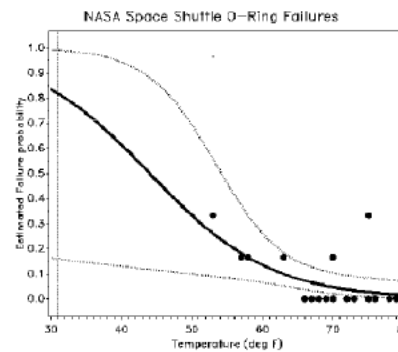
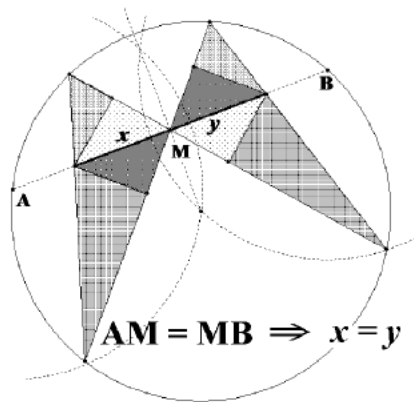


# A STUDENT HANDBOOK FOR UNC ASHEVILLE MATHEMATICS MAJORS

Department of Mathematics, CPO #2350  
University of North Carolina at Asheville  
Asheville, NC 28804-8511



**Fall 2017 - Spring 2018 - Summer 2018**

(Cover image: A two-affine-transformation fractal, A visual representation of the Butterfly Theorem,  
An example of a logistic regression)

## WELCOME

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To Prospective Mathematics and Statistics Students:

We are delighted that you are showing an interest in mathematics by reading this welcome letter. Whether you plan to major in Mathematics or just to take a few Mathematics courses let me highlight some of the benefits of studying Mathematics at UNC Asheville.

Mathematics is the foundation of many academic and industrial endeavors. Whether you are setting up the logistics for a company, analyzing political polls, animating Pixar movies, or combating disease you need the power of higher Mathematics to do your job. Our department takes pride in offering a relevant and flexible curriculum to help you lay the foundation of a successful career. We offer concentrations in statistics, theoretical and applied mathematics, as well as teacher licensure.

Mathematics at UNC Asheville is embedded in the university's Liberal Arts Curriculum. In our program students get a solid understanding of the foundations of Mathematics anchored within a broader educational context. Students who major in Mathematics often finish their studies by either doing an undergraduate research project or participate in an internship. Our Alumni have become successful business owners, actuaries, award winning teachers, and active research professionals.

We are located on the third floor of Robison Hall. Please come by and look at our facilities, which includes the Parsons Mathematics Assistance Center, a great place to learn / study mathematics and get tutorial help if needed. Alternatively, visit us on the web ([math.unca.edu](http://math.unca.edu)) or on Facebook ([mathematics.asheville](https://www.facebook.com/mathematics.asheville)).

If you have any questions concerning mathematics at UNC Asheville, please feel free to contact me at [dohse@unca.edu](mailto:dohse@unca.edu), or call the department at (828) 251-6556.



Lothar Dohse, Chair

Mathematics Department

## EDUCATIONAL RESOURCES

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### **Information Resources**

D.H. Ramsey Library is centrally located on campus. It has a wide selection of traditional reference resources, and maintains the portals *JSTOR* and *MathSciNet*, which allow you to access hundreds of scientific journals using UNC Asheville's campus wide wireless Internet.

The campus's Information Services also maintains site licenses to several important mathematical software tools including Mathematica, SAS, and Minitab.

### **Parsons Math Lab**

The Mathematics Department maintains a professionally staffed learning resource center known as the Math Lab. This center is designed for students who require additional help for introductory mathematics courses, or students who want to collaborate on class work. Students are invited to drop in at any time to study, to obtain help, and to work in groups. Computers with mathematical software are also available.

In addition to staff members, the Math Lab employs mathematics majors to help tutor students. This facility is open Monday - Thursday from 8:00 a.m. to 9:30 p.m., Friday from 8:00 a.m. to 4:30 p.m., and Sunday from 4:30 p.m. to 9:30 p.m.

### **Scholarships**

The Math Department has three student scholarships that are awarded each year to Junior and Senior Math majors. The Parsons Scholarship and the Jane Oliver Swafford Scholarship are given to top math students on any track. The Martha Games Scholarship is given to a top math student on the Teaching track. Applications are collected in the Spring Semester and awards given for the following year. Application due dates and information will be emailed to all Math majors.

### **Regional Math Conferences**

The department encourages its majors to participate in professional mathematics conferences. In the past the department has given financial support to students who presented at the regional and national MAA (Mathematics Association of America) and SMURCHOM (Smoky Mountain Undergraduate Research Conference on the History of Mathematics).

## ADDITIONAL PROFESSIONAL OPPORTUNITIES

### **Math Clubs**

We have two student Math Clubs. One affiliated with the Mathematical Association of America (MAA) and the other affiliated with the Association for Women in Mathematics (AWM). The clubs organize social events and as well as mathematics events. Examples of activities involve potlucks, hiking adventures, Pi-Day, and teaching Super Saturday classes.

### **Parsons Lecture**

Celebrating exceptional teaching at UNC Asheville - past, present, and future.

In 1998 a Mathematics alumnus from UNC Asheville provided an endowment, in honor of Joe Parsons, to fund this annual lecture series. Speakers are invited to present a mathematics lecture for the general public and raise awareness of the relevance of Mathematics.

### **Summer Research Programs**

Every summer several of our students participate in summer math programs across the country and abroad. Many of these are fully supported and offer a stipend. The NSF-REU programs have students spend 8 weeks at another campus doing math research. These programs cover room and board as well as a stipend. Participants are typically between their junior and senior years.

### **Study Abroad**

Students have completed Mathematical Studies programs at Universities overseas. Two programs in particular have been popular, the Budapest Semester in Mathematics and the Math in Moscow Program. Both are endorsed by the national math societies.

In addition one of our faculty, Dr. Boudreaux, has led four study abroad trips to Greece, Turkey and Italy. On these trips students take a university course, typically History of Mathematics, while visiting the historical sites.

### **Math Recital**

Every spring the Math Department hosts a recital. Everyone is welcome! If you dance, sing, recite poetry, juggle, play an instrument, tell jokes, do magic tricks, tell stories, etc, please come share your talent and enjoy the talents of others.

## FACULTY PROFILE

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BAHLS, Patrick – Professor; University Honors Program Director, B.S., 1998, University of Denver; M.S., 2000 and Ph.D., 2002, Vanderbilt University.

Interests: graph theory and combinatorics, algebra, number theory, math and writing. Additional Responsibilities: National MAA involvement, Project NExT Sectional Co- Director, Director of Research Experience for Undergraduates, and Algebra al Fresco.

BEHARRYSINGH, Rudy – Director of the Parsons Math Lab; B.S., 1984, McGill University; M.S., Western Carolina University, 2002.

Interests: Applied mathematics, environmental applications, alternative energy, economics.

BOUDREAUX, Gregory – Assoc. Professor; B.S., 1987, Loyola University; M.S., 1996, Ph.D., 2001, University of Louisiana at Lafayette.

Interests: abstract algebra, topology and mathematics informed by history Additional Responsibilities: Coordinator of Study Abroad in Greece/Turkey, Putnam/VTRMC Math Contests, and Faculty Standing Committees; Science Olympiad scorekeeper, Faculty Senate member.

DOHSE, Lothar A. – Professor; B.S., 1975, University of New Orleans; M.S., 1978, and Ph.D., 1982, both from North Carolina State University.

Interests: mathematical modeling, problem solving, and on-line delivery of Mathematics courses.

Additional Responsibilities: Coordinator of the North Carolina State Mathematics Contest.

KAPLAN, Samuel – Professor; B.S., 1990, University of North Carolina; M.A., 1992, Boston University; Ph.D., 1996, Boston University.

Interests: differential equations, chaos, math and music Additional Responsibilities: Asheville Initiative for Mathematics.

LEE, Jimin – Assoc. Professor; B.S., 1996, Kyungpook National University, Korea; M.S., 2006, and Ph.D., 2008, University of North Carolina Charlotte.

Interests: applied statistics, survival analysis, application of statistical models to real problems

McCLURE, Mark C. – Professor; B.S., 1988, and Ph.D., 1994, Ohio State University. Interests: fractal geometry and measure theory.

PATCH, Steve C. – Professor; B.A., 1975, University of Connecticut; M.S., 1982, and Ph.D., 1984, Clemson University.

Interests: applied statistics and data analysis, environmetrics, water quality.

PEIFER, David E. – Professor; B.A., 1986, Northeastern Illinois University; Ph.D., 1992, University of Illinois.

Interests: modern algebra and geometric group theory.

Additional Responsibilities: Chair of the Mathematics Department.

SANFT, Becky – Asst. Professor; B.S., 2003, College of William and Mary; Ph.D., 2009, University of Arizona.

Interests: mathematical biology, applied mathematics, biomechanics

STEELE, David – Assoc. Professor; B.A. 1971, Clearwater Christian College; M.A., University of South Florida; Ph.D., 1983, U.S.F.

Interests: probability theory and discrete mathematics.

TINNEY, Laura – Lecturer; B.S., 2013, University of North Carolina Asheville, Asheville, NC; M.S., 2016, Nicholls State University, Thibodaux, LA.

Interests: applied mathematics, problems solving, and mathematics education

WEBSTER, Julia – Lecturer; B.S., 2001, Haverford College; M.A.T., 2008, Western Carolina University.

Interests: mathematics education, applied mathematics

WHITLOCK, Cathy – Lecturer; B.S., 1989, Salem College, Winston-Salem, NC; M.S., 1995, North Carolina State University.

Interests: applied mathematics and mathematics education.

Additional Responsibilities: Science Olympiad, Burroughs Wellcome.

## ADJUNCT FACULTY

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KOH, Eunmee – B.S., 1981, Seoul National University; M.S., 1985, and Ph.D., 1989 (Statistics) University of Wisconsin - Madison.

RASCHE, Michael – B.S., 2007, Rose-Hulman Inst. of Tech.; M.S., 2010, and Ph.D., 2015 (Chemical Engineering) University of Illinois.

SPICUZZA, Bob – B.S., 1969, Worcester Polytech Inst.; M.S., 1972, and Ph.D., 1976 (Physics) University of Connecticut.

# THE CURRICULUM

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## Declaration of Major

Declaring a major in mathematics requires a student to first complete LANG 120. Once that is established, the student needs to complete and submit a *Declaration of Major* form to the departmental Chair. Forms are available in the department office, RRO 303.

The mathematics major is designed to provide the student with a foundation in mathematics while also giving the student a deeper understanding of a specific concentration. There are four concentrations to choose from: Pure (theoretical) Mathematics, Applied Mathematics, Mathematics with Teacher Licensure, and Statistics.

## Course Requirements

All students, in addition to the Liberal Arts Core Requirements, must complete the following course work. For specific courses, see individual programs. It is assumed that a student's mathematics background is sufficient to start with calculus. If this is not the case, he or she will be asked to take MATH 167, Precalculus.

- I. Required courses in the major – 39-40 hours, including: MATH 191, 192, and 291 (Calculus I, II, and III) MATH 280 (Math Foundations) MATH 365 (Linear Algebra I) MATH 381 (Problems in Mathematics), and MATH 480 (Senior Seminar) 18-19 additional hours of courses in mathematics or statistics. See specific concentrations for exact course requirements.
- II. Required courses outside major - 9-31 hours including: 3 hours in CSCI 181 or 182 (Intro to Prog for Numeric Appl or Intro Prog for Media Appl). See specific concentrations for possible options.
- III. Other departmental requirements: A passing score on a comprehensive mathematics exam.

The comprehensive exam consists of a standardized two-hour exam, usually given at the end of Math 381, Problems in Mathematics. If a student fails to attain a passing score, he or she may be asked to do additional work in mathematics in order to fulfill this requirement. Students are expected to take this exam during the semester prior to their last.

## Concentration in Applied Mathematics

The Applied Mathematics Concentration is structured around the premise that Mathematics is a useful tool in many academic areas. Students in this program are required to take upper-level courses in a second discipline of their choosing, and are encouraged to explore the connections between mathematics and this second discipline. By developing expertise in two areas, students will increase their options for future studies and employment after they graduate.

- I. Required courses in the major—39–40 hours, including: MATH 191, 192, 280, 291, 365, 381, 394, 480, 491; STAT 225 or 425; one course from MATH 366, 395, 441, 452 or STAT 426; and 6 additional hours in Mathematics or Statistics at the 300-400 level.
- II. Required courses outside the major—18 hours, including: CSCI 181 or 182, and at least 15 additional hours from a discipline in which mathematical applications are important. These courses must be approved by the department chair. 9 of the 15 hours must be at the 300-400 level.
- III. Other departmental requirements—Satisfactory performance on a comprehensive Mathematics exam and the satisfactory presentation of one seminar in MATH 480. Successful completion of MATH 480 demonstrates oral competency. Successful completion of CSCI 181 or 182 demonstrates computer competency.

## Concentration in Pure Mathematics

This area consists of a traditional Mathematics major. It serves well as a strong liberal arts major. With appropriate selection of the major options, it will give the student an adequate preparation for graduate study in mathematics.

- I. Required courses in the major—39–40 hours, including: MATH 191, 192, 280, 291, 365, 381, 394, 461, 480, 491; and an additional 9–10 hours chosen from STAT 225 and Mathematics or Statistics at the 300-400 level. These latter hours must include either: one from MATH 366, 462, 492; or the sequence STAT 425-426.
- II. Required courses outside the major—9–11 hours, consisting of CSCI 181 or 182, and one of the following groups of courses: CHEM 111, 132, 145 and 236; or ECON 101 and 102; or PHYS 221 and 222; or at least 6 credit hours of courses at the 300-level or above, approved by the department chair, from disciplines in which mathematics plays a significant role.
- III. Other departmental requirements—Satisfactory performance on a comprehensive Mathematics exam and the satisfactory presentation of one seminar in MATH 480. Successful completion of MATH 480 demonstrates oral competency. Successful completion of CSCI 181 or 182 demonstrates computer competency.



## Concentration in Statistics

This program is designed for students who have an interest in probability and statistics. Graduates may pursue a career in actuarial science, quality control or related fields, or enter a graduate program in statistics, mathematics or a related discipline.

- I. Required courses in the major—40 hours, including: MATH 191, 192, 280, 291, 365, 381, 480; STAT 185 or 225; 325, 326, 425, 426; and an additional 3-hour Mathematics or Statistics course numbered above 300. Students intending to pursue graduate study are strongly advised to take MATH 491.
- II. Required courses outside the major—9 hours, including: CSCI 181 or 182, and either ACCT 215 and ECON 306; or ECON 102 and 305; or MGMT 220 and 380; or 6 hours at the 300-400 level approved by the department chair from disciplines which routinely employ statistical methodology. Students interested in actuarial science are strongly encouraged to take ACCT 215, ECON 101, 102, 305, and 306.
- III. Other departmental requirements—Satisfactory performance on a comprehensive Mathematics exam and the satisfactory presentation of one seminar in MATH 480. Successful completion of MATH 480 demonstrates oral competency. Successful completion of CSCI 181 or 182 demonstrates computer competency.

## Concentration in the Teaching of Mathematics

This area is designed to provide a good background in mathematics for those students planning to teach mathematics at the secondary level. Completing this program also satisfies the requirements for secondary licensure in mathematics. Students seeking middle school licensure should review requirements found in the Education section of the catalog and see the appropriate licensure advisor for additional information.

- I. Required courses in the major—40 hours, including: MATH 191, 192, 280, 291, 332, 365, 381, 461, 480; STAT 225; and an additional 9 hours chosen from MATH 251 and Mathematics or Statistics courses numbered at or above the 300-level.
- II. Required courses outside the major—32 hours, consisting of CSCI 181 or 182; PSYC 319; and EDUC 210, 211, 314, 346, 383, 455, 456. Please see the Education curriculum for more detail.
- III. Other departmental requirements—Satisfactory performance on a comprehensive Mathematics exam and the satisfactory presentation of one seminar in MATH 480. Successful completion of MATH 480 demonstrates oral competency. Successful completion of CSCI 181 or 182 demonstrates computer competency.

## Mathematics Minor

21 hours in mathematics or statistics, including MATH 191, 192, and 291. The remaining 9 semester hours must be chosen from 300-400 level MATH or STAT courses. One-half of the hours required for a minor must be completed at UNC Asheville. All minors require that a minimum of 6 semester hours of 300-400 level courses are completed at UNC Asheville.

## Preparation for Graduate School

Students who wish to continue their studies of mathematics in graduate school should consider completing MATH 461, MATH 462, MATH 491, and MATH 492. They should also elect additional upper-level mathematics courses in fields of their interest to broaden their understanding. The requirements for graduation listed in the catalog reflect minimum standards. A student who wishes to have a sound education in mathematics should use the opportunities provided by this university and its Mathematics Department to broaden his or her knowledge base. The best preparation for advanced studies in mathematics is to have some understanding of the different branches of mathematics.

## Undergraduate Research

Undergraduate Research is not required in the mathematics major. However, it is a great opportunity for students planning to go on to graduate studies or who enjoy doing research. If you are interested, you should talk with a mathematics professor to discuss possible topics. Most research students work one or two semesters and typically begin in the second semester of their junior year. Below is a list of a few of the past student research projects and the faculty advisors.

Cylindrical Braids and Knots (Peifer)  
Longitudinal Study of Chemical Properties and Macroinvertebrate Diversity in Western North Carolina Streams from 2005 to 2009 (Patch)  
Estimating the worst case of the Dedekind-MacNeille completion (Bahls)  
Moebius inversion in subgraph lattices (Bahls)  
Connectivity properties of random regular graphs (Bahls)  
Analysis of Taxicab Geometry (Atkinson)  
The Geometry of the Roots of a Polynomial (Bahls)  
Dynamics of Frisbee Flight (Kaplan)  
The Maney Force and Satellite Motion (Kaplan)  
Aperiodic Fractal Tiling (McClure)  
Evaluating the Relationship Between Chemical Properties and Macroinvertebrate Diversity in Western North Carolina Streams 2005-2009 (Patch)  
Rewriting Systems for Knot Groups (Peifer)  
Classifying Cylindrical Braids (Peifer)  
Survival Analysis of time to Declare a Major for Undergraduate Students (Lee)  
Pythagorean Magic Squares Triples (Boudreaux)  
Using History of Mathematics to Introduce Topics in K-12 Math Courses (Boudreaux)  
Mathematics and Music (Boudreaux)  
The Trifid Transformation (Boudreaux)  
A Horn Angle Approach to Calculus (Boudreaux)  
Topics in Endomorphism Near-Rings (Boudreaux)  
Measuring functions and Arc Length (Boudreaux)  
Using Flanking Circles to Investigate Tangency (Boudreaux)  
The Derivation of Johann Hudde (Boudreaux)  
Race, Gender, and Profiling: An Examination of Traffic Stop Data in Asheville, North Carolina (Lee)  
Predicting blood pressure using demographics and consumers' behaviors (Lee)  
The structure of Pythagorean sequences (Bahls)  
Clawfreeness of powers of graphs (Bahls)

Sample Academic Program by Mathematical Concentration					
Sem	Subject	Applied	Pure	Licensure	Stats
Fall	Calculus I	MATH 191	MATH 191	MATH 191	MATH 191
	Fr. Colloquium	LA 178	LA 178	LA 178	LA 178
	Academic Writing	LANG 120	LANG 120	LANG 120	LANG 120
	Foreign Lang <sup>1</sup> or Elective	For. Lang.	For. Lang.	For. Lang.	For. Lang.
	Total Hours	15	15	15	15
Spring	Calculus II	MATH 192	MATH 192	MATH 192	MATH 192
	Intro Programming <sup>2</sup>	CSCI 181/182	CSCI 181/182	CSCI 181/182	CSCI 181/182
	Humanities: Ancient World	HUM 124	HUM 124	HUM 124	HUM 124
	Foreign Lang <sup>1</sup> or Elective	For. Lang.	For. Lang.	For. Lang.	For. Lang.
	Total Hours	15	15	15	15
Fall	Calculus III	MATH 291	MATH 291	MATH 291	MATH 291
	Foundations of Math or Stats	MATH 280	MATH 280	MATH 280	STAT 225
	Humanities: Renaissance World	HUM 214	HUM 214	HUM 214	HUM 214
	Math application outside major <sup>3,4</sup> (Alternative sequence)	Check with advisor	PHYS 221 CHEM 132/111	EDUC 210/211	ECON 102 MGMT 130
	Total Hours	14	15	15	15
Spring	Linear Algebra I	MATH 365	MATH 365	MATH 365	MATH 365
	Calculus-Based Statistics	STAT 225	STAT 225*	STAT 225	MATH 280
	Math applications outside major <sup>3,4</sup> (Alternative sequence)	Check with advisor	PHYS 222 CHEM 233/145	EDUC 314	ECON 305 MGMT 380
	LAC: Social Science <sup>4</sup> Elective	See Catalog Gen Elective	See Catalog Gen Elective	PSYC 319 Gen Elective	See Catalog Gen Elective
	Total Hours	16	17	16	15

\* Course is optional for Pure Math students, and student may substitute a 300 level mathematics class in its place.

<sup>1</sup> Students can place out of the foreign language by showing proficiency through the second semester.

<sup>2</sup> This course meets the “scientific perspective” requirement of the LAC.

<sup>3</sup> Other options are available depending on the concentration. Check with your advisor for more detail.

<sup>4</sup> Lab Science and Social Science requirement may be met by the “Math application outside major”.

**Sample Academic Program by Mathematical Concentration**

Sem	Course Name	Applied	Pure	Licensure	Stats
Junior	Problem Solving	---	---	MATH 380	---
	Specific Required Math course	MATH 394	MATH 461	MATH 332 <sup>5</sup>	STAT 325 <sup>5</sup>
	Math Elective (300+ Level)	MATH Elective	MATH Elective	MATH Elective	MATH Elective
	Lab Science <sup>4</sup> or Elective	See Catalog	Gen. Elective	See Catalog	See Catalog
	Diversity Intensive	See Catalog	See Catalog	EDUC 346	See Catalog
	Elective	Gen. Elective	Gen. Elective	Gen. Elective	Gen. Elective
	Total Hours (max)	16	15	17	16
	Math course	MATH Elective	MATH 394	MATH Elective	STAT 326 <sup>5</sup>
	Additional Course	Math Application <sup>6</sup>	Gen. Elective	MATH Elective	Gen. Elective
	Humanities: Modern World	HUM 324	HUM 324	HUM 324	HUM 324
Senior	Arts Elective	See Catalog	See Catalog	See Catalog	See Catalog
	Elective	Gen. Elective	Gen. Elective	Gen. Elective	Gen. Elective
	Total Hours	16	16	16	16
	Problem Solving / Seminar	MATH 381	MATH 381	MATH 480	MATH 381
	Senior Level Math Course	MATH 491	MATH 491	MATH 461	STAT 425 <sup>5</sup>
	Senior Capstone	HUM 414	HUM 414	HUM 414	HUM 414
	Additional Course	Math Application <sup>6</sup>	Gen. Elective	EDUC 430	Gen. Elective
	Additional Course	Math Application <sup>6</sup>	Gen. Elective	EDUC 435	Gen. Elective
	Elective	Gen. Elective	Gen. Elective	Gen. Elective	Gen. Elective
	Total Hours	14	14	14	14
Senior	Senior Seminar	MATH 480	MATH 480	---	MATH 480
	Math Sequence	MATH 395 or 452 <sup>7</sup>	MATH 366, 462 or 492	Student Teaching EDUC 455 EDUC 456	STAT 426 <sup>5</sup>
	Elective (Except Licensure)	Gen. Elective	Gen. Elective		Gen. Elective
	Elective (Except Licensure)	Gen. Elective	Gen. Elective		Gen. Elective
	Elective (Except Licensure)	Gen. Elective	Gen. Elective	Gen. Elective	Gen. Elective
	Total Hours	14	14	12	14

<sup>4</sup> Lab Science and Social Science requirement may be met by the “Courses with Math Application”.

<sup>5</sup> Courses offered on alternate years.

<sup>6</sup> The applied concentration requires 15 hours in another discipline. 9 of these credit hours should be at 300 level.

<sup>7</sup> Other options are available including MATH 366, 441, and STAT 425.

**Applied**  
**Required for Major**  
**Within Major Department**

___ MATH 191	4	___	___
___ MATH 192	4	___	___
___ MATH 280	3	___	___
___ MATH 291	4	___	___
___ MATH 365	3	___	___
___ MATH 381	1	___	___
___ MATH 394	3	___	___
___ MATH 480	2	___	___
___ MATH 491	3	___	___
___ STAT 225 or 425	4	___	___

\_\_\_ Must include one of MATH 366, MATH 395, MATH 441, MATH 452, or the sequence STAT 425-426.

_____	3	___	___
_____	3	___	___
_____	3	___	___

**Required Outside of Major Department**

___ CSCI 181 or 182	3	___	___
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\_\_\_ 15-17 hours in area of concentration\*  
 (9 hours must be at the 300-400 level)

\*Approved by department chair

**Pure**  
**Required for Major**  
**Within Major Department**

___ MATH 191	4	___	___
___ MATH 192	4	___	___
___ MATH 280	3	___	___
___ MATH 291	4	___	___
___ MATH 365	3	___	___
___ MATH 381	1	___	___
___ MATH 394	3	___	___
___ MATH 461	3	___	___
___ MATH 480	2	___	___
___ MATH 491	3	___	___

\_\_\_ 9-10 hours chosen from STAT 225 or 300-400 level MATH *or* STAT.

Must include one course from MATH 366, MATH 462, MATH 492, or the sequence STAT 425-426

_____	___	___	___
_____	___	___	___
_____	___	___	___

**Required Outside of Major Department**

___ CSCI 181 or 182	3	___	___
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\_\_\_ One of the following sequences:

CHEM 111/132/145/236

ECON 101/102

PHYS 221/222

or 6 hours 300-400 level courses\*

_____	___	___	___
_____	___	___	___
_____	___	___	___

\*Approved by department chair

**Statistics**  
**Required for Major**

**Within Major Department**

___ MATH 191	4	___	___
___ MATH 192	4	___	___
___ MATH 280	3	___	___
___ MATH 291	4	___	___
___ MATH 365	3	___	___
___ MATH 381	1	___	___
___ MATH 480	2	___	___
___ STAT 185 or 225	4	___	___
___ STAT 325	3	___	___
___ STAT 326	3	___	___
___ STAT 425	3	___	___
___ STAT 426	3	___	___

\_\_\_ 3 hours from 300-400 level MATH or STAT  
 \_\_\_\_\_ 3 \_\_\_\_\_

**Required Outside of Major Department**

___ CSCI 181 or 182	3	___	___
___ 6 hours from one sequence: ACCT 215/ECON306 ECON 102/305 MGMT 220/380 300-400 level statistical courses*			
_____	3	___	___
_____	3	___	___

\*Approved by department chair

**Recommended Course:**  
**MATH 491**

**Mathematics with Teacher**  
**Licensure (6-9 & 9-12)**

**Required for Major**

**Within Major Department**

___ MATH 191	4	___	___
___ MATH 192	4	___	___
___ MATH 280	3	___	___
___ MATH 291	4	___	___
___ MATH 332	3	___	___
___ MATH 365	3	___	___
___ MATH 381	1	___	___
___ MATH 461	3	___	___
___ MATH 480	2	___	___
___ STAT 225	4	___	___
___ 9 hours from 300-400 Level MATH or STAT			
_____	3	___	___
_____	3	___	___
_____	3	___	___

**Required Outside of Major Department**

___ CSCI 181 or 182	3	___	___
___ PSYC 319	3	___	___

**Teacher Licensure**

___ EDUC 210	3	___	___
___ EDUC 211	1	___	___
___ EDUC 314	3	___	___
___ EDUC 320*	3	___	___
___ EDUC 346	3	___	___
___ EDUC 430	3	___	___
___ EDUC 435	2	___	___
___ EDUC 455	8	___	___
___ EDUC 456	4	___	___

\*6-9 Licensure only

## Liberal Arts Core Requirements - Summary and Checklist

Done	Requirement	Hours	Courses
	<b>First-Year Colloquium</b>	3-4	LA 178 or DEPT 178
	<b>Academic Writing and Critical Inquiry</b>	4	LANG 120
	<b>Humanities</b> (3 courses)	4	HUM 124
		4	HUM 214
		4	HUM 324
	<b>Laboratory Science</b> (the same course cannot be used to fulfill both the Laboratory Science and the Scientific Perspectives requirements)	4	ASTR 102+112 or 113 ASTR 103+112 or 113 ATMS 111+113 BIOL 125+126, 136, 223 CHEM 109, 111+132, 145+231, 145+233, 222+232 ENVR 105 HWP 295 PHYS 101+121, 102+122, 131, 221 PSYC 362
	<b>Scientific Perspectives</b> (the same course cannot be used to fulfill both the Laboratory Science and the Scientific Perspectives requirements)	3-4	ASTR 102, 103 ATMS 103, 113 BIOL 107, 108, 110, 125, 135, 136 CHEM 109, 132, 323 CSCI 107, 182, 183, 185 EDUC 322 ENVR 106, 130 HWP 225, 420 JEM 484 PHIL 307 PHYS 101, 102, 131, 221 POLS 396 SOC 362
	<b>Quantitative Perspective</b>	4	MATH or STAT—any 4-hour course
	<b>Social Science</b>	3-4	Any 3-4 credit course with the following prefixes: ANTH, ECON, POLS, PSYC, SOC AFST 130, 364, 433 ASIA 100, 320, 330 EDUC 210 ESI 101 HWP 250, 333 INTS 201, 301, 320, 330 MCOM 104 MGMT 300, 360, 398 WGSS 100
	<b>Second Language</b> (proficiency through the 2 <sup>nd</sup> semester)	0-4	ASIA 102 CLAS 102, 104, 106 FREN 120 or 130 GERM 120 or 130 PORT 120 SPAN 130 WLNG 120
	<b>Arts and Ideas</b>	3-4	ARTS 310 or 3 hours of course work designated as ARTS
	<b>Senior Capstone</b>	4	HUM 414 or LA 478
	<b>Diversity Intensive</b>	3-4	A course from across the curriculum designated as DI
	<b>Information Literacy Competency</b>	0	Information Literacy Competency fulfilled in the major
	<b>Writing Competency</b>	0	Writing Competency fulfilled in the major

## LIST OF COURSE OFFERINGS IN MATHEMATICS

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The following is a list of courses that are offered by the department on a regular basis over a two- year period. Special topic courses, software training, internships, and undergraduate research are also taught periodically. Courses included in every concentration are in bold. For a more complete description, check your catalogue.

MATH 155	Nature of Mathematics	(F&S)
MATH 167	Precalculus	(F&S)
<b>MATH 191</b>	<b>Calculus I</b>	(F&S)
<b>MATH 192</b>	<b>Calculus II</b>	(F&S)
MATH 211	Structure of Math I	(F)
MATH 215	Structure of Math II	(S)
MATH 251	Discrete Mathematics	(S)
<b>MATH 280</b>	<b>Introduction to Foundations of Mathematics</b>	<b>(F &amp; S)</b>
<b>MATH 291</b>	<b>Calculus III</b>	<b>(F &amp; S)</b>
MATH 303	History of Math	(S-even)
MATH 332	Geometry	(F-odd)
<b>MATH 365</b>	<b>Linear Algebra I</b>	<b>(F &amp; S)</b>
MATH 366	Linear Algebra II	(S-even)
MATH 368	Number Theory	(S-odd)
<b>MATH 381</b>	<b>Problems in Mathematics</b>	<b>(F)</b>
MATH 391	Advanced Calculus	(S-even)
MATH 394	Differential Equations	(F & S)
MATH 395	Partial Differential Equations	(S-odd)
MATH 397	Chaos and Fractals	(F-odd)
MATH 398	Complex Variables	(F-even)
MATH 431	Topology	(S-even)
MATH 441	Numerical Analysis (CSCI 441)	(S-even)
MATH 452	Introduction to Mathematical Models	(S-odd)
MATH 461	Abstract Algebra I	(F)
MATH 462	Abstract Algebra II	(S-odd)
<b>MATH 480</b>	<b>Senior Seminar</b>	<b>(F &amp; S)</b>
MATH 491	Analysis I	(F)
MATH 492	Analysis II	(S-even)

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STAT 185	Introductory Statistics	(F&S)
STAT 220	Introduction to Applied Probability	(F)
STAT 225	Introduction to Calculus-Based Statistics	(F & S)
STAT 321	Applied Data Analysis	(F-even)
STAT 325	Introduction to Regression Models	(F-odd)
STAT 326	Statistics for Experimenters	(S-even)
STAT 327	Applied Multivariate Analysis	(S-odd)
STAT 329	Big Data Analytics	(S-even)
STAT 425	Introduction to Probability Theory	(F-even)
STAT 426	Introduction to Mathematical Statistics	(S-odd)



## CAREERS IN MATHEMATICS AND STATISTICS

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The University of North Carolina Asheville is a school that strives toward giving the student the best possible liberal education. Mathematics is one of the traditional liberal arts. Mathematics graduates are not trained for particular jobs or professions, but rather they are equipped with the problem solving and analytical thinking skills necessary for a wide range of careers. The opportunities for a mathematics major are boundless when the undergraduate combines his/her background in mathematics with a specialty in an applied field and with more advanced graduate-level training.

Each year about one-third of the UNC Asheville mathematics graduates become teachers – about one-third go on to graduate school, and about one-third seek employment in industry and government. The following list gives examples of the types of professions some of our graduates have pursued.

### Professions of Former UNC Asheville Mathematics Majors

Actuarial Scientist	International Project Manager
Assistant Professor of Agronomy	Market Analyst
Biomedical Technician / Statistician	Product Planner
Business Systems Manager	Quality Processor
Computer Analyst	Small Business Owner
Computer Systems Manager	Software Engineer
Emergency Planner	Systems Analyst

In the past, mathematics majors have found employment in banks, computer companies, and telephone or power companies; in government; in medicine; and in the military. In today's highly technological and ever-changing world, there is no specific training which will guarantee you a job. Many companies are looking for a work force with diverse expertise and are interested in persons whose expertise is mathematics.

