assist in formulating your program of study and preparing you for the beginning of your career (or further education). While the advisor's role is to provide guidance, the student has final responsibility for staying fully informed on University deadlines and relevant academic policies.

It is essential that you meet with your advisor each semester so that you can plan your course of studies for the following semester. The advisement process must be completed before the student can register for the next semester. Most advisement appointments are made through the Undergraduate Office (LeConte 413). You should receive an e-mail from the Undergraduate Director or Program Administrator concerning advisement procedure. If you have not been notified by mid-semester, please see the Undergraduate Program Administrator in LeConte 413. *To increase your likelihood of getting the courses you want and need, please be certain to be advised during the regular advisement period.*

Academic and personal problems do arise, of course, and we encourage you to discuss them with your advisor at any time. When you have a special problem that is beyond your advisor's authority (such as variations on requirements or special cognates), or when your advisor is not available and you need assistance, contact the Undergraduate Program Administrator in LeConte 413 to set up an appointment with the Director of Undergraduate Studies.

A *Senior Records Check* needs to be completed one year before you plan to graduate. When you have earned approximately 95 credit hours, ask your advisor to complete a *Major Program Card*. This involves listing all major and cognate/minor courses that you intend to take to fulfill the degree requirements. The purpose of this check is to identify all unfulfilled graduation requirements while you still have time to complete them without delaying your graduation.

AWARDS AND SCHOLARSHIPS

The Department of Mathematics and College of Arts and Sciences recognize continuing and graduating students at the end of each academic year. The current list of awards and scholarships, with brief descriptions, is shown below. The Undergraduate Advisory Council solicits applications from interested students each spring; the awards are announced and presented at Undergraduate Awards Day.

Outstanding Undergraduate Student in Mathematics Education
… presented yearly to an outstanding undergraduate student in mathematics education who has exhibited excellence in the mathematics program.

Outstanding Undergraduate Student in Mathematics
… presented yearly to an outstanding undergraduate student who has exhibited excellence in the mathematics program.

College of Arts and Sciences Rising Senior Award
… awarded annually by the College of Arts and Sciences to a rising senior mathematics major who has demonstrated excellence in mathematics and has a cumulative GPA of at least 3.50.

James Bruce Coleman Mathematics Scholarship
… awarded annually by the Department of Mathematics to an outstanding mathematics major from South Carolina. The scholarship was established in 1992 by Joseph Harold Burckhalter (Class of 1934), in memory of the late James Bruce Coleman, who was a professor of mathematics and head of the department from 1915—1942.

Thomas Markham Mathematics Scholarship
… awarded annually to an outstanding mathematics major who also has significant extracurricular mathematical activities. The scholarship was established in 1999 in honor of Professor Emeritus Thomas Markham, who was a professor of mathematics from 1968—1999 and undergraduate director 1996—1999.

Victor W. Laurie Undergraduate Research Scholarship
… provides monetary support for an undergraduate student interested in being involved with mathematical research. This is a competitive award based on proposals submitted by all interested students.

Dr. Edwin R. and Mrs. Elizabeth F. Jones Endowed Scholarship
… awarded cooperatively by the Departments of Chemistry, Mathematics, and Physics to South Carolina resident majoring in one or more of chemistry, mathematics, and physics. The Jones family created this scholarship in 2013 to recognize students in chemistry, mathematic, s and physics. The application for this scholarship can be obtained from the College of Arts and Sciences.

Lovelace Family Endowed Scholarship
… awarded bi-annually by the Department of Mathematics to an outstanding undergraduate mathematics major who had demonstrated excellence in mathematics. The Lovelace family created this scholarship in 2013 to recognize students in mathematics and physics. Awards alternate between mathematics and physics.

Pi Mu Epsilon Award
… presented annually to an outstanding member of Pi Mu Epsilon based on performance in mathematics courses and service to the department. The Undergraduate Advisory Council, in conjunction with the Pi Mu Epsilon advisor, selects the recipient.

Polston Family Mathematics Scholarship
… is awarded to undergraduate mathematics students who are excelling in the mathematics program. The Polston family established the scholarship in 2008.

Cary K. Smith, Jr., Mathematics Scholarship
… awarded annually by the Department of Mathematics to an outstanding undergraduate mathematics major who has demonstrated excellence in mathematics and leadership. The scholarship was established in 1998 in memory of Cary Kincaid Smith, Jr., an Honors graduate of USC who died while performing his duties as a pilot in the U.S. Marine Corps.

Wyman L. Williams Scholarship
… awarded to an undergraduate mathematics major at the University of South Carolina. Can be renewed for not more than 3 additional years of undergraduate study. Wyman L. Williams came to the University in 1919 as a freshman, joined the Mathematics Department faculty in 1924 and retired in 1970 as Distinguished Professor Emeritus. The Wyman L. Williams Mathematics Scholarship Fund was established in 1975.

Jeong S. Yang Award for Excellence in Undergraduate Mathematics
… awarded yearly to outstanding undergraduate mathematics majors at the University of South Carolina selected from students who have earned at least 100 credit hours and have completed at least 4 of the 5 core mathematics courses required for the major with a GPA of at least 3.70 in all upper-division mathematics courses. The award was established by the Department of Mathematics in memory of the late Professor Jeong S. Yang, undergraduate director 1984—1995.

MATHEMATICS FACULTY

PROFESSORS

Matthew Boylan, Ph.D.,
University of Wisconsin at Madison, 2002

Stephen J. Dilworth, Ph.D.,
Cambridge University, 1985

Michael A. Filaseta, Ph.D.,
Assistant Chair
University of Illinois, 1984

Maria Girardi, Ph.D.,
University of Illinois, 1990

Jerrold R. Griggs, Ph.D.,
Massachusetts Institute of Technology, 1977

Ralph E. Howard, Ph.D.,
California Institute of Technology, 1982

Lili Ju, Ph.D.,
Iowa State University, 2002

Andrew Kustin, Ph.D.,
University of Illinois, 1979

Linyuan (Lincoln) Lu,
Ph.D., University of California, San Diego, 2002

George F. McNulty, Ph.D.,
University of California, Berkeley, 1972

Matthew Miller, Ph.D.,
Undergraduate Director,
University of Illinois, 1979,

Peter J. Nyikos, Ph.D.,
Carnegie Mellon University, 1971

Pencho Petrushev, Ph.D.,
University of Sofia, 1977

Anton R. Schep, Ph.D.,
Chair,
University of Leiden, 1977

László A. Székely, Ph.D.,
Eötvös University, 1983

Vladimir Temlyakov, Ph.D.,
Carolina Distinguished Professor
Steklov Institute, 1981

Adela Vraciu, Ph.D.,
University of Michigan, 2000

Hong Wang, Ph.D.,
University of Wyoming, 1992

Qi Wang, Ph.D.,
Ohio State University, 1991

ASSOCIATE PROFESSORS

George Androulakis, Ph.D.,
University of Texas, 1996

Peter G. Binev, Ph.D.,
University of Sofia, 1985

Joshua N. Cooper, Ph.D.,
University of California, San Diego, 2003

Eva Czabarka, Ph.D.,
University of South Carolina, 1998

Daniel B. Dix, Ph.D.,
University of Chicago, 1988

Xinfeng Liu, Ph.D.,
State University of New York, 2006

Douglas B. Meade, Ph.D.,
Carnegie Mellon University, 1989

Yi Sun, Ph.D.,
Princeton University, 2006

Ognian T. Trifonov, Ph.D.,
Graduate Director
University of Sofia, 1990

Xian Wu, Ph.D.,
Harvard University, 1986

Xiaofeng Yang, Ph.D.,
Purdue University 2007

ASSISTANT PROFESSORS

Matthew R. Ballard, Ph.D.,
University of Washington, 2008

Alexander Duncan, Ph.D.,
University of British Columbia, 2011

Jesse Kass, Ph.D.,
Harvard University, 2009

Frank Thorne, Ph.D.,
University of Wisconsin at Madison, 2008

Paula A. Vasquez, Ph.D.,
University of Delaware, 2007

Zhu Wang, Ph.D.,
Virginia Polytechnic Institute, 2012

Sean Yee, Ph.D.,
Kent State University, 2012

CLINICAL ASSOCIATE PROFESSOR

Debra Geddings, Ph.D.,
University of South Carolina, 2003

SENIOR INSTRUCTOR

Courtney Baber, M.S.,
Virginia Tech, 2009

Ronda Sanders, M.S.,
University of South Carolina, 2004

INSTRUCTORS

Scott Dunn, Ph.D.,
University of South Carolina, 2014

Ivan Haynes, M.S.,
University of South Carolina, 2008

Francisco Blanco-Silva, Ph.D.,
Purdue University, 2007

ADJUNCT FACULTY

Edwin M. Dickey, Professor, Ph.D.,
University of South Carolina, 1982

Don Jordan, Ph.D.,
University of South Carolina

VISITING PROFESSORS

Ryan Causey, Ph.D.,
Texas A&M University, 2014

Wolfgang Dahmen, Ph.D.,
RWTH Aachen, Germany, 1976

DISTINGUISHED PROFESSORS EMERITI

Colin Bennett, Ph.D.,
University of Newcastle upon Tyne, 1971

Ronald A. DeVore, Ph.D.,
Robert L. Sumwalt Distinguished Professor Emeritus
Ohio State University, 1967

Thomas L. Markham, Ph.D.,
Auburn University, 1967

James W. Roberts, Ph.D.,
Rutgers University, 1970

H. Edward Scheiblich, Ph.D.,
University of Texas, 1966

Robert M. Stephenson Jr., Ph.D.,
Tulane University, 1967

Robert C. Sharpley, Ph.D.,
University of Texas, 1972

Manfred Stoll, Ph.D.,
Pennsylvania State University, 1971

David P. Sumner, Ph.D.,
University of Massachusetts, 1971

FACULTY EMERITI

Peter W. Harley III, Ph.D.,
University of Georgia, 1966

Richard H. Hudson, Ph.D.,
Duke University, 1971

Karl H. Matthies,
Dr. Rerum Naturalium,
University of Freiburg, 1956

Charles A. Nicol Jr., Ph.D.,
University of Texas, 1954

Mary Ellen O'Leary, M.A.,
University of Michigan, 1967

Konstantin Oskolkov, Ph.D.,
Steklov Institute, 1978

THE B.S. PROGRAM IN MATHEMATICS

1. Carolina Core Plus College of Arts and Sciences

COLLEGE CORE PLUS COLLEGE OF ARTS AND SCIENCES

I. Effective, Engaged, and Persuasive Communication (CMW) — 6 hrs

ENGL 101	Composition	(CMW)
ENGL 102	Composition and Literature	(CMW & INF, when taken at USC)

ENGL 101 and 102 **must each be passed with a grade of C or higher**, and must be completed within the first sixty hours of the degree in order to be counted toward the total needed for graduation.

II. Analytical Reasoning and Problem Solving (ARP) — 15 hrs

Students pursuing a Bachelor of Science degree in Mathematics must complete 15 hours as described below.

MATH 141 and 142	(ARP – CC)
CSCE 145 or 206	(ARP – AS)
STAT 509, 512, or 515 (or equivalent)	(ARP – AS)

III. Scientific Literacy (SCI) — 8 hrs

Two Carolina Core-approved[1] laboratory courses selected from Anthropology, Astronomy, Biological Science, Chemistry, Environmental Science, Geography 201, 202 (for Bachelor of Arts degrees only) **Geology, Marine Science, and Physics.** Each science course must have a co-requisite laboratory. The two courses need not be taken in the same field. Lab credit cannot be applied unless its co-requisite lecture is also applied. Some of the more commonly selected courses appear in the following list – it is not exhaustive.

ANTH	161
ASTR	101
BIOL	101/L, 102/L, 110 or 120/L, 200/L or 270/L
CHEM	102, 105, 107, 111/L (or 141), 112/L (or 142) Note: Credit cannot be given for both CHEM 111/L and 141 or for CHEM 112/L and 142.
ENVR	101/L or 200/L
GEOG	201 or 202
GEOL	101, 102, 103, or 215/L
MSCI	101, 102, 210/L, or 215/L
PHYS	101/L, 102/L, 151/L, 153/L, 155/L, 201/L, 202/L, 211/L, or 212/L Note: Credit cannot not be given for both PHYS 151 and 153 or for both PHYS 151 and 155.

IV. Global Citizenship and Multicultural Understanding: Language (GFL) — 0-9 hrs

Proficiency in one foreign language is equivalent to the minimal passing grade on the exit examination in the 122 course. Students can demonstrate this proficiency by successfully completing Phase II of the Proficiency Test or by successfully completing the 122 course, including the exit exam administered as part of that course.

V. Global Citizenship and Multicultural Understanding: Historical Thinking (GHS) — 6 hrs

Both history courses must be at the 100 level

HIST 10x	Non-US History	3 hrs	(GHS – AS)
HIST 11x	US History	3 hrs	(GHS – CC)

[1] The full list of Carolina Core- approved courses can be found at http://www.sc.edu/carolinacore/courses.php.

VIa. Global Citizenship and Multicultural Understanding (GSS) 3 hrs

One Carolina Core-approved social science course.
The up-to-date list of Carolina Core-approved courses can be found at http://www.sc.edu/carolinacore/courses.php

VIb. College of Arts and Sciences Global Citizenship and Multicultural Understanding 3 hrs

One additional course in the social sciences. This does not have to be a Carolina Core-approved course, but does need to be approved by the College of Arts and Sciences. Some of the more common choices are listed below:

ANTH	{excluding 161}
COLA	{pending content}
CRJU	{excluding 202, 301, 399, 494}
ECON	
GEOG	{excluding 201, 202}
LASP	{301, 311, 312, 315, 322, 325, 331, 351, 398 pending content, 425, 451, 454, 455 only}
LING	{300, 340, 405 pending content, 442, 505 pending content, 540, 541, 542, 543, 545, 567, 570, 600 only}
POLI	
PSYC	{excluding 226, 227, 228}
SOCY	{excluding 220}
SOST	{298, 299, 301, 302 pending content, 305, 405 pending content}
SSCI	{001T, 003T}
WGST	{112, 210, 300, 301, 304, 305, 307, 308, 310, 351, 352, 358, 381, 430 pending content, 454, 525, 554, 555}

VIIa. Aesthetics and Interpretive Understanding (AIU) 3 hrs

Fine Arts or Literature:

Excluding 399, internships, Senior Seminar and Senior thesis courses

a) **Fine Arts**

A Carolina Core-approved[2] course dealing with the study and/or practice of the visual and performing arts. Students may take a course in art studio, art design, art history and appreciation, film, media arts, music history and appreciation, music theory and performance, theatre history and appreciation, acting, stagecraft, theatre design, and dance to fulfill this requirement.

Courses in speech (SPCH) apply to the humanities requirement, but **DO NOT** satisfy the fine arts requirement. Theatre production laboratories (THEA 119, 120, 121, 122, 123, 219, 220, 221), one-hour credits for participation in music organizations (band, chorus, orchestra), DANC 177, 577, and MART 302 do NOT apply to the fine arts requirement or to the humanities requirement.

b) **Literature**

A Carolina Core-approved[2] literature course numbered 200 or higher, or a comparative literature course and literature course taught in a foreign language.

VIIb. College of Arts and Sciences Fine Arts and Humanities Requirement 3 hrs

One additional course in the humanities. This does not have to be a Carolina Core-approved course, but does need to be approved by the College of Arts and Sciences. Some of the more common choices are listed below:

AFAM	
ARTS	
ARTE	{excluding 465, 471, 565, 595}
ARTH	
CLAS	
CPLT	
DANC	{excluding DANC177, 577}
ENGL	
EURO	
FILM	
HIST	
LANG	{ARAB, CHIN, FREN, GERM, GREK, ITAL, JAPA, LATN, PORT, RUSS, SPAN, (excluding 1xx, 315)}
LASP	{LASP 201, 301, 341, 342, 361, 371, 398 pending content, 441, 442, 447, 471, 481, 501, 541 only}
LING	{LING 301, 405 pending content, 421, 431, 440, 441, 442, 502, 503, 504, 505 pending content, 512, 514, 530, 540, 565, 600, 610, 620, 627, 650 only}
MART	{excluding MART 302}
MUSC	{excluding one-hour credits for participation in music organizations, 399}
PHIL	{excluding 110, 111, 511}
RELG	
SOST	{298, 299, 301, 302 pending content, 305, 405 pending content}
SPCH	
THEA	{excluding THSP 119, 120, 121, 122, 123, 219, 220, 221}
WGST	{111, 307, 308, 320, 321, 376, 379, 437, 464, 485, 535 pending content, only}

VIII. Overlay 3-9 hrs

Two of the three overlay courses[2] can fulfill General Education requirements. At least one overlay course must stand alone. Overlay courses cannot be used to fulfill a major/cognate/minor requirement.

a. Effective, Engaged, and Persuasive communication: Spoken Component **(CMS)**
b. Information Literacy **(INF)**
c. Values, Ethics, and Social Responsibility **(VSR)**

TOTAL HOURS in Carolina Core Plus for College of Arts and Sciences: 50-65 hrs

2. Pre-Major requirements

The following pre-major courses may fulfill some requirements of the Carolina Core Plus for CAS.

a) MATH 141, MATH 142, MATH 241, and MATH 300 (each with a grade of C or better)
b) at least one of CSCE 145 or CSCE 206
c) at least one of STAT 509, STAT 512, or STAT 515

3. Major Requirements

RETENTION

1. *A grade of **C** or better is required in each major course and in each of MATH 141, 142, 241, and 300.*
2. *A student may enroll in each major course and in each of MATH 141, 142, 241, and 300 a maximum of two times.* ***(Enrolled in a course is interpreted to mean that a grade, including W, has been recorded).***
3. *Students may repeat a maximum of three MATH courses (receiving a grade of **W** is not considered a repeat).*

Students who violate the retention policy can file a petition in the Dean's Office requesting an exception to this policy. Otherwise, the student will have to find a new major.

TRANSFER REQUIREMENTS

In addition to the minimum University and College of Arts and Sciences requirements, a student seeking to transfer to the mathematics major from another program within the University, or from another accredited college or university, is required to have earned a grade of "B" or higher in at least one of the following courses, or their USC equivalent: MATH 141 (Calculus I), MATH 142 (Calculus II), MATH 241 (Vector Calculus), or MATH 300 (Transition to Advanced Mathematics). An AP or IB exam score that provides credit for MATH 142 also satisfies this requirement.

PROGRAM OPTIONS

B.S.in Mathematics (24 hours)

- MATH 544
- At least one of
  - MATH 511 – Probability (=STAT 511)
  - MATH 520 – Ordinary Differential Equations
  - MATH 534 - Elements of General Topology
  - MATH 550 - Vector Analysis
  - MATH 552 - Applied Complex Variables
- MATH 546 - Algebraic Structures I
- MATH 554 - Analysis I
- At least 12 hours of MATH electives numbered above 500.
  The choice of the four MATH elective courses should be made to support the student's educational goals and career objectives. MATH electives are discussed below.

[2] The full list of Carolina Core- approved courses can be found at http://www.sc.edu/carolinacore/courses.php.

B.S. with Distinction in Mathematics (39 hours)

Available to students majoring in mathematics who wish to participate in significant research with a faculty mentor.

Prerequisite
A minimum GPA of 3.60 in upper division (500 and above) major courses and 3.30 overall when the student applies to enter the B.S. with Distinction in Mathematics track.

Requirements
The student should apply to enter the B.S. with Distinction in Mathematics track and choose the members of the thesis committee as early as possible, but in all cases at least one year before completion of the degree. The committee will consist of a thesis advisor, who must be a tenure-track faculty member in Mathematics, and one or two other tenure-track or research faculty members in Mathematics or any other department, as approved by the Undergraduate Advisory Council. The senior thesis consists of either significant original work or a synthesis of known material beyond the scope of ordinary undergraduate coursework. The student may use their senior thesis to simultaneously fulfill other requirements as well (e.g., Magellan Scholarship, Honors College Thesis, etc.), at the discretion of the thesis advisor.

By the end of the semester in which the student is admitted into the B.S. with Distinction in Mathematics track, a brief research plan must be agreed upon by the thesis committee and the student, and filed in the Department of Mathematics and College of Arts and Sciences. Before submitting and defending the thesis, the student must have completed three credit hours of MATH 499 (Undergraduate Research) under the supervision of the thesis advisor, and at least 12 hours of upper-level (500 and above) MATH credit approved by the Undergraduate Director beyond the 24 credit hours of 500-level MATH courses required for the B.S. in Mathematics.

By the end of the student's last semester, the student must present and defend the senior thesis before the thesis committee. The defense must be announced at least one week in advance and be open to the general public. A certificate attesting to a successful defense, signed by the committee, must be placed on file with both the Department of Mathematics and the College of Arts and Sciences. In addition, prior to graduation the student must have either (a) presented the research at a meeting of a professional society, at Discovery Day at USC, or at a comparable venue; or (b) submitted the work for publication in an undergraduate or professional journal.

Students who successfully fulfill all of these requirements with a GPA of at least 3.60 in upper division (500 and above) major courses and 3.30 overall, will be awarded their degree with "Distinction in Mathematics" upon graduation.

Math Electives
The courses listed below are available for MATH elective credit. (As MATH 544, MATH 546, and MATH 554 are required of all majors, these are not listed.) Undergraduate students interested in taking 700-level MATH courses as MATH elective credit should consult the Graduate Bulletin.

Algebra
- MATH 540 - Modern Applied Algebra
- MATH 541 - Algebraic Coding Theory
- MATH 547 - Algebraic Structures II

Analysis
- MATH 511 - Probability
- MATH 550 - Vector Analysis
- MATH 551 - Introduction to Differential Geometry
- MATH 552 - Applied Complex Variables
- MATH 555 - Analysis II

Differential Equations and Modeling
- MATH 520 - Ordinary Differential Equations
- MATH 521 - Boundary Value Problems and Partial Differential Equations
- MATH 522 - Wavelets
- MATH 523 - Mathematical Modeling of Population Biology

Discrete Mathematics
- MATH 541 - Algebraic Coding Theory
- MATH 570 - Discrete Optimization
- MATH 574 - Discrete Mathematics I
- MATH 575 - Discrete Mathematics II
- MATH 576 - Combinatorial Game Theory
- MATH 587 - Introduction to Cryptography

Financial Mathematics and Probability
- MATH 511 - Probability
- MATH 514 - Financial Mathematics I
- MATH 515 - Financial Mathematics II
- MATH 525 - Mathematical Game Theory

Number Theory
- MATH 580 - Elementary Number Theory
- MATH 587 - Introduction to Cryptography

Geometry
- MATH 531 - Foundations of Geometry
- MATH 532 - Modern Geometry
- MATH 533 - Elementary Geometric Topology
- MATH 534 - Elements of General Topology
- MATH 551 - Introduction to Differential Geometry

Special Topics
- MATH 599 - Topics in Mathematic

Mathematical Logic
- MATH 561 - Introduction to Mathematical Logic
- MATH 562 - Theory of Computation

Optimization and Computation
- MATH 524 - Nonlinear Optimization
- MATH 527 - Numerical Analysis
- MATH 570 - Discrete Optimization

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General Guidelines for Selecting 500-level MATH Electives

- Students planning **to go to graduate school in mathematics** should complete at least one of the two-semester sequences in algebra (MATH 546 and MATH 547) or analysis (MATH 554 and MATH 555). Completing both two-semester sequences provides the strongest foundation for graduate study in mathematics. Students completing this combination of courses are well on their way towards completing the B.S. with Distinction in Mathematics.

- Students planning **to become mathematics teachers at the secondary (grades 9-12) level** should choose MATH 574, MATH 580, and at least one of MATH 531 or MATH 532. In addition, as a cognate, these students should take

  EDFI 300 - Schools In Communities
  EDPY 401 - Human Growth and Development
  EDSE 302 - Teachers and Teaching
  EDSE 500 - Equity and Community Engagement

  With two additional Education courses, students complete a minor in Education. This selection of MATH electives and of the education cognate positions students to complete, after completing a B.S. in Mathematics, a one-year graduate Master of Teaching degree from the College of Education and apply for grades 9-12 mathematics licensure in South Carolina

- Students planning **to pursue a career in actuarial science** should declare a minor in Risk Management and Insurance and complete their MATH electives with the following courses:

  MATH 511 - Probability
  MATH 520 - Ordinary Differential Equations
  MATH 574 - Discrete Mathematics, and
  either MATH 524 - Nonlinear Optimization
  or MATH 570 - Discrete Optimization

  The Risk Management and Insurance Minor is completed by taking ACCT 225, ECON 221 and 222, and FINA 363, 469, 471, and 475. (Note that FINA 469 is a prerequisite for FINA 475.)

  To develop a strong basis for success in the initial actuarial examinations (Exam P and Exam F), and to qualify for the Society of Actuaries' Validation through Educational Experience (VEE) in Applied Statistics, Economics, and Corporate Finance, students should complete the following collection of 30 semester hours in the Department of Statistics and the Darla Moore School of Business. For detailed information about the VEE program, see https://www.soa.org/Education/Exam-Req/edu-vee.aspx.

Mathematical Statistics and Statistical Models (9 hours)
STAT 512 - Mathematical Statistics
STAT 513 - Theory of Statistical Inference
ECON 436 - Introduction to Econometrics

Economics and Corporate Finance (12 hours)
ACCT 225 - Introduction to Financial Accounting
ECON 221 - Principles of Microeconomics
ECON 222 - Principles of Macroeconomics
FINA 363 - Introduction to Finance

Risk Management and Insurance (0-3 hours)
FINA 341 - Management of Risk and Insurance

Finance and Stochastic Processes (3-6 hours) from
FINA 469 - Investment Analysis and Portfolio Management
FINA 471 - Derivative Securities
FINA 475 - Fixed Income Securities
STAT 521 - Applied Stochastic Processes

Computing (3 hours) from
CSCE 146 - Algorithmic Design II
MGSC 390 - Business Information Systems
STAT 540 - Computing in Statistics

- Students planning **to undertake further study in applied mathematics or who intend to start mathematical careers in the private or public sectors after graduation**, should consider MATH 520 and other courses in Differential Equations and Modeling, in Discrete Mathematics, in Financial Mathematics, and in Optimization and Computation, including 9 credit hours from two of the following categories.

Differential Equations and Modeling
MATH 521 - Boundary Value Problems and Partial Differential Equations
MATH 522 - Wavelets
MATH 523 - Mathematical Modeling of Population Biology

Financial Mathematics and Probability
MATH 511 - Probability
MATH 514 - Financial Mathematics I
MATH 515 - Financial Mathematics II

Discrete Mathematics

MATH 541 - Algebraic Coding Theory
MATH 570 - Discrete Optimization
MATH 575 - Discrete Mathematics II
MATH 576 - Combinatorial Game Theory
MATH 587 - Introduction to Cryptography

Optimization and Computation

MATH 524 - Nonlinear Optimization
MATH 527 - Numerical Analysis
MATH 570 - Discrete Optimization

Analysis

MATH 550 - Vector Analysis
MATH 552 - Applied Complex Variables
MATH 555 – Analysis II

4. Cognates, Minors, Double Majors and Dual Degrees

MINORS

You may replace the cognate with a minor if you so desire. The minor consists of a minimum of eighteen hours of coursework instead of the twelve needed for the cognate. The minor is also more structured. All courses in the minor must be passed with grades of C or better and at least half of the courses must be in residence at USC. Students who are planning to minor in a subject area need to go to the Dean's office and fill out the appropriate forms to declare the minor.

Four minors that are popular with mathematics majors are as follows:

- MINOR IN RISK MANAGEMENT AND INSURANCE
  1. Prerequisite Course (3 hrs)
     a) ECON 221
  2. Required Courses: (18 hrs)
     a) ACCT 225
     b) ECON 222
     c) FINA 363, FINA 469, FINA 471, FINA 475
  3. Additional courses of interest may include
     FINA 341, FINA 442, FINA 443, FINA 444, FINA 445
     Note that FINA 469 is a prerequisite for FINA 475.

- MINOR IN EDUCATION
  1. EDFI 300, EDPY 401, EDSE 302, and EDSE 502
  2. Two courses (6 credit hours) chosen from your area of educational specialization.
     This combination of courses is recommended for optimal preparation for the MT in Secondary Education.

- MINOR IN STATISTICS
  1. Required Courses: Eighteen (18) credit hours of 500-level STAT courses.
     Only one of STAT 509 and STAT 515 may be counted for minor credit.

- MINOR IN COMPUTER SCIENCE
  1. Required Foundation Courses: (8 hrs): CSCE 145 and 146
  2. Intermediate Level Courses (6 hrs): Two of the following courses: CSCE 210, 211, 212, 240, and 242
     Note: CSCE 211 is prerequisite for CSCE 212 and CSCE 210 is less intensive introduction to computer hardware than the CSCE 211/212 sequence.
  3 Advanced Courses (6 hrs): Any two CSCE courses at the 300 level or above with the exception of CSCE 500. Recommended tracks are listed on the CSCE website at http://www.cse.sc.edu/acadinfo/CSMinor.html.
     Note that some CSCE courses have MATH or STAT prerequisites.

COGNATES

The cognate consists of 12 hours of upper-division courses selected in consultation with, and approved by, your advisor. Mathematics majors may satisfy this requirement by passing 12 credit hours of cognate eligible courses offered by the College of Arts and Sciences or Department of Computer Science and Engineering. Cognates selected from other disciplines should be supportive***** of the major and must be in <u>one field</u> selected with and approved by the student's academic advisor. The Undergraduate Director must approve all exceptions <u>in advance</u>.

* *If a discipline is not supportive of the major, then the student should pursue a minor in that subject area.*

Accounting (ACCT):
All numbered 300and above except 498, 499
Aeronautics (AERO):
All numbered 300 and above
African-American Studies (AFAM):
All
Anthropology (ANTH)
All numbered 200 and above
Arabic (ARAB):
All numbered 300 and above
Army/Military Science (ARMY):
All numbered 300 and above
Art Education (ARTE)):
All numbered 300 and above
Art History (ARTH):
All numbered 300 and above
Art Studio (ARTS)):
All numbered 200 and above
Astronomy (ASTR):
All numbered 300 and above
Biology (BIOL):
All numbered 300 and above
Chemistry (CHEM):
All numbered 300 and above
Chinese (CHIN)):
All numbered 300 and above
Classics (CLAS):
All
Communication Sciences and Disorders (COMM):
All numbered 300 and above
Comparative Literature (CPLT):
All numbered 300 and above
Computer Science (CSCE):
All numbered 145 and above
Criminology and Criminal Justice (CRJU):
All numbered 311 and above
Dance (DANC):
All numbered 300 and above
Economics (ECON):
All numbered 300 and above
Education (all designators):
All numbered 300 and above (except directed teaching courses and seminar).
Note: EDFI 300, EDPY 401, EDSE 302, and EDSE 502 are recommended for students preparing for the MT in Secondary Education.
Engineering (all designators):
All numbered 200 and above
English (ENGL):
All numbered 300 and above
Environmental Studies (ENVR):
All 300 and above
European Studies (EURO):
All numbered 300 and above
Exercise Science (EXSC)
All numbered 300 and above
Film and Media Studies (FILM):
All numbered 200 and above
Finance (FINA):
All numbered 300 and above except 498, 499
Foreign Languages (all designators):
All numbered 300 and above except 315
Geography (GEOG):
All numbered 200 and above
Foreign Languages (FORL):
All numbered 300 and above (except 315)
Foreign Language (FLNG):
All numbered 003T and above
French (FREN):
All numbered 300 and above
German (GERM):
All numbered 300 and above
Geography (GEOG):
All numbered 300 and above
Geology (GEOL):
All numbered 202and above
Greek (GREK):
All numbered 300 and above
Health Promotion, Education, and Behavior (HPEB):
All numbered 300 and above (except 335)
Hebrew (HEBR):
All numbered 300 and above
History (HIST):
All numbered 200 and above
Hotel, Restaurant, and Tourism (HRTM):
All numbered 300 and above
Humanities (HUMA):
All numbered 003T and above
Integrated Information Technology (ITEC):
All numbered 300 and above
International Business (IBUS)
All numbered 300 and above
Italian (ITAL):
All numbered 300 and above
Japanese (JAPA):
All numbered 300 and above
Jewish Studies (JSTU):
All numbered 300 and above
Journalism (JOUR)
All numbered 300 and above
Latin-American Studies (LASP):
All
Latin (LATN):
All numbered 300 and above
Library and Information Science (LIBR):
All numbered 300 and above
Linguistics (LING):
All numbered 300 and above
Management Science (MGSC):
All numbered 300 and above except 498, 499
Management (MGMT):
All numbered 300 and above except 498, 499
Marine Science (MSCI):
All courses numbered 215 and above
Marketing (MKTG):
All numbered 300 and above except 498, 499
Mathematics (MATH):
All numbered 241 and above (except 401)
Media Arts (MART):
All numbered 200 and above
Music (MUSC)
115, 116, 145 and all numbered 200 and above
Naval Science (NAVY):
All numbered 300 and above

Nursing (NURS):
All numbered 200 and above
Pharmacy (PHAR):
All numbered 300 and above
Philosophy (PHIL):
All numbered 200 and above
Physics (PHYS):
all numbered 212 and above
Political Science (POLI):
All numbered 300 and above
Portuguese (PORT):
All numbered 300 and above
Psychology (PSYC):
All numbered 300 and above
Religious Studies (RELG):
All numbered 300 and above
Retailing (RETL):
All numbered 300 and above
Russian (RUSS):
All numbered 300 and above
SC Honors College (SCHC):
Pending advisor approval
Social Sciences (SSCI):
All numbered 003T and above
Sociology (SOCY):
All numbered 300 and above
Social Work (SOWK):
All numbered 300 and above ll
Southern Studies (SOST):
All numbered 300 and above
Spanish (SPAN):
All numbered 300 and above
Speech (SPCH):
All numbered 200 and above
Sport and Entertainment Management (SPTE):
All numbered 300 and above
Statistics (STAT):
All numbered 300 and above. *Only one of STAT 509 and 515 may be used for cognate credit*
Theater (THEA):
All numbered 230 and above
University Elective (UELC)):
All numbered 003T and above; Pending Assistant Dean's approval
Women's and Gender Studies (WGST):
All numbered 300 and above; Pending Assistant Dean's approval

DOUBLE MAJORS AND DUAL DEGREES

Instead of selecting a cognate (12 hours) or a minor (18 hours), some students complete a second major. If the second discipline is in the College of Arts and Sciences, or Computer Science (in the College of Engineering and Computing), they will graduate with double majors.

Students interested in other combinations of degrees must pursue dual degrees. This means that students must satisfy all requirements for each degree. The same courses can be applied towards the Carolina Core Plus requirements for each degree; no course may be counted towards the Major Requirements for more than one degree, except that MATH/STAT 511 can be used to fulfill a major requirement for both Mathematics and Statistics.

Double majors and dual degrees must be approved by the Dean and usually can be accommodated within the required 120-hours if the decision is made reasonably early, say in the second year. The most common double majors are Mathematics and Statistics and Mathematics and Computer Science.

5. Electives

Requirements for the baccalaureate degree in the College of Arts and Sciences include at least 120 hours in academic subjects. Students in the College of Arts and Sciences may elect acceptable courses offered in other colleges of the University. Elective credits for participation in the University chorus, orchestra, or band may be counted up to a maximum of 4 credits.

6. Honors Courses

Honors sections of the calculus courses (141, 142, and 241), are offered every Fall and Spring semester. Honors section of other courses, MATH 242, 544, 546, 547, 550, 554, 555, 574, and 575, are offered once each academic year. Honors MATH courses are available to highly qualified students regardless of whether they are in the South Carolina Honors College. Non-Honors College students must receive approval from the Undergraduate Director prior to being permitted to register for an honors MATH course.

7. Five-Year Program

This program of study is designed to permit an outstanding mathematics student to obtain both a bachelor's degree, as described above, and a master's degree in mathematics in five years, while at the same time receiving undergraduate and graduate assistant support during the last two years.

Program Guidelines

1. To be considered for the program, the student must have earned at least 103 hours by the start of his senior year, and must have completed one of the preparatory undergraduate sequences MATH 546-547 or MATH 554-555. This is easily accomplished if the student has received undergraduate credit through advanced placement examinations, or enrolls for one or more summer sessions.

2. During their senior year, the student takes, for graduate credit, the basic graduate sequence, MATH 700-701 (or 706) or MATH 703-704 corresponding to the undergraduate sequence they have already taken. In addition, the student will complete the other preparatory undergraduate course sequence. The remaining 9 hours in the fall semester of the senior year will consist of additional undergraduate or graduate courses. This will leave the student 10 hours short of his bachelor's degree, which will be completed in the spring semester.
3. For the spring semester of the senior year, the student is conditionally admitted into the graduate program. Final acceptance into the program will be contingent upon receipt of the bachelor's degree at the end of spring semester. To be considered for ad-mission, except for lacking the bachelor's degree, the student must meet all other requirements for admission to the graduate program.

Admission into the program

The prospective student will normally be considered for admission into the program during the fall semester of their senior year. A recommendation from their undergraduate advisor is a critical part of the application. It is expected that the prospective student will have attained a 3.5 overall GPA, a 3.5 on all mathematics courses taken, and will have taken the GRE examination by the end of October of their senior year.

By November 1, the prospective student must submit an application with all supporting material to the Graduate School for admission into the M.S. program in Mathematics for the following spring semester. A decision on admission into the graduate program will be made prior to the start of the spring semester. Prior to registration for 700-level courses, the student must be approved for Accelerated Bachelor's/Graduate Study (G-BGCA and G-BGPA) .

Note: *Students considering the Five-Year Program should discuss their plans with the Graduate Director, in addition to their regular advisor. This discussion should begin as early as possible, typically during the student's sophomore year.*

c) Financial Aid

Upon admission to the program, the student will be eligible for financial assistance from the department as follows: During the fall semester of the senior year, the student will receive consideration for employment as an undergraduate assistant for 10 hours per week, and during the spring semester of the senior year, the student will receive consideration for a quarter-time graduate assistantship. In the fifth year and the first and second summer of graduate study, the student will be eligible for a halftime graduate teaching assistantship.

DESCRIPTIONS OF UNDERGRADUATE MATHEMATICS COURSES

111 **Basic College Mathematics. (3)** (Prereq: placement through Algebra version of the Mathematics Placement Test: http://assess.math.sc.edu/) Basic college algebra; linear and quadratic equations, inequalities, functions and graphs of functions, exponential and logarithm functions, systems of equations.

111I **Intensive Basic College Mathematics. (4)** (Prereq: placement through Algebra version of the Mathematics Placement Test: http://assess.math.sc.edu/) An intensive treatment of the topics covered in MATH 111. Basic college algebra; linear and quadratic equations, inequalities, functions and graphs of functions, exponential and logarithm functions, systems of equations.

112 **Trigonometry. (2)** (Prereq: C or better in MATH 111 or 111I, or placement through Algebra version of the Mathematics Placement Test: http://assess.math.sc.edu/) Topics in trigonometry specifically needed for MATH 141, 142, 241. Circular functions, analytic trigonometry, applications of trigonometry.

115 **Precalculus Mathematics. (4)** (Prereq: C or better in MATH 111 or 111I, or placement through Precalculus version of the Mathematics Placement Test: http://assess.math.sc.edu/) Topics in algebra and trigonometry specifically needed for MATH 141, 142, 241. Subsets of the real line, absolute value; polynomial, rational, inverse, logarithmic, exponential functions; circular functions; analytic trigonometry.

116 **Brief Precalculus Mathematics. (2)** (Prereq: C or better in MATH 112 or 115 or placement through Precalculus version of the Mathematics Placement Test: http://assess.math.sc.edu/) Essential algebra and trigonometry topics for Calculus, including working with equations that involve polynomials, rational functions, exponential and logarithmic functions, and trigonometric and inverse trigonometric functions. Intended for students with prior experience in Precalculus, but not ready for MATH 141.

122 **Calculus for Business Administration and Social Sciences. (3)** (Prereq: C or better in MATH 111/111I, or by placement through Algebra version of the Mathematics Placement Test: http://assess.math.sc.edu/) Derivatives and integrals of elementary algebraic, exponential, and logarithmic functions. Maxima, minima, rate of change, motion, work, area under a curve, and volume. Note: Carolina Core ARP

141 **Calculus I. (4)** (Prereq: C or better in MATH 112, 115, 116, or placement through Precalculus version of the Mathematics Placement Test: http://assess.math.sc.edu/) Functions, limits, derivatives, introduction to integrals, the Fundamental Theorem of Calculus, applications of derivatives and integrals. Notes: Four classroom hours and one laboratory hour per week. Note: Carolina Core ARP

142 **Calculus II. (4)** (Prereq: **C** or better in MATH 141) Four classroom hours and one laboratory hour per week. Methods of integration, sequences and series, approximations. Notes: Four classroom hours and one laboratory hour per week. Note: Carolina Core ARP

151 **Calculus Workshop I. (2)** (Prereq: Concurrent registration in MATH 141) Small study group practice in applications of calculus. For elective credit only. Note: Two 2-hour sessions per week.

152 **Calculus Workshop II. (2)** (Prereq: Concurrent registration in MATH 142) Small study group practice in applications of calculus. For elective credit only. Note**:** Two 2-hour sessions per week.

170 **Finite Mathematics. (3)** (Prereq: C or better in MATH 111 or 111I or 122, or by placement through Algebra version of the Mathematics Placement Test: http://assess.math.sc.edu/) Elementary matrix theory; systems of linear equations; permutations and combinations; probability and Markov chains; linear programming and game theory. Note: Carolina Core ARP

172 **Mathematical Modeling for the Life Sciences. (3)** **(**Prereq: C or better in MATH 122 or MATH 141) Modeling population growth and structure using difference equations, differential equations, and matrix techniques. Emphasis on determining equilibria and stability or instability of these to analyze long term system behavior. Qualitative analysis using graphical and numerical techniques, analytical techniques used for linear and affine discrete and continuous models. Biological topics drawn from Malthusian exponential growth, logistic growth, Alee effects, predator-prey and competition interactions, age structured populations, allometric relationships, metapopulations and island biogeography, succession, Michaelis-Menton-Monod resource uptake and other functional responses. Note: Carolina Core ARP

174 **Discrete Mathematics for Computer Science. (3)** (Prereq: C or better in any 100-level MATH course or placement through either version of the Mathematics Placement Test: http://assess.math.sc.edu/) Induction, complexity, elementary counting, combinations and permutations, recursion and recurrence relations, graphs and trees; discussion of the design and analysis of algorithms--with emphasis on sorting and searching. Note: Carolina Core ARP (pending)

198 **Introduction to Careers and Research in the Mathematical Sciences. (1)** (Prereq: C or better in MATH 141) An overview of different areas of mathematical research and career opportunities for mathematics majors. Pass/fail only

221 **Basic Concepts of Elementary Mathematics I. (3)** (Prereq: C or better in MATH 111/111I, or by placement through Algebra version of the Mathematics Placement Test: http://assess.math.sc.edu/, or consent of the Undergraduate Director) The meaning of number, fundamental operations of arithmetic, the structure of the real number system and its subsystems, elementary number theory. Open only to students in elementary or early childhood teacher certification.

222 **Basic Concepts of Elementary Mathematics II. (3)** (Prereq: grade of C or better in MATH 221, or consent of the Undergraduate Director) Informal geometry and basic concepts of algebra. Open only to students in elementary or early childhood teacher certification.

241 **Vector Calculus. (3)** (Prereq: **C** or better in MATH 142, or consent of the Undergraduate Director) Vector algebra, geometry of three-dimensional space; lines, planes, and curves in space; polar, cylindrical, and spherical coordinate systems; partial differentiation, max-min theory; multiple and iterated integration, line integrals, and Green's theorem in the plane.

242 **Elementary Differential Equations. (3)** (Prereq **C** or better in MATH 142 or consent of the Undergraduate Director) Ordinary differential equations of first order, higher order linear equations, Laplace transform methods, series methods; numerical solution of differential equations. Applications to physical sciences and engineering.

300 **Transition to Advanced Mathematics. (3)** (Prereq: C or better in MATH 142 or consent of the Undergraduate Director) Rigor of mathematical thinking and proof writing via logic, sets, and functions. Intended to bridge the gap between lower-level (computational-based) and upper-level (proof-based) mathematics courses.

344 **Applied Linear Algebra. (3)** (Prereq: C or better in Math 142 or consent of Undergraduate Director) General solutions of systems of linear equations, vector spaces and subspaces, linear transformations, determinants, orthogonality, characteristic polynomials, eigenvalues and eigenvectors, singular value decompositions, and generalized inverse. Note: Math 344L is an optional laboratory course where additional applications will be discussed.

344L Applied Linear Algebra Lab. (1) (Prereq or coreq: C or better or concurrent enrollment in Math 344) Computer based applications of linear algebra for science and engineering students. Topics include numerical analysis of matrices, direct and indirect methods for solving linear systems, and least squares method (regression). Typical applications include practical issues related to discrete Markov processes, image compression, and linear programming. Note: Credit not allowed for both Math 344L and 544L.

374 Discrete Structures. (3) (Prereq: C or better in both MATH 142 and CSCE 146) Propositional and predicate logic; proof techniques; recursion and recurrence relations; sets, combinatorics, and probability; functions, relations, and matrices; algebraic structures.

399 Independent Study. (3-9) Contract approved by instructor, advisor, and department chair is required for undergraduate students.

401 Conceptual History of Mathematics. (3) (Prereq: C or better in MATH 122, or 141, or consent of the Undergraduate Director) Topics from the history of mathematics emphasizing the 17th century to the present. Various mathematical concepts are discussed and their development traced. For elective credit only.

499 Undergraduate Research. (1-3) Research on a specific mathematical subject area. The specific content of the research project must be outlined in a proposal that must be approved by the instructor and the Undergraduate Director. Intended for students pursuing the B.S. in Mathematics with Distinction (Pass-Fail grading only.)

511 Probability. {= STAT 511} (3) (Prereq: C or higher or concurrent enrollment in MATH 241 or consent of the Undergraduate Director) Probability and independence; discrete and continuous random variables; joint, marginal, and conditional densities, moment generating functions; laws of large numbers; binomial, Poisson, gamma, univariate, and bivariate normal distributions.

514 Financial Mathematics I. {=STAT 522} (3) (Prereq: **C** or better in MATH 241 or consent of Undergraduate Director) Probability spaces. Random variables. Mean and variance. Geometric Brownian Motion and stock price dynamics. Interest rates and present value analysis. Pricing via arbitrage arguments. Options pricing and the Black-Scholes formula.

515 Financial Mathematics II. {=STAT 523} (3) (Prereq: C or better in MATH 514 or STAT 522; or consent of the Undergraduate Director) Convex sets. Separating Hyperplane Theorem. Fundamental Theorem of Asset Pricing. Risk and expected return. Minimum variance portfolios. Capital Asset Pricing Model. Martingales and options pricing. Optimization models and dynamic programming.

520 Ordinary Differential Equations. (3) (Prereq: C or better in MATH 344 or 544; or consent of the Undergraduate Director) Differential equations of the first order, linear systems of ordinary differential equations, elementary qualitative properties of nonlinear systems.

521 Boundary Value Problems and Partial Differential Equations. (3) (Prereq: C or better in MATH 520 or in both 241 and 242 or consent of Undergraduate Director) Laplace transforms, two-point boundary value problems and Green's functions, boundary value problems in partial differential equations, eigenfunction expansions and separation of variables, transform methods for solving PDE's, Green's functions for PDE's, and the method of characteristics.

522 Wavelets. (3) (Prereq: C or better in MATH 344 or 544 or consent of Undergraduate Director) Basic principles and methods of Fourier transforms, wavelets, and multiresolution analysis; applications to differential equations, data compression, and signal and image processing; development of numerical algorithms. Computer implementation.

523 Mathematical Modeling of Population Biology. (3) (Prereq: C or better in MATH 142, BIOL 301, or MSCI 311 recommended) Applications of differential and difference equations and linear algebra modeling the dynamics of populations, with emphasis on stability and oscillation. Critical analysis of current publications with computer simulation of models.

524 Nonlinear Optimization. (3) (Prereq: C or better in MATH 344 or 544 or consent of the Undergraduate Director) Descent methods, conjugate direction methods, and Quasi-Newton algorithms for unconstrained optimization; globally convergent hybrid algorithm; primal, penalty, and barrier methods for constrained optimization. Computer implementation of algorithms.

525 Mathematical Game Theory. (3) (Prereq: C or better in MATH 544 or in both MATH 300 and 344, or consent of the Undergraduate Director) Two-person zero-sum games, minimax theorem, utility theory, n-person games, market games, stability.

526 Numerical Linear Algebra. (4) (Prereq: C or better in MATH 142 or consent of the Undergraduate Director) Matrix algebra, Gauss elimination, iterative methods; overdetermined systems and least squares; eigenvalues, eigenvectors; numerical software. Computer implementation. Notes: Three lectures and one laboratory hour per week. Credit may not be received for both MATH 526 and MATH 544.

527 **Numerical Analysis. {=CSCE 561} (3)** (Prereq: C or better in MATH 520 or in both MATH 242 and 344, or consent of the Undergraduate Director) Interpolation and approximation of functions; solution of algebraic equations; numerical differentiation and integration; numerical solutions of ordinary differential equations and boundary value problems; computer implementation of algorithms.

531 **Foundations of Geometry. (3)** (Prereq: C or better in MATH 300 or consent of the Undergraduate Director) The study of geometry as a logical system based upon postulates and undefined terms. The fundamental concepts and relations of Euclidean geometry developed rigorously on the basis of a set of postulates. Some topics from non-Euclidean geometry.

532 **Modern Geometry. (3)** (Prereq: C or better in MATH 300 or consent of the Undergraduate Director) Projective geometry, theorem of Desargues, conics, transformation theory, affine geometry, Euclidean geometry, non-Euclidean geometries, and topology.

533 **Elementary Geometric Topology. (3)** (Prereq: C or better in MATH 300 or consent of the Undergraduate Director) Topology of the line, plane, and space, Jordan curve theorem, Brouwer fixed point theorem, Euler characteristic of polyhedra, orientable and non-orientable surfaces, classification of surfaces, network topology.

534 **Elements of General Topology. (3)** (Prereq: C or better in MATH 300 or consent of the Undergraduate Director) Elementary properties of sets, functions, spaces, maps, separation axioms, compactness, completeness, convergence, connectedness, path connectedness, embedding and extension theorems, metric spaces, and compactification.

540 **Modern Applied Algebra. (3)** (Prereq: C or better in MATH 300 or consent of the Undergraduate Director) Finite structures useful in applied areas. Binary relations, Boolean algebras, applications to optimization, and realization of finite state machines.

541 **Algebraic Coding Theory. (3)** (Prereq: C or better in MATH 544 or in both MATH 300 and 344 or consent of the Undergraduate Director) Error-correcting codes, polynomial rings, cyclic codes, finite fields, BCH codes.

544 **Linear Algebra. (3)** (Prereq: C or better in MATH 300, or consent of Undergraduate Director) Vectors, vector spaces, and subspaces; geometry of finite dimensional Euclidean space; linear transformations; eigenvalues and eigenvectors; diagonalization. Throughout there will be an emphasis on theoretical concepts, logic, and methods. Note:–MATH 544L is an optional laboratory course where additional applications will be discussed.

544L **Linear Algebra Lab (1) {=MATH 344L**} (Prereq or coreq: C or better or concurrent enrollment in MATH 544). Objectives include acquainting mathematics students with the capabilities of computers for solving linear algebra-based problems that arise in their professions and providing students an opportunity to develop their programming and problem solving skills. Topics include numerical analysis of matrices, direct and indirect methods for solving linear systems, and least squares method (regression). Applications include discrete Markov processes and linear programming. Credit not allowed for both MATH 344L and 544L.

546 **Algebraic Structures I. (3)** (Prereq: C or better in MATH 544 or consent of the Undergraduate Director) Permutation groups; abstract groups; introduction to algebraic structures through study of subgroups, quotient groups, homomorphisms, isomorphisms, direct product; decompositions; introduction to rings and fields.

547 **Algebraic Structures II. (3)** (Prereq: C or better in MATH 546 or consent of the Undergraduate Director) Rings, ideals, polynomial rings, unique factorization domains; structure of finite groups; topics from: fields, field extensions, Euclidean constructions, modules over principal ideal domains (canonical forms).

550 **Vector Analysis. (3)** (Prereq: C or higher in MATH 241 or consent of the Undergraduate Director) Vector fields, line and path integrals, orientation and parametrization of lines and surfaces, change of variables and Jacobians, oriented surface integrals, theorems of Green, Gauss, and Stokes; introduction to tensor analysis.

551 **Introduction to Differential Geometry. (3)** (Prereq: C or better in MATH 300 or consent of Undergraduate Director) Parametrized curves, regular curves and surfaces, change of parameters, tangent planes, the differential of a map, the Gauss map, first and second fundamental forms, vector fields, geodesics, and the exponential map.

552 **Applied Complex Variables. (3)** (Prereq: C or better in MATH 241 or consent of Undergraduate Director) Complex integration, calculus of residues, conformal mapping, Taylor and Laurent Series expansions, applications.

554 **Analysis I. (3)** (Prereq: C or better in MATH 300 and at least one of MATH 511, 520, 534, 550, or 552, or consent of the Undergraduate Director) Least upper bound axiom, the real numbers, compactness, sequences, continuity, uniform continuity, differentiation, Riemann integral and fundamental theorem of calculus. Note: Carolina Core Integrative Course, Mathematics, BS

555 **Analysis II. (3)** (Prereq: C or better in MATH 554 or consent of the Undergraduate Director) Riemann-Stieltjes integral, infinite series, sequences and series of functions, uniform convergence, Weierstrass approximation theorem, selected topics from Fourier series or Lebesgue integration.

561 **Introduction to Mathematical Logic. (3)** (Prereq: C or better in MATH 300 or consent of Undergraduate Director) Syntax and semantics of formal languages; sentential logic, proofs in first order logic; Godel's completeness theorem; compactness theorem and applications; cardinals and ordinals; the Lowenheim-Skolem-Tarski theorem; Beth's definability theorem; effectively computable functions; Godel's incompleteness theorem; undecidable theories.

562 **Theory of Computation. {=CSCE 551} (3)** (Prereq: C or better in CSCE 350 or MATH 344 or 544 or 574 or consent of the Undergraduate Director) Basic theoretical principles of computing as modeled by formal languages and automata; computability and computational complexity. Major credit may not be received for both CSCE 355 and CSCE 551.

570 **Discrete Optimization. (3)** (Prereq: C or better in MATH 344 or 544 or consent of the Undergraduate Director) Discrete mathematical models. Applications to such problems as resource allocation and transportation. Topics include linear programming, integer programming, network analysis, and dynamic programming.

574 **Discrete Mathematics I. (3)** (Prereq: C or better in MATH 300 or consent of the Undergraduate Director) Mathematical models; mathematical reasoning; enumeration; induction and recursion; tree structures; networks and graphs; analysis of algorithms.

575 **Discrete Mathematics II. (3)** (Prereq: C or better in MATH 574 or consent of the Undergraduate Director) A continuation of MATH 574. Inversion formulas; Polya counting; combinatorial designs; minimax theorems; probabilistic methods; Ramsey theory; other topics.

576 **Combinatorial Game Theory. (3)** (Prereq: a grade of C or better MATH 344, 544, or 574 or consent of the Undergraduate Director) Winning in certain combinatorial games such as Nim, Hackenbush, and Domineering. Equalities and inequalities among games, Sprague-Grundy theory of impartial games, games which are numbers.

580 **Elementary Number Theory. (3)** (Prereq: C or better in MATH 300 or consent of the Undergraduate Director) Divisibility, primes, congruences, quadratic residues, numerical functions. Diophantine equations.

587 **Introduction to Cryptography. {=CSCE 557} (3)** (Prereq: C or better in CSCE 145, or in MATH 241, and either CSCE 355 or MATH 574 or consent of the Undergraduate Director) Design of secret codes for secure communication, including encryption and integrity verification: ciphers, cryptographic hashing, and public key cryptosystems such as RSA. Mathematical principles underlying encryption. Code-breaking techniques. Cryptographic protocols.

590 **Undergraduate Seminar. (1-3)** (Prereq: consent of instructor) A review of literature in specific subject areas involving student presentations. Content varies and will be announced in the *Master Schedule of Classes* by suffix and title. Pass-fail grading. For undergraduate credit only.

599 **Topics in Mathematics. (1-3)** Recent developments in pure and applied mathematics selected to meet current faculty and student interest.

602 **An Inductive Approach to Geometry. (3)** (Prereq: C or better in MATH 122 or 141 or equivalent, or consent of the Undergraduate Director) This course is designed for middle level pre-service mathematics teachers. This course covers geometric reasoning, Euclidean geometry, congruence, area, volume, similarity, symmetry, vectors, and transformations. Dynamic software will be utilized to explore geometric concepts. This course cannot be used towards a major or minor in mathematics.

603 **Inquiry Approach to Algebra. (3)** (Prereq: C or higher in MATH 122 or MATH 141 or equivalent, or consent of the Undergraduate Director) This course introduces basic concepts in number theory and modern algebra that provide the foundation for middle level arithmetic and algebra. Topics include: algebraic reasoning, patterns, inductive reasoning, deductive reasoning, arithmetic and algebra of integers, algebraic systems, algebraic modeling, and axiomatic mathematics. This course cannot be used for credit towards a major or minor in mathematics.

650 **AP Calculus for Teachers (3)** (Prereq: current secondary high school teacher certification in mathematics and a C or better in at least 6 hours of calculus or consent of the Undergraduate Director) A thorough study of the topics to be presented in AP calculus, including limits of functions, differentiation, integration, infinite series, and applications. (Not intended for degree programs in mathematics.)

PLANNING YOUR DEGREE PROGRAM

A general schedule for the offering of upper-division mathematics courses is shown below. A collection of sample programs of study and a graduation checklist are also included in this document. Additional programs of study, including a blank form for you to use to plan and monitor your personal progress can be found under the Undergraduate Program link on the Department of Mathematics homepage (http://www.math.sc.edu/).

Tentative Schedule of Regularly-Offered Upper-Division MATH Courses

Course	Fall (odd)	Spring (even)	Summer (even)	Fall (even)	Spring (odd)	Summer (odd)
300	X	X		X	X	
344 / 526	X	X		X	X	
374	X	X		X	X	
511	*X*	*X*	*X*	*X*	*X*	*X*
514	X			X		
515		X				
520	*X*	*X*		*X*	*X*	
521					X	
522				X		
523	X					
524				X		
527		X				
531	X			X		
532		X			X	
534	*X*					
544	X	X + H	X	X	X + H	X
546	H	X	X	X + H	X	X
547		H			H	
550	*X*	*X + H*		*X*	*X + H*	
552		*X*			*X*	
554	X + H	X	X	H	X	X
555		H			H	
570	X					
574	X + H	X	X	X + H	X	
580	X			X		X
587				X		

Legend:	
H	Registration in Honors sections is controlled by the SC Honors College. Non-Honors students can request permission to enroll in Honors sections by completing the Honors Request form, available from the Undergraduate Office (LC 413).
bold	required for all Mathematics degrees at USC
italics	*one of these courses is required – before taking MATH 554*

Notes:

1. Whether a course runs in each of the indicated semesters depends upon enrollment and staffing.
2. MATH 526 will not be offered after Fall 2016; MATH 344 will be offered beginning in Spring 2017.

Individual Program of Study for
B. S. in Mathematics

Major Pathway: __ General ___ Cognate/Minor: ______________

	Fall Semester	Role	Hrs	Spring Semester	Role	Hrs	Total Hrs
Freshman	MATH 141	ARP - CC	4	MATH 142	ARP - CC	4	
	ENGL 101	CMW - CC	3	ENGL 102	CMW+INF - CC	3	
	Lab Science	SCI - CC	4	Lab Science	SCI - CC	4	
	HIST 10x / 11x	GHS - CC	3	HIST 11x / 10x	GHS - CC	3	
	UNIV 101	Elective	3	Humanity / Fine Art	AIU - AS	3	
	Semester Total		17			17	34
							34
Sophomore	MATH 241	Pre-Major	3	MATH 544	Major Core	3	
	MATH 300	Pre-Major	3	MATH 5xx	Major Elec	3	
	For Lang 121	GFL - CC	4	For Lang 122	GFL - CC	3	
	Social Science	GSS - CC	3	Social Science	GSS - AS	3	
	CSCE 145 / 206	ARP - AS	4	SPCH 140	CMS - CC	3	
	Semester Total		17			15	32
							66
Junior	MATH 511 / 520 / 534 / 550	Major Core	3	MATH 546 / 554	Major Core	3	
	MATH 5xx	Major Elec	3	STAT 509 / 512 / 515	ARP - AS	3	
	Fine Art / Lit	AIU - CC	3	Val, Eth, Soc Resp	VSR - CC	3	
	Cognate / Minor		3	Cognate / Minor		3	
	Elective		3	Elective		3	
	Semester Total		15			15	30
							96
Senior	MATH 546 / 554	Major Core	3	MATH 5xx	Major Elec	3	
	MATH 5xx	Major Elec	3	Cognate / Minor		3	
	Cognate / Minor		3	Minor / Elective		3	
	Minor / Elective		3	Elective		3	
	Elective		3	Elective		3	
	Semester Total		15			15	30
							126

Individual Program of Study for

B. S. in Mathematics

Major Pathway: __ Actuarial ___ Cognate/Minor: _ Risk Mgmt & Ins _

	Fall Semester	Role	Hrs	Spring Semester	Role	Hrs	Total Hrs
Freshman	MATH 141	ARP - CC	4	MATH 142	ARP - CC	4	
	ENGL 101	CMW - CC	3	ENGL 102	CMW+INF - CC	3	
	Lab Science	SCI - CC	4	Lab Science	SCI - CC	4	
	HIST 10x / 11x	GHS - CC	3	HIST 11x / 10x	GHS - CC	3	
	UNIV 101	Elective	3	ACCT 225	Minor	3	
	Semester Total		17			17	34
							34
Sophomore	MATH 241	Pre-Major	3	MATH 300	Pre-Major	3	
	MATH 511	Major Core	3	STAT 512	ARP - AS	3	
	For Lang 121	GFL - CC	4	For Lang 122	GFL - CC	3	
	ECON 221	GSS – A / Minor / VEES	3	ECON 222	Minor / SOA-VEE	3	
	Fine Art / Lit	AIU - CC	3	CSCE 145 / 206	ARP - AS	4	
	Semester Total		16			16	32
							66
Junior	MATH 544	Major Core	3	MATH 546 / 554	Major Core	3	
	MATH 5xx	Major Elec	3	MATH 5xx	Major Elec	3	
	STAT 513	Elective	3	SPCH 140	CMS - CC	3	
	FINA 363	Minor / SOA-VEE	3	ECON 436	SOA - VEE	3	
	Humanity / Fine Art	AIU - AS	3	FINA 341	Minor	3	
	Semester Total		15			15	30
							96
Senior	MATH 524 / 570	Major Elec	3	MATH 554 / 546	Major Core	3	
	MATH 5xx	Major Elec	3	FINA 475	Minor	3	
	FINA 469	Minor	3	FINA 471	Minor	3	
	Val, Eth, Soc Resp	VSR - CC	3	Elective		3	
	Social Science	GSS - CC	3	Elective		3	
	Semester Total		15			15	30
							126

Individual Program of Study for

B. S. in Mathematics

Major Pathway: __ Education ___ Cognate/Minor: _ Secondary Education _

	Fall Semester	Role	Hrs	Spring Semester	Role	Hrs	Total Hrs
Freshman	MATH 141	ARP - CC	4	MATH 142	ARP - CC	4	
	ENGL 101	CMW - CC	3	ENGL 102	CMW+INF - CC	3	
	Lab Science	SCI - CC	4	Lab Science	SCI - CC	4	
	HIST 10x / 11x	GHS - CC	3	HIST 11x / 10x	GHS - CC	3	
	UNIV 101	Elective	3	Humanity / Fine Art	AIU - AS	3	
	Semester Total		17			17	34
							34
Sophomore	MATH 241	Pre-Major	3	MATH 544	Major Core	3	
	MATH 300	Pre-Major	3	MATH 5xx	Major Elec	3	
	For Lang 121	GFL - CC	4	For Lang 122	GFL - CC	3	
	Social Science	GSS - CC	3	SPCH 140	CMS - CC	3	
	EDFI 300	Cognate	3	EDPY 401	Cognate	3	
	Semester Total		16			15	31
							65
Junior	MATH 511 / 520 / 534 / 550	Major Core	3	MATH 546 / 554	Major Core	3	
	MATH 580	Major Elec	3	STAT 509 / 512 / 515	ARP - AS	3	
	Fine Art / Lit	AIU - CC	3	Val, Eth, Soc Resp	VSR - CC	3	
	CSCE 145 / 206	ARP - AS	4	Social Science	GSS - AS	3	
	EDSE 302	Cognate	3	EDSE 500	Cognate	3	
	Semester Total		16			15	31
							96
Senior	MATH 546 / 554	Major Core	3	MATH 5xx / 532	Major Elec	3	
	MATH 531 / 5xx	Major Elec	3	Minor / Elective		3	
	Minor / Elective		3	Elective		3	
	Elective		3	Elective		3	
	Elective		3	Elective		3	
	Semester Total		15			15	30
							126

Individual Program of Study for
B. S. in Mathematics

Major Pathway: __ Applied ___ Cognate/Minor: ______________

	Fall Semester	Role	Hrs	Spring Semester	Role	Hrs	Total Hrs
Freshman	MATH 141	ARP - CC	4	MATH 142	ARP - CC	4	
	ENGL 101	CMW - CC	3	ENGL 102	CMW+INF - CC	3	
	Lab Science	SCI - CC	4	Lab Science	SCI - CC	4	
	HIST 10x / 11x	GHS - CC	3	HIST 11x / 10x	GHS - CC	3	
	UNIV 101	Elective	3	Humanity / Fine Art	AIU - AS	3	
	Semester Total		17			17	34
							34
Sophomore	MATH 241	Pre-Major	3	MATH 544	Major Core	3	
	MATH 300	Pre-Major	3	MATH 544L	Major Elec	1	
	For Lang 121	GFL - CC	4	MATH 5xx	Major Elec	3	
	Social Science	GSS - CC	3	For Lang 122	GFL - CC	3	
	CSCE 145 / 206	ARP - AS	4	Social Science	GSS - AS	3	
				SPCH 140	CMS - CC	3	
	Semester Total		17			16	33
							67
Junior	MATH 511 / 520 / 534 / 550	Major Core	3	MATH 546 / 554	Major Core	3	
	MATH 5xx	Major Elec	3	STAT 509 / 512 / 515	ARP - AS	3	
	Fine Art / Lit	AIU - CC	3	Val, Eth, Soc Resp	VSR - CC	3	
	Cognate / Minor		3	Cognate / Minor		3	
	Elective		3	Elective		3	
	Semester Total		15			15	30
							97
Senior	MATH 554 / 546	Major Core	3	MATH 5xx	Major Elec	3	
	MATH 5xx	Major Elec	3	Cognate / Minor		3	
	Cognate / Minor		3	Minor / Elective		3	
	Minor / Elective		3	Elective		3	
	Elective		3	Elective		3	
	Semester Total		15			15	30
							127

Individual Program of Study for
B. S. in Mathematics

Major Pathway: __ Distinction ___ Cognate/Minor: _______________

	Fall Semester	Role	Hrs	Spring Semester	Role	Hrs	Total Hrs
Freshman	MATH 141	ARP - CC	4	MATH 142	ARP - CC	4	
	ENGL 101	CMW - CC	3	ENGL 102	CMW+INF - CC	3	
	Lab Science	SCI - CC	4	Lab Science	SCI - CC	4	
	HIST 10x / 11x	GHS - CC	3	HIST 11x / 10x	GHS - CC	3	
	UNIV 101	Elective	3	Humanity / Fine Art	AIU - AS	3	
	Semester Total		17			17	34
							34
Sophomore	MATH 241	Pre-Major	3	MATH 544	Major Core	3	
	MATH 300	Pre-Major	3	MATH 5xx	Major Elec	3	
	For Lang 121	GFL - CC	4	For Lang 122	GFL - CC	3	
	Social Science	GSS - CC	3	Social Science	GSS - AS	3	
	CSCE 145 / 206	ARP - AS	4	SPCH 140	CMS - CC	3	
	Semester Total		17			15	32
							66
Junior	MATH 511 / 520 / 534 / 550	Major Core	3	MATH 547	Distinction	3	
	MATH 546	Major Elec	3	MATH 5xx	Major Elec	3	
	Fine Art / Lit	AIU - CC	3	STAT 509 / 512 / 515	ARP - AS	3	
	Cognate / Minor		3	Val, Eth, Soc Resp	VSR - CC	3	
	Elective		3	Cognate / Minor		3	
	Semester Total		15			15	30
							96
Senior	MATH 554	Major Core	3	MATH 555	Distinction	3	
	MATH 5xx	Major Elec	3	MATH 5xx	Major Elec	3	
	MATH 5yy	Distinction	3	MATH 5yy	Distinction	3	
	Elective		3	MATH 499	Distinction	3	
	Elective		3	Cognate / Minor		3	
	Semester Total		15			15	30
							126

Individual Program of Study for

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B. S. in Mathematics

Major Pathway: ________________ Cognate/Minor: ________________

	Fall Semester	Hrs	Spring Semester	Hrs	Summer Semester	Hrs	Total Hrs
Freshman							
	Semester Total	0		0		0	0
Sophomore							
	Semester Total	0		0		0	0
Junior							
	Semester Total	0		0		0	0
Senior							
	Semester Total	0		0		0	0
							0
Fifth Year							
	Semester Total	0		0		0	0
							0

Graduation Checklist for B.S. in Mathematics (2015-2016)

	Course	Credit Hrs	Grade	Note
Effective & Persuasive Communication: Writing	ENGL 101			CMW - CC
	ENGL 102			CMW - CC
Analytical Reasoning & Problem Solving	MATH 141			ARP - CC
	MATH 142			ARP - CC
STAT 509, 512, or 515	STAT			ARP - AS
CSCE 145 or 206	CSCE			ARP - AS
Scientific Literacy				SCI - CC
				SCI - CC
2 lab sequences (8 hrs)				SCI - CC
				SCI - CC
Global Citizenship: Foreign Language				GFL - CC
				GFL - CC
thru 122 (0-9 hrs)				GFL - CC
Global Citizenship: Historical Thinking	HIST 10_			GHS - CC
	HIST 11_			GHS - CC
Global Citizenship: Social Science				GSS - CC
				GSS - AS
Fine Arts / Literature				AIU - CC
Humanity / Fine Arts				AIU - AS
***Comm: Speech**				CMS - CC
***Information Literacy**				INF - CC
***Values, Ethics, Soc Resp**				VSR - CC

* 2 of CMS, INF, and VSR can be overlays

total hrs depends on GFL & overlays

Hrs Earned 0

Hrs Req'd 53 -- 68

	Course	Credit Hrs	Grade
Pre-Major	MATH 241		
	MATH 300		

Hrs Earned 0

Hrs Req'd 6

	Course	Credit Hrs	Grade
Major	MATH 544		
	MATH 511, 520, 534, 550, or 552		
	MATH 546		
	MATH 554		
	MATH 5__		
	MATH 5__		
	MATH 5__		
	MATH 5__		

Hrs Earned 0

Hrs Req'd 24

	Course	Credit Hrs	Grade
Cognate, Minor, or 2^{d} Major			

Hrs Earned 0

Hrs Req'd 12--18

	Course	Credit Hrs	Grade
Elective			

Hrs Earned 0

Hrs Req'd 3 -- 25

Total Hours Earned 0

Total Hours Req'd 120

An electronic copy of this document can be found on the Undergraduate section of the Department of Mathematics website:

http://www.math.sc.edu/undergraduate/

This page contains lots of information about courses, advising, summer opportunities, scholarships and awards, etc.

The direct URL to this Undergraduate Booklet is

http://www.math.sc.edu/undergraduate/2015ugradbooklet.pdf

The Sample and Individual Programs of Study and Graduation Checklist are available as Excel spreadsheets from

http://www.math.sc.edu/undergraduate/2015UgradSampleProgChecklist.xlsx