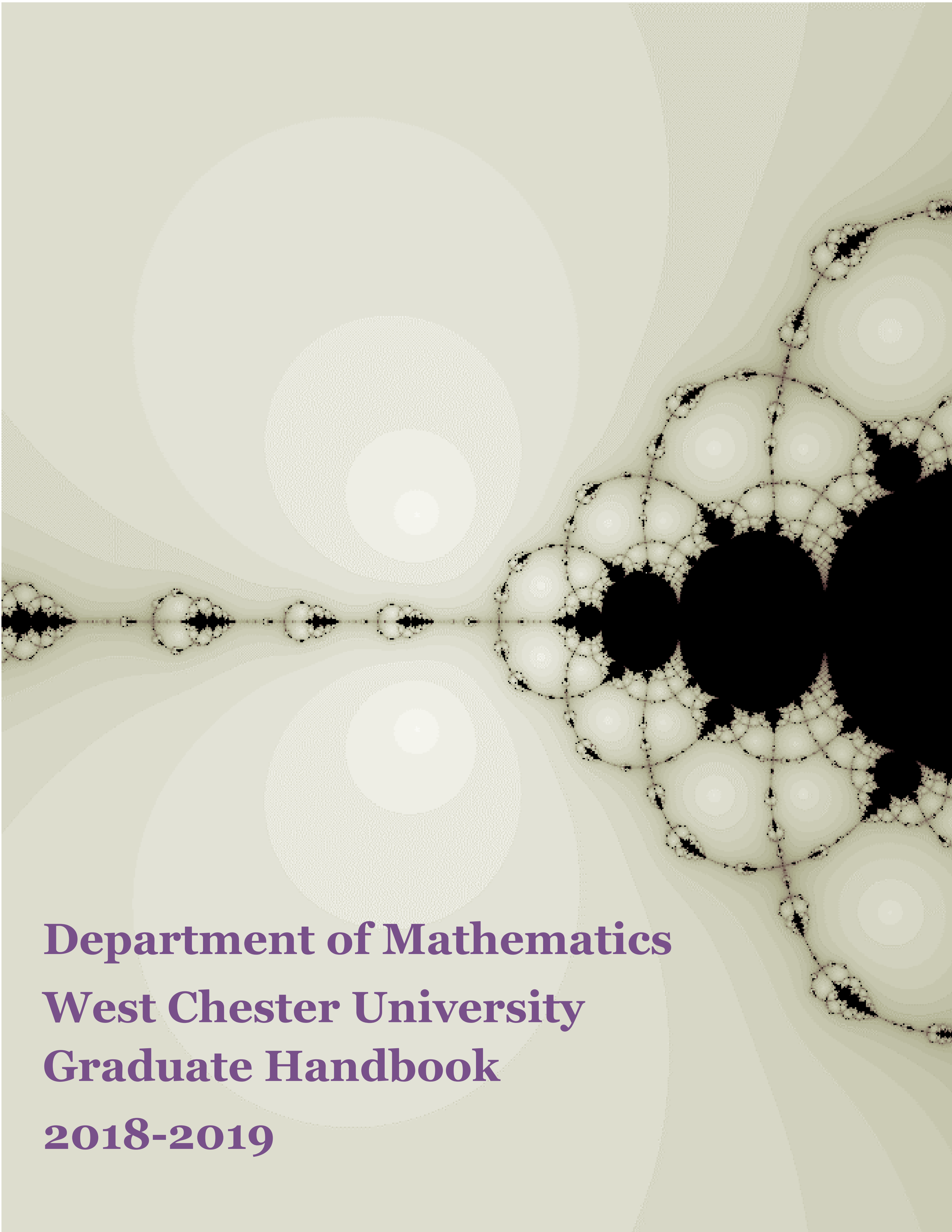

Department of Mathematics

West Chester University

Graduate Handbook

2018-2019

If you have any questions about any item in the Handbook or if you wish to learn more about our graduate programs or the Department of Mathematics at West Chester University, please do not hesitate to contact us.

Peter L. Glidden, Ph.D., Columbia University UNA 101, pglidden@wcupa.edu
Professor and Chair 610-436-2440

Gail Gallitano, Ed. D., Columbia University UNA 114, ggallitano@wcupa.edu
Professor and Coordinator of the MA Mathematics Program 610-436-2452

Mark McKibben, Ph.D., Ohio University UNA 113, mmckibben@wcupa.edu
Professor and Coordinator of the MS Applied and Computational Mathematics Program 610-436-2148

Randall Rieger, Ph.D., University of North Carolina UNA 116, rrieger@wcupa.edu
Professor and Coordinator of the MS Applied Statistics Program 610-436-2893

Department of Mathematics
25 University Avenue
West Chester University
Fax: 610.738.0578

Cover art courtesy of Dr. Andreas Aristotelous

The cover is an example of Newton fractal generated by plotting the starting points of a Newton's iteration applied to a complex valued function. The fractal geometry is created by those starting points that the iteration failed to converge to a root. Coloring here represents the iteration number where the formula found the root within a given tolerance. The fixed point iteration used here is z=g(z)=z-1/(0.5/(z-1)+1/(z+0.5 - 0.866i)+1/(z+0.5 + 0.866i)

TABLE OF CONTENTS

Mathematics at West Chester University

Mission

The Department's mission statement includes the following goals:

- To give students a firm grounding in the ideas and methods of mathematics.
- To develop an understanding and appreciation of the abstract and deductive nature of mathematics.
- To give students an appreciation of the contemporary as well as the historical importance of mathematics.
- To provide students with sufficient skills to enable them to apply their knowledge to related fields of study.
- To prepare students for continued study in graduate school, a career as a middle or secondary school teacher of mathematics, or for a career as an actuary, as an applied mathematician or such as a statistician, or an industrial mathematician.

Mathematics Colloquia

Almost every Wednesday afternoon, the Department of Mathematics hosts a talk on an important topic in mathematics or mathematics education. The talks are presented by our faculty, visiting faculty members, well known lecturers in mathematics education, former students, and sometimes even current upper-class undergraduate or graduate students.

Quality Teaching

Graduate students receive individual attention from our faculty members. We like to think of ourselves as being a friendly, warm, and student-centered department.

Social Activities

There are frequent opportunities for faculty members and students to socialize. Both are invited to attend the Wednesday afternoon Teas, the Annual Thanksgiving Dinner, and the Annual Awards Banquet as well other events sponsored by individual faculty members and student organizations.

Technical and Related Support

Students have access to microcomputer networks at numerous locations. These have full internet access. A current collection of mathematical, statistical and programming software is available for student use including Mathematica, Maple, MATLAB, MiniTab, and SAS. Computational Mathematics Laboratories are located in rooms 103 & 109 next to the Student Tutorial Center. Desktop computers and a large and current software library are available in the Student Tutorial Center. The Department also has a Seminar Room (room 103) that includes a small mathematics library.

Degree Programs

The Department of Mathematics offers three graduate degrees:

- **MA Mathematics**. The MA in Mathematics Program is a thirty-three credit Master's Program designed to offer candidates flexibility through elective courses. The core curriculum is eighteen mathematics courses consisting of abstract algebra, real analysis, mathematical statistics, and geometry. Students in this program have fifteen credits of electives, which they may carefully select to prepare themselves for a wide variety of job opportunities. The student's capstone experience is either a thesis or an oral comprehensive exam. A thesis is recommended, if a student would like to pursue a doctoral degree in mathematics or a related field, or be employed as a research mathematician. A graduate degree in mathematics is a much sought-after degree by many employers because mathematics teaches discipline and great problem-solving skills. Through selection of elective courses students may prepare for a wide variety of jobs in many areas with possible employment in colleges, universities, and many state, federal and private agencies. The program is also well suited for high school mathematics teachers or educators who are interested in college teaching. Students may elect up to four mathematics education courses. *For further information, please contact Dr. Gail Gallitano, Program Coordinator.*

- **MA Mathematics – the Mathematics Education Track**. The MA in Mathematics with the Mathematics Education Track is a thirty three-credit Master's Program which is designed to offer candidates flexibility through their elective course selection so they may select mathematics education electives. The core curriculum is eighteen solid mathematics courses which consist of abstract algebra, real analysis, mathematical statistics and geometry. Students in this program have fifteen credits of electives and they may select up to four mathematics education electives which is twelve credits and then an additional three credit elective in any area of mathematics or related field. This will help prepare them for a wide variety of job opportunities in the field teaching and/or mathematics education. The student's capstone experience is either a thesis or an oral comprehensive exam. A thesis is recommended if a student would like to pursue a doctoral program in mathematics education or related field. *For further information, please contact Dr. Gail Gallitano, Program Coordinator.*

- **MS in Applied and Computational Mathematics**. The Master of Science in Applied and Computational Mathematics Program is designed to provide students with training essential to launching a career as an industrial mathematician and to provide a course of study that would facilitate doctoral study in applied or computational mathematics or further graduate study in a computationally-intensive cognate area. The project-driven curriculum equips students with an advanced body of knowledge in content areas that span the realm of applied mathematics, including differential equations, discrete mathematics, probabilistic modeling, optimization, and statistical analysis. The development, refinement, analysis, and validation of mathematical models of real-world phenomena extracted from actual industrial settings is front and center in all courses. Dual emphasis is placed on computational mathematics in the study of all real-world projects in each course of the curriculum. Semester-long team-oriented projects culminating in formal technical reports and oral presentations are required in each course*. For further information, please contact Dr. Mark McKibben, Program Coordinator.*

- **MS in Applied Statistics.** The MS in Applied Statistics is a state-of-the art program that brings together statistical theory, computer programming, and scientific research. This degree prepares you for immediate employment in a variety of high-paying industry positions as well as for doctoral study in applied statistics or a related field. Starting in Fall of 2018, students will be able to get their Master's degree in Applied Statistics with a concentration in either Biostatistics or Business and Marketing Analytics. Students will also still have the option to get the more general Master's in Applied Statistics without a concentration. Our Master's degree in Applied Statistics with a concentration in Biostatistics will prepare students for careers in medical research, pharmaceutical statistics, and bioinformatics. Our Master's degree in Applied Statistics with a concentration in Business and Marketing Analytics will prepare students for careers in business, banking, risk management, and marketing analytics. Students may select a concentration at the time of application to the Program. They will have the option of changing concentrations (or moving to the general degree) at any time while enrolled in the Program. *For further information, please contact Dr. Randy Rieger, Program Coordinator.*

MA Mathematics

The MA in Mathematics at West Chester University is a thirty-three credit Master's Program which offers great flexibility. Students take eighteen credits of core curriculum courses and fifteen credits of electives which they choose in conjunction with their advisor. The core curriculum includes a broad selection of mathematics courses including abstract algebra, real analysis, mathematical statistics, and geometry. Students may select from a wide range of specialized electives. Elective courses may be in mathematics education, statistics, computer science, pure mathematics, applied and computational mathematics, actuarial science, and others. For their capstone experience, a student may choose between a thesis and an oral comprehensive exam.

By properly selecting their electives, our MA candidates may train for work in a large variety of fields, including, but not limited to, actuarial science, computer science, operations research, biomathematics, cryptography, teaching in a high school or a two-year/four-year college, research, economics, environmental mathematics, geophysical mathematics, air traffic control operations, photogrammetry, and many more. Five excellent jobs namely, software engineer, actuary, computer systems analyst, computer programmer, and mathematician all require a strong background in mathematics. Upon completion of the MA in Mathematics students are also well prepared to pursue a doctoral degree in mathematics.

Mathematics opens the doors to many promising careers and teaches patience, discipline, and systematic problem-solving skills. In addition, most high-earning college degrees all have a common element namely mathematics. Not only do many professions and majors (engineering, doctors, physics, nurses, computer science, actuarial science, etc.) require courses in mathematics, but the analytical and problem-solving skills students learn in mathematics can apply to all disciplines. There are an unlimited number of job opportunities for our graduates with an MA in Mathematics.

Many public and private employers hire in the field of mathematics. These include schools, colleges, universities, and many state and federal agencies. Some specific employers include the Internal Revenue Service, U. S. Census Bureau, Ford Motor Co., Transamerica Insurance Co., Jet Propulsion Laboratory, IBM Corporation, Center for Communications Research, A. C. Nielsen Co., American Airlines, U. S. Department of Energy, Exxon Production Research Co., United Airlines, Bureau of Labor Statistics, Prudential Securities, International Computer Science Institute, National Security Agency, Silicon Graphics, and others.

WCU Master of Arts in Mathematics
Thesis Option
Graduate Advising Sheet. (33 credits)

Student Name: ______________________ WCU ID # ______________ Semester accepted _____________

Core Curriculum (18 credit hours)	**Semester**	**Year**	**Grade**
MAT 515 (3) Algebra I	_______	___	____
MAT 516 (3) Algebra II	_______	___	____
MAT 545 (3) Real Analysis I	_______	___	____
MAT 546 (3) Real Analysis II	_______	___	____
MAT 532 (3) Geometry I	_______	___	____
STA 505 (3) Mathematical Statistics I	_______	___	____

Electives (9 credit hours)

Course	**Semester**	**Year**	**Grade**
1. _____________________________________	_______	___	____
2. _____________________________________	_______	___	____
3. _____________________________________	_______	___	____

Electives may be chosen, in consultation with the student's advisor, from a variety of disciplines including Pure Mathematics, Mathematics Education, Applied Mathematics, Computer Science, Statistics, Actuarial Science, and others.

Thesis Option (6 credit hours)	**Semester**	**Year**	**Grade**
MAT 609 Thesis I	_______	___	____
MAT 610 Thesis II	_______	___	____

WCU Master of Arts in Mathematics
Non-Thesis Option
Graduate Advising Sheet. (33 credits)

Student Name: ______________________WCU ID # _______________ Semester accepted _____________

Core Curriculum (18 credit hours)	**Semester**	**Year**	**Grade**
MAT 515 (3) Algebra I	_______	____	____
MAT 516 (3) Algebra II	_______	____	____
MAT 545 (3) Real Analysis I	_______	____	____
MAT 546 (3) Real Analysis II	_______	____	____
MAT 532 (3) Geometry I	_______	____	____
STA 505 (3) Mathematical Statistics I	_______	____	____

Electives (15 credit hours)

Course	**Semester**	**Year**	**Grade**
1. ______________________________________	_______	____	____
2. ______________________________________	_______	____	____
3. ______________________________________	_______	____	____
4. ______________________________________	_______	____	____
5. ______________________________________	_______	____	____

Electives may be chosen, in consultation with the student's advisor, from a variety of disciplines including Pure Mathematics, Mathematics Education, Applied Mathematics, Computer Science, Statistics, Actuarial Science, and others.

Oral Comprehensive Exam (3 subject areas)	**Semester**	**Year**	**Grade**
1. ______________________________________	_______	____	____

WCU Master of Arts in Mathematics – Mathematics Education
Thesis Option
Graduate Advising Sheet. (33 credits)

Student Name: ______________________WCU ID # ______________ Semester accepted _____________

Core Curriculum (18 credit hours)	**Semester**	**Year**	**Grade**
MAT 515 (3) Algebra I	_______	____	_____
MAT 516 (3) Algebra II	_______	____	_____
MAT 545 (3) Real Analysis I	_______	____	_____
MAT 546 (3) Real Analysis II	_______	____	_____
MAT 532 (3) Geometry I	_______	____	_____
STA 505 (3) Mathematical Statistics I	_______	____	_____

Electives (9 credit hours)

Course	**Semester**	**Year**	**Grade**
1. MTE 512 (3) Teaching Math Senior High	_______	____	_____
2. MTE 604 (3) Research in Math Ed	_______	____	_____
3. MTE 508 (3) Middle School Math	_______	____	_____

Electives may be chosen, in consultation with the student's advisor, from a variety of disciplines including Pure Mathematics, Mathematics Education, Applied Mathematics, Computer Science, Statistics, Actuarial Science, and others.

Thesis Option (6 credit hours)	**Semester**	**Year**	**Grade**
MAT 609 Thesis I	_______	____	_____
MAT 610 Thesis II	_______	____	_____

WCU Master of Arts in Mathematics – Mathematics Education
Non-Thesis Option
Graduate Advising Sheet. (33 credits)

Student Name: ______________________WCU ID # _______________ Semester accepted _____________

Core Curriculum (18 credit hours)	**Semester**	**Year**	**Grade**
MAT 515 (3) Algebra I	_______	___	____
MAT 516 (3) Algebra II	_______	___	____
MAT 545 (3) Real Analysis I	_______	___	____
MAT 546 (3) Real Analysis II	_______	___	____
MAT 532 (3) Geometry I	_______	___	____
STA 505 (3) Mathematical Statistics I	_______	___	____

Electives (15 credit hours)

Course	**Semester**	**Year**	**Grade**
1. MTE 512 (3) Teaching Math Senior High	_______	___	____
2. MTE 604 (3) Research in Math Ed	_______	___	____
3. MTE 507 (3) Foundations of Math Ed	_______	___	____
4. MTE 508 (3) Middle School Math	_______	___	____
5. MAT 533 (3) Geometry II	_______	___	____

Electives may be chosen, in consultation with the student's advisor, from a variety of disciplines including Pure Mathematics, Mathematics Education, Applied Mathematics, Computer Science, Statistics, Actuarial Science, and others.

Oral Comprehensive Exam (3 subject areas)	**Semester**	**Year**	**Grade**
1. Student Schedules the Date	_______	___	____

(ACCELERATED) B.A. MATHEMATICS TO M.A. MATHEMATICS – 141 CREDITS

Name:	Date Major Declared:				
	CREDITS	COURSE	SEMESTER	GRADE	REP/W**
GENERAL EDUCATION REQUIREMENTS (48 LESS 9 ATTRIBUTED TO MAJOR REQUIREMENTS = 39 CREDITS)					
WRT 120	3				
WRT 200, 204, 205, 206, 208, or 220	3				
MATHEMATICS (MAT 311 below)	3				
SPK 208 OR 230	3				
DIVERSE COMMUNITIES "J" COURSE	3				
INTERDISCIPLINARY "I" COURSE	3				
SCIENCE (CSC 141 BELOW)	3				
SCIENCE (3 CREDITS OF PHY 170 BELOW)	3				
BEHAVIOR & SOCIAL SCI (ANT, SOC, ECO, GEO, OR PSC)	3				
BEHAVIOR & SOCIAL SCI (ANT, SOC, ECO, GEO, OR PSC)	3				
HUMANITIES (PHI, HIS, LIT,OR CLS)	3				
HUMANITIES (PHI, HIS, LIT,OR CLS)	3				
ARTS (ART CINEMATOGRAPHY MUSIC PHOTOGRAPHY THEATRE)	3				
GENERAL EDUCATION ELECTIVE	3				
GENERAL EDUCATION ELECTIVE	3				
GENERAL EDUCATION ELECTIVE	3				
WRITING INTENSIVE COURSES:					
NOTE TO STUDENTS AND ADVISORS: I/J COURSES MAY NOT COUNT AS DISTRIBUTIVE REQUIREMENTS.					
MATHEMATICS REQUIREMENTS (42 LESS 15 ATTRIBUTED TO GRADUATE REQUIREMENTS = 27 CREDITS)					
MAT 161 CALCULUS I	4				
MAT 162 CALCULUS II	4				
MAT 200 NATURE OF MATHEMATICS	3				
MAT 261 CALCULUS III	4				
MAT 311 LINEAR ALGEBRA	3				
MAT 411 ABSTRACT ALGEBRA	3				
MAT 421 MATHEMATICAL STATISTICS I	3				
MAT 441 ADVANCED CALCULUS I	3				
ANALYSIS ELECTIVE: MAT 432, 442, 443, 444	3				
APPLIED MATH ELECTIVE: STA 319, MAT 325, 403, 406, 409, 422, 423, 425, 427, 493	3				
ALGEBRA ELECTIVE: MAT 412, 413, 414	3				
UNDERGRADUATE MATHEMATICS ELECTIVE	3				
UNDERGRADUATE MATHEMATICS ELECTIVE	3				
MINOR REQUIREMENTS AND FREE ELECTIVES (23 CREDITS)					
MINOR ELECTIVE	3				
MINOR ELECTIVE	3				
MINOR ELECTIVE	3				
MINOR ELECTIVE	3				
MINOR ELECTIVE	3				
MINOR ELECTIVE	3				
FREE ELECTIVE	3				
FREE ELECTIVE	2				
FOREIGN LANGUAGE REQUIREMENT (12 CREDITS)					
LANGUAGE 101	3				
LANGUAGE 102	3				
LANGUAGE 201	3				
LANGUAGE 202	3				
RELATED REQUIREMENTS (7 CREDITS)					
CSC 141 COMPUTER SCIENCE I	3				
PHY 170 PHYSICS I	4				

GRADUATE COURSES (33 CREDITS)					
MAT 515 ALGEBRA I	3				
MAT 516 ALGEBRA II	3				
MAT 532 GEOMETRY I	3				
MAT 545 REAL ANALYSIS I	3				
MAT 546 REAL ANALYSIS II	3				
STA 505 MATHEMATICAL STATISTICS I	3				
MAT 514 OR **MAT 575** (RECOMMENDED ELECTIVE)*	3				
GRADUATE MATHEMATICS ELECTIVE	3				
GRADUATE MATHEMATICS ELECTIVE	3				
GRADUATE MATHEMATICS ELECTIVE OR THESIS	3				
GRADUATE MATHEMATICS ELECTIVE OR THESIS	3				

*STUDENTS REACHING YEAR 4 IN FALL OF AN EVEN YEAR MAY USE **MAT 545** TO REPLACE THE ANALYSIS ELECTIVE AND **MAT 514** TO REPLACE THE ALGEBRA ELECTIVE. STUDENTS REACHING YEAR 4 IN FALL OF AN ODD YEAR MAY USE **MAT 515** TO REPLACE THE ALGEBRA ELECTIVE AND **MAT 575** TO REPLACE THE ANALYSIS ELECTIVE.

(Accelerated) B.A. Mathematics to M.A. Mathematics

First Year	
Fall (odd)	Spring (even)
MAT 161 (4) CSC 141 (3) Language 101 (3) Gen Ed Humanities (3) Gen Ed Arts (3)	MAT 162 (4) MAT 200 (3) PHY 170 (4) WRT 120 (3) Language 102 (3)
Second Year	
Fall (even)	Spring (odd)
MAT 261 (4) SPK 208 (3) Language 201 (3) WRT 200 (3) Minor Elective (3)	MAT 311 (3) W course (MAT 401 recommended) (3) Gen Ed Behavioral /Social Sciences (3) Language 202 (3) Minor Elective (3)
Third Year	
Fall (odd)	Spring (even)
MAT 411 (3) MAT 421 (3) Minor Elective (3) I Course (3) W Course (3)	MAT 441 (3) MAT 514 (Elective) (3)* W course (ENG 371 W recommended) (3) J Course (3) Minor Elective (3)
Fourth Year	
Fall (even)	Spring (odd)
MAT 545 (3)* STA 505 (3) Minor Elective (3) Gen Ed Humanities (3) Free Elective (3)	MAT 546 (3)* MAT 575 (Elective) (3)* Minor Elective (3) Gen Ed Behavioral/Social Science (3) Free Elective (2)
Fifth Year	
Fall (odd)	Spring (even)
MAT 515 (3)* MAT 532 (3) Grad Math Elective or Thesis (3)	MAT 516 (3)* Grad Math Elective (3) Grad Math Elective or Thesis (3)

*STUDENTS REACHING YEAR 4 IN FALL OF AN ODD YEAR MAY USE **MAT 515** TO REPLACE THE ALGEBRA ELECTIVE AND **MAT 575** TO REPLACE THE ANALYSIS ELECTIVE. **MAT 515-516** MAY BE TAKEN PRIOR TO **MAT 545-546**.

(ACCELERATED) B.S. MATHEMATICS: MATHEMATICS TO M.A. MATHEMATICS – 141 CREDITS

Name:	Date Major Declared:				
	CREDITS	COURSE	SEMESTER	GRADE	REP/W**
GENERAL EDUCATION REQUIREMENTS (48 LESS 12 ATTRIBUTED TO MAJOR REQUIREMENTS = 36 CREDITS)					
WRT 120	3				
WRT 200, 204, 205, 206, 208, or 220	3				
MATHEMATICS (MAT 311 below)	3				
SPK 230 (below)	3				
DIVERSE COMMUNITIES "J" COURSE	3				
INTERDISCIPLINARY "I" COURSE	3				
SCIENCE (CSC 141 BELOW)	3				
SCIENCE (3 CREDITS OF PHY 170 BELOW)	3				
BEHAVIOR & SOCIAL SCI (ANT, SOC, ECO, GEO, OR PSC)	3				
BEHAVIOR & SOCIAL SCI (ANT, SOC, ECO, GEO, OR PSC)	3				
HUMANITIES (PHI, HIS, LIT,OR CLS)	3				
HUMANITIES (PHI, HIS, LIT,OR CLS)	3				
ARTS (ART CINEMATOGRAPHY MUSIC PHOTOGRAPHY THEATRE)	3				
GENERAL EDUCATION ELECTIVE (MAT 125 RECOMMENDED)	3				
GENERAL EDUCATION ELECTIVE (FOREIGN LANGUAGE 201 RECOMMENDED)	3				
GENERAL EDUCATION ELECTIVE (FOREIGN LANGUAGE 202 RECOMMENDED)	3				
WRITING INTENSIVE COURSES: ENG 371 AND 2 OTHERS (MAT 401 RECOMMENDED)					
*****NOTE TO STUDENTS AND ADVISORS: I/J COURSES MAY NOT COUNT AS DISTRIBUTIVE REQUIREMENTS.*****					
BS MATHEMATICS REQUIREMENTS (21 CREDITS)					
MAT 161 CALCULUS I	4				
MAT 162 CALCULUS II	4				
MAT 200 NATURE OF MATHEMATICS	3				
MAT 261 CALCULUS III	4				
MAT 311 LINEAR ALGEBRA	3				
MAT 343 DIFFERENTIAL EQUATIONS	3				
CONCENTRATION COURSES (30 CREDITS LESS 15 ATTRIBUTED TO GRADUATE REQUIREMENTS = 15 CREDITS)					
MAT 411 ALGEBRA I	3				
MAT 421 MATHEMATICAL STATISTICS I	3				
MAT 441 ADVANCED CALCULUS I	3				
MAT 445 COMPLEX VARIABLES (MAT 575 BELOW)*	3				
ANALYSIS ELECTIVE: MAT 432, 442, 443, 444	3				
APPLIED MATH ELECTIVE: STA 319, MAT 325, 403, 406, 409, 422, 423, 425, 427, 493	3				
ALGEBRA ELECTIVE: MAT 412, 413, 414	3				
UNDERGRADUATE MATHEMATICS ELECTIVE	3				
UNDERGRADUATE MATHEMATICS ELECTIVE	3				
UNDERGRADUATE MATHEMATICS ELECTIVE*	3				
COGNATE REQUIREMENTS (17 CREDITS)					
SPK 230 BUSINESS/PROFESSIONAL SPEECH	3				
CSC 141 COMPUTER SCIENCE I	3				
PHY 170 PHYSICS I	4				
PHY 180 PHYSICS II	4				
ENG 371 TECHNICAL WRITING (W COURSE)	3				
INDEPENDENT STUDY, W COURSES, AND ELECTIVES (19 CREDITS)					
FREE ELECTIVE (MAT 499 RECOMMENDED)	1				
W COURSE (MAT 401 RECOMMENDED)	3				
W COURSE	3				
FREE ELECTIVE	3				
FREE ELECTIVE	3				

FREE ELECTIVE	3				
FREE ELECTIVE	3				
GRADUATE COURSES (33 CREDITS)					
MAT 515 ALGEBRA I	3				
MAT 516 ALGEBRA II	3				
MAT 532 GEOMETRY I	3				
MAT 545 REAL ANALYSIS I	3				
MAT 546 REAL ANALYSIS II	3				
STA 505 MATHEMATICAL STATISTICS I	3				
MAT 575 (RECOMMENDED ELECTIVE)*	3				
GRADUATE MATHEMATICS ELECTIVE	3				
GRADUATE MATHEMATICS ELECTIVE	3				
GRADUATE MATHEMATICS ELECTIVE OR THESIS	3				
GRADUATE MATHEMATICS ELECTIVE OR THESIS	3				

***STUDENTS ELECTING MAT 445 MAY INSTEAD APPLY A GRADUATE COURSE TAKEN IN YEAR 3 OR YEAR 4 TO A REPLACE A THIRD MATHEMATICS ELECTIVE; MAT 575 IS NOT REQUIRED.**

(Accelerated) B.S. Mathematics: Mathematics to M.A. Mathematics

First Year	
Fall (odd)	Spring (even)
MAT 161 (4) MAT 125 (3) (recommended) CSC 141 (3) Gen Ed Humanities (3) Gen Ed Arts (3)	MAT 162 (4) MAT 200 (3) PHY 170 (4) WRT 120 (3) SPK 230 (3)
Second Year	
Fall (even)	Spring (odd)
MAT 261 (4) MAT 311 (3) PHY 180 (4) WRT 200 (3) Gen Ed Behavioral/Social Science (3)	MAT 343 (3) W course (MAT 401 recommended) (3) Gen Ed Humanities (3) I Course (3) Free Elective (3)
Third Year	
Fall (odd)	Spring (even)
MAT 411 (3) MAT 421 (3) Gen Ed Behavioral/Social Science (3) J Course (3) W Course (3)	MAT 441 (3) MAT 532 (3) ENG 371 W (3) Algebra Elective (3)* Free Elective (3)
Fourth Year	
Fall (even)	Spring (odd)
MAT 545 (3)* STA 505 (3) Undergrad Math Elective (3) Foreign Language 201 (3) (recommended) Free Elective (3)	MAT 546 (3)* MAT 575 (elective) (3)* Free Elective (3) Foreign Language 202 (3) (recommended) MAT 499 (1) (recommended)
Fifth Year	
Fall (odd)	Spring (even)
MAT 515 (3)* Grad Math Elective (3) Grad Math Elective or Thesis (3)	MAT 516 (3)* Grad Math Elective (3) Grad Math Elective or Thesis (3)

***STUDENTS REACHING YEAR 4 IN FALL OF AN ODD YEAR WILL INSTEAD USE MAT 515 TO REPLACE THE ALGEBRA ELECTIVE AND TAKE AN ANALYSIS ELECTIVE IN YEAR 3. MAT 515-516 MAY BE TAKEN PRIOR TO MAT 545-546.**

MA in Mathematics - Tentative Course Schedule

	Fall 2018	Spring 2019	Sum I 2019	Sum II 2019	Fall 2019	Spring 2020	Sum 1 2020	Sum II 2020
MAT 513 – Linear Algebra		√				√		
MAT 514 – Number Theory								
MAT 515 – Algebra I					√			
MAT 516 – Algebra II						√		
MAT 521 – Discrete Math & Graph Theory				√				
MAT 532 – Geometry I					√			
MAT 533 – Geometry II								
MAT 535 - Topology	√							
MAT 536 – Algebraic Topology		√						
MAT 543 – Topics in Differential Equations								
MAT 545 - Real Analysis I	√							
MAT 546 – Real Analysis II		√						
MAT 548 - Industrial Math I	√				√			
MAT 549 – Industrial Math II		√				√		
MAT 552 – Operations Research					√			
MAT 553 – Stochastic Modeling						√		
MAT 554 - Scientific Computing	√							
MAT 555 – Industrial Math Practicum I		√			√			
MAT 556 – Industrial Math Practicum II						√		
MAT 570 – Math Models in Life, Physical, Soc Sci				√				√
MAT 575 – Complex Analysis			√				√	
MAT 595 – Topics in Mathematics			√					
MAT 597 - Topics								√
STA 505 – Mathematics Statistics I	√				√			
STA 506 – Mathematics Statistics II		√				√		
STA 511 – Intro Statistical Computing/Data		√						
MTE 507 – Foundation of Math Education	√							
MTE 508 – Middle School Math, Curriculum		√						
MTE 512 – HS Math Curriculum,					√			
MTE 553 – Teaching Elementary Math I	√		√		√	√		
MTE 555 – Teaching Elementary Math II	√	√	√		√	√		
MTE 604 – Research in Math Ed						√		

MS Applied and Computational Mathematics

Applied mathematicians are often recruited by companies for positions as financial analysts, technical consultants, systems engineers, meteorologists, software developers, etc. They must possess the skills to filter theoretical results spanning different mathematical disciplines in order to formulate models of complicated phenomena; they must be able to critically analyze the models and run simulations using mathematical software to test their validity; and they must be able to communicate mathematical concepts and results effectively to scientists and non-scientists from a wide array of disciplines. Individuals possessing these skills at the master's and doctoral levels are highly sought after by financial and industrial companies at the regional and national levels.

In order for students with a graduate degree in mathematics to be competitive in this particular job market, they must exhibit these attributes. Mere completion of traditional coursework, even when it is supplemented by a single semester of internship or applied practicum designed to *bring it all together*, is insufficient in developing these abilities at a sufficiently rigorous and competitive level. As a result, many students find themselves jobless, even after two years of traditional graduate work in mathematics. The **Master of Science degree in Applied and Computational Mathematics** at West Chester University equips graduate students with the training necessary to successfully launch careers as industrial mathematicians **and** to pursue doctoral study in applied and computational mathematics or other computationally intensive fields. Students who wish to pursue graduate study in areas that involve significant computation and numerical analysis (such as economics, finance, physics, chemistry, and engineering) will also benefit greatly from the emphasis on computational mathematics incorporated into the proposed program.

The program was designed hand-in-hand with mathematicians and scientists from large companies such as Boeing, Vanguard, and PrimePay; employees of up-and-coming software companies such as iPipeline; and representatives of small privately-owned consulting firms and hedge fund companies, such as Wagner Associates and TFS Capital. Vastly different types of mathematical problems are studied by the members of this group, and our joint work led to several guiding priniciples that were used to develop the proposed program.

One, the analysis revealed that the method of content delivery, whether it is online or face-to-face, employed by these programs inevitably compartmentalizes theory, numerics, and application within the coursework. This by-product is a crucial shortcoming that we have made certain to avoid by carefully designing the curriculum of the proposed program. Specifically, all courses are project-driven in the sense that the mathematical theory is presented in response to addressing specific real-world problems. The interplay among theory, application, and computation arises naturally as the material is developed.

Two, extensive team problem-solving is incorporated by way of semester-long projects culminating in technical reports and oral presentations in each of the seven required core applied mathematics courses. Such a strong emphasis on team mathematical modeling projects (especially when the teams are multidisciplinary), while noticeably absent in competitor programs, is highly encouraged by the *Society of Industrial and Applied Mathematics* (SIAM) and has been adopted by other similar nationally-successful programs.

Three, building on the previous point, while most competitor programs encourage or require an internship experience, there are rarely other opportunities in which students can gain managerial experience in project development. Our program requires two semester-long practicums that emulate an industrial microcosm in which our local industry partners and faculty in other disciplines are invited to play an active role. In addition, this team of cohorts will play a significant role in managing the M.S. students' projects and supervise their teams consisting of undergraduate students and other graduate students in the program until completed.

The project-driven curriculum is designed to equip students with an advanced body of knowledge in content areas that span the realm of applied mathematics, including differential equations, discrete mathematics, probabilistic modeling, optimization, and statistical analysis. The development, refinement, analysis, and validation of mathematical models of real-world phenomena extracted from actual industrial settings is front and center in all courses. Dual emphasis is placed on computational mathematics in the study of all real-world projects in each course of the curriculum. Semester-long team-oriented projects culminating in formal technical reports and oral presentations are required in each course.

Students must complete 12 graduate courses (6 core courses, 4 elective courses, and 2 practicums) totaling 36 credit hours. The two practicum courses emulate an industrial microcosm in which students tackle real-world problems from inception; they gain valuable managerial experience by supervising the work of a team of students to bring the project to completion. An electronic portfolio containing an annotated compendium of all numerical methods and applied techniques accumulated throughout the coursework, along with all technical reports and formal presentations, must be submitted for department approval prior to completion of the program.

WCU Master of Science in Applied and Computational Mathematics
Graduate Advising Sheet. (36 credits)

Student Name: ____________________ WCU ID # _____________Semester accepted _____________

Core Curriculum (24 credit hours)	**Semester**	**Year**	**Grade**
MAT 500 Fundamentals of Applied Mathematics	_______	____	____
MAT 548 Industrial Mathematics I – Continuous Models	_______	____	____
MAT 549 Industrial Mathematics II – Discrete Models	_______	____	____
MAT 552 Operations Research	_______	____	____
MAT 553 Stochastic Modeling and Simulation	_______	____	____
MAT 554 Scientific Computing	_______	____	____
STA 505 Mathematical Statistics I	_______	____	____
STA 511 Introduction to Statistical Computing and Data Management	_______	___	____

Industrial Mathematics Practicum (6 credit hours)	**Semester**	**Year**	**Grade**
1. ___________________________	_______	____	____
2. ___________________________	_______	____	____

For 2, choose from:

MAT 555 Industrial Math Practicum I - Continuous Models
MAT 556 Industrial Math Practicum II - Discrete Models
Internship

Pure Mathematics Course Elective (3 credit hours)

Course	**Semester**	**Year**	**Grade**
1. ____________________________________	_______	____	____

Choose from:

MAT 514 Theory of Numbers
MAT 515 Algebra I
MAT 516 Algebra II
MAT 532 Geometry I
MAT 533 Geometry II
MAT 535 Topology
MAT 545 Real Analysis I
MAT 546 Real Analysis II
MAT 575 Complex Analysis

Additional Course Elective (3 credit hours)

Course	**Semester**	**Year**	**Grade**
1. ____________________________________	_______	____	____

Choose from: any 500-level MAT or STA course not completed to fulfill other degree requirements.

Exit Electronic Portfolio

Submission Date____ Date approved_____________

(ACCELERATED) B.S. APPLIED AND COMPUTATIONAL MATHEMATICS TO M.S. APPLIED AND COMPUTATIONAL MATHEMATICS – 141 CREDITS

Name:	**Date Major Declared:**				
	CREDITS	COURSE	SEMESTER	GRADE	REP/W**
GENERAL EDUCATION REQUIREMENTS (48 LESS 12 ATTRIBUTED TO MAJOR REQUIREMENTS = 36 CREDITS)					
WRT 120	3				
WRT 200, 204, 205, 206, 208, or 220	3				
MATHEMATICS (MAT 311 below)	3				
SPK 230 (below)	3				
DIVERSE COMMUNITIES "J" COURSE	3				
INTERDISCIPLINARY "I" COURSE	3				
SCIENCE (CSC 141 BELOW)	3				
SCIENCE (PHY 170, BIO 110, CHE 103, or ESS 101 below)	3				
BEHAVIOR & SOCIAL SCI (ANT, SOC, ECO, GEO, OR PSC)	3				
BEHAVIOR & SOCIAL SCI (ANT, SOC, ECO, GEO, OR PSC)	3				
HUMANITIES (PHI, HIS, LIT, OR CLS)	3				
HUMANITIES (PHI, HIS, LIT, OR CLS)	3				
ARTS (ART CINEMATOGRAPHY MUSIC PHOTOGRAPHY THEATRE)	3				
GENERAL EDUCATION ELECTIVE	3				
GENERAL EDUCATION ELECTIVE	3				
GENERAL EDUCATION ELECTIVE	3				
WRITING INTENSIVE COURSES: ENG 368, 371, OR 375 (SEE BELOW), AND 2 OTHERS. COURSES WITH THE I/J AND W DESIGNATION FULFILL BOTH REQUIREMENTS SIMULATANEOUSLY.					
*****NOTE TO STUDENTS AND ADVISORS: I COURSES MAY NOT COUNT AS DISTRIBUTIVE REQUIREMENTS.*****					
BS MATHEMATICS REQUIREMENTS (21 CREDITS)					
MAT 161 CALCULUS I	4				
MAT 162 CALCULUS II	4				
MAT 200 NATURE OF MATHEMATICS	3				
MAT 261 CALCULUS III	4				
MAT 311 LINEAR ALGEBRA	3				
MAT 343 DIFFERENTIAL EQUATIONS	3				
CONCENTRATION COURSES (24 CREDITS LESS 6 ATTRIBUTED TO GRADUATE REQUIREMENTS = 18 CREDITS)					
STA 319 APPLIED STATISTICS	3				
MAT 325 COMPUTATIONAL MATHEMATICS	3				
MAT 413 COMPUTER ALGEBRA	3				
MAT 425 NUMERICAL ANALYSIS	3				
MAT 443 APPLIED ANALYSIS I	3				
MAT 445 COMPLEX VARIABLES OR MAT 441 ADVANCED CALCULUS (MAT 575 or MAT 545 below)	3				
MAT 493 Mathematical Modeling (MAT 548 or 549 below)	3				
MAT 455 Industrial Mathematics Practicum	3				
COGNATE REQUIREMENTS (24-26 CREDITS)					
CSC 141 COMPUTER SCIENCE I	3				
PHY 170, BIO 110, CHE 103, OR ESS 101	3-4				
COGNATE 1*	3-4				
COGNATE 2*	3				
COGNATE 3*	3				
COGNATE 4*	3				
SPK 230 BUSINESS/PROFESSIONAL SPEECH	3				
ENG 368, ENG 371, OR ENG 375 TECHNICAL /BUSINESS WRITING	3				

Internship and Electives (13-15 credits less 9 attributed to graduate requirements = 4-6 credits)					
MAT 491: Internship In Applied Mathematics**	2-4				
Free Elective**	4-6				
Free Elective (MAT 552 below)	3				
Free Elective (MAT 553 below)	3				
Free Elective (STA 505 below)	3				
Graduate Courses (36 Credits)					
MAT 500 Fundamentals Of Applied Mathematics (A)	3				
MAT 548 Industrial Mathematics I – Continuous Models	3				
MAT 549 Industrial Mathematics II – Discrete Models	3				
MAT 552 Operations Research	3				
MAT 553 Stochastic Modeling And Simulation	3				
MAT 554 Scientific Computing	3				
STA 505 Mathematical Statistics I	3				
STA 511 Introduction To Statistical Computing And Data management	3				
MAT 555 Industrial Math Practicum I (A)	3				
MAT 556 Industrial Math Practicum II (A)	3				
MAT 575 or MAT 545 (Elective)	3				
MAT Elective (B)	3				

*** Select 4 Science Cognates (PHY, BIO, CHE, CS, ESS) under guidance of advisor. At least two cognates must be at the 200-level or above. Discuss with your advisor any prerequisites. For example, CSC 220 requires MAT 151.**

** All free electives must be approved by advisor. MAT 491 is an elective and may be taken for variable credit and repeated for credit. A minor may be obtained by electing appropriate additional classes in a single scientific discipline. Discuss this option with your advisor.

(A) MAT 500 and MAT 555 or 556 are waived for 3-2 students.

(B) Choose any 500-Level MAT or STA course not completed to fulfill other degree requirements.

(Accelerated) B.S. Mathematics: Applied and Computational Mathematics to M.S. Applied and Computational Mathematics

First Year	
Fall (odd)	Spring (even)
MAT 161 (4) CSC 141 (3) Gen Ed Arts (3) Gen Ed Humanities (3) Gen Ed Behavioral/Social Science (3)	MAT 162 (4) MAT 200 (3) Gen Ed Science (3) WRT 120 (3) SPK 230 (3)
Second Year	
Fall (even)	Spring (odd)
MAT 261 (4) MAT 311 (3) Cognate 1 (3) WRT 200 (3) JW Course (3)	MAT 343 (3) MAT 325 (3) Cognate 2 (3) Gen Ed Behavioral/Social Science (3) Free Elective** (3)
Third Year	
Fall (odd)	Spring (even)
MAT 413 (3) MAT 425 (3) Cognate 3 (3) Gen Ed Humanities (3) Gen Ed Elective (3)	STA 319 (3) IW Course (3) ENG 356 W (3) Gen Ed Elective (3) MAT 443* (3)
Fourth Year	
Fall (even)	Spring (odd)
MAT 548 (3) MAT 554* (3) STA 505 (3) Gen Ed Elective (3) Cognate 4 (3)	MAT 491** (3) MAT 575 (elective) (3) MAT 549 (3) MAT 455 (3)
Fifth Year	
Fall (odd)	Spring (even)
MAT 552* (3) STA 511 (3) MAT elective[(B)] (3)	MAT 553* (3) MAT 555 (3)

*Only offered every other year. See course offering schedule in handbook.
**All free electives must be approved by advisor. MAT 491 is an elective and may be taken for variable credit and repeated for credit. A minor may be obtained by electing appropriate additional classes in a single scientific discipline. Discuss this option with your advisor.
[(B)] Choose any 500-Level MAT or STA course not completed to fulfill other degree requirements
Note: MAT 500 and MAT 555 or 556 are waived for 3-2 students.

MS Applied & Computational Mathematics
Tentative Course Schedule

	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021
MAT 500 – Fundamentals of Applied Mathematics	***Offered independently as needed***					
MAT 548 – Industrial Mathematics – Continuous Models	√		√		√	
MAT 549 – Industrial Mathematics – Discrete Models		√		√	-	√
MAT 552 – Operations Research	√				√	
MAT 553 – Stochastic Modeling		√				√
MAT 554 – Scientific Computing			√			
MAT 555 – Industrial Mathematics Practicum I		√		√		√
MAT 556 - Industrial Mathematics Practicum II	√		√		√	
New Applied Elective				√ **(finite element methods)**		

MS APPLIED STATISTICS

One of the most relevant degrees in today's world, the Master of Science in Applied Statistics prepares you to analyze and explain information, an ever-increasing need for employers in virtually every industry. From estimating population trends to analyzing data on new products to investigating the efficacy of new medical treatments, professionals with backgrounds in applied statistics are in demand in seemingly limitless disciplines.

Among the many benefits of a West Chester University education in applied statistics are:

- a flexible curriculum that allows you to explore various concentrations
- visiting lectures from prominent statisticians on topics of current interest in applied statistics
- pursuing intensive study on a topic of interest with a faculty member through the optional thesis track
- optional supervised, paid internships at local companies

Want to know more about this thriving field of study or WCU's intimate, energetic program of study in it? Contact the Office of Graduate Studies (gradstudy@wcupa.edu) or the program director, Dr. Randall Rieger (rrieger@wcupa.edu). Or visit us online at wcupa.edu/applied statistics.

Concentrations in Biostatistics and Marketing Strategies

Starting in Fall of 2018, students will be able to get their Master's degree in Applied Statistics with a concentration in either Biostatistics or Business and Marketing Analytics. Students will also still have the option to get the more general Master's in Applied Statistics without a concentration.

Our Master's degree in Applied Statistics with a concentration in Biostatistics will prepare students for careers in medical research, pharmaceutical statistics, and bioinformatics. This concentration will provide students with the tools to help answer pressing research questions in medicine, biology and public health, such as whether a new drug works, what toxicants are linked to cancer and other diseases, and how long a person with a certain illness is likely to survive. Students in this concentration will choose from a wide variety of elective courses in areas such as Survival Analysis, Longitudinal Data Analysis, Data Mining, and Applied Bayesian Methods.

Our Master's degree in Applied Statistics with a concentration in Business and Marketing Analytics will prepare students for careers in business, banking, risk management, and marketing analytics. This concentration will provide students with the necessary knowledge to answer questions such as whether or not an advertising campaign was successful, how one can better predict consumer behavior, how to determine which factors are most important in profitability, and how to best communicate results to a nontechnical audience. Students in this concentration will choose from a wide variety of elective courses in areas such as Time Series, Marketing Analytics, Statistical Methods in Business and Finance, and Multivariate Data Analysis.

Students may select a concentration at the time of application to the Program. They will have the option of changing concentrations (or moving to the general degree) at any time while enrolled in the Program. More information about courses and degree requirements can be found on the Curriculum page.

Certificate Program in Applied Statistics Concentrations in Biostatistics and Marketing Strategies

Students can pursue studies on a part-time basis or just learn new skills through an exciting option: the Certificate Program in Applied Statistics. This 19-credit hour program features a hands-on curriculum where you can apply statistical and computational procedures to real-life problems. The certificate program offers a broad overview to the application of statistical concepts to various research settings.

Post Master's Certificate of Advanced Study in Applied Statistics

We are excited to announce our Post Master's Certificate of Advanced Study in Applied Statistics which will begin in the Spring semester of 2018. This Certificate is an official West Chester University degree designed for students who have already successfully completed a Master's degree in Statistics or a similar field. It is a degree for those who are looking for a way to competitively differentiate themselves from, while also staying up-to-date with, the rapidly evolving field of Statistics. To complete this Certificate students are required to take 12 credits of elective courses above and beyond what was used to complete their Master's degree. New elective courses such as Bayesian Modeling, R Programming, Marketing Analytics, and Advanced Categorical Analysis are examples of courses that may comprise a Certificate. (See Curriculum page for additional courses.)

Graduate Degree Requirements

Upon admission to the program, students will be allowed to select the thesis or non-thesis track for the MS in Applied Statistics or the Certificate option. The thesis option replaces two elective classes with a six-credit thesis, to be initiated after the completion of STA 506.

WCU Master of Science in Applied Statistics - Non-Thesis option
Graduate Advising Sheet. (32-33 credits)

Student Name: ____________________WCU ID # ________________ Semester accepted _____________

Core Curriculum (24 credit hours)		**Semester**	**Year**	**Grade**
STA 505 (3)	Mathematical Statistics 1 or	_______	___	____
STA 504 (4)	Mathematical Statistics w/Calculus Review	_______	___	____
STA 506 (3)	Mathematical Statistics II	_______	___	____
STA 507 (3)	Introduction to Categorical Data Analysis	_______	___	____
STA 511 (3)	Introduction to Statistical Computing and Data Management	_______	___	____
STA 512 (4)	Principles of Experimental Analysis	_______	___	____
STA 513 (4)	Intermediate Linear Models	_______	___	____
STA 514 (3)	Modern Experimental Design	_______	___	____

Internship in Applied Statistics (Optional)		**Semester**	**Year**	**Grade**
STA 601	Internship	_______	___	____

Applied Statistics Elective (6-9 credit hours)

Course	**Semester**	**Year**	**Grade**
1. Elective ____	_______	___	____
2 Elective ____	_______	___	____
3. Elective if Internship not elected _____________	_______	___	____

Choose from:

STA 531 Topics in Applied Statistics
STA 532 Survival Analysis
STA 533 Longitudinal Data Analysis
STA 534 Time Series
STA 535 Multivariate Data Analysis
STA 536 Data Mining
STA 537 Advanced Statistical Programming Using SAS
STA 538 Statistical Programming Using R
STA 539 Applied Bayesian Methods
STA 540 Statistical Consulting
STA 541 Categorical Data Analysis II
STA 542 Observational Studies
STA 543 Statistical Methods in Business and Finance
STA 544 Marketing Analytics

WCU Master of Science in Applied Statistics - Thesis option
Graduate Advising Sheet. (32-33 credits)

Student Name: ______________________ WCU ID # _______________Semester accepted ________

Core Curriculum (24 credit hours)	**Semester**	**Year**	**Grade**
STA 505 (3) Mathematical Statistics 1 or	_______	____	_____
STA 504 (4) Mathematical Statistics w/Calculus Review	_______	____	_____
STA 506 (3) Mathematical Statistics II	_______	____	_____
STA 507 (3) Introduction to Categorical Data Analysis	_______	____	_____
STA 511 (3) Introduction to Statistical Computing and Data Management	_______	____	_____
STA 512 (4) Principles of Experimental Analysis	_______	____	_____
STA 513 (4) Intermediate Linear Models	_______	____	_____
STA 514 (3) Modern Experimental Design	_______	____	_____

Thesis in Applied Statistics	**Semester**	**Year**	**Grade**
STA 609 (3-6) Thesis I	_______	____	_____
STA 610 (3-6) Thesis II	_______	____	_____

Internship in Applied Statistics (Optional)	**Semester**	**Year**	**Grade**
STA 601 Internship	_______	____	_____

Applied Statistics Elective (3-6 credit hours)

Course	**Semester**	**Year**	**Grade**
1. Elective ________________________________	______	____	_____
2. Elective if Internship not elected ________________	_______	____	_____

Choose from:

STA 531 Topics in Applied Statistics
STA 532 Survival Analysis
STA 533 Longitudinal Data Analysis
STA 534 Time Series
STA 535 Multivariate Data Analysis
STA 536 Data Mining
STA 537 Advanced Statistical Programming Using SAS
STA 538 Statistical Programming Using R
STA 539 Applied Bayesian Methods
STA 540 Statistical Consulting
STA 541 Categorical Data Analysis II
STA 542 Observational Studies
STA 543 Statistical Methods in Business and Finance
STA 544 Marketing Analytics

The concentration in Biostatistics differs from the general Applied Statistics degrees shown above in requiring specific elective courses relevant to Biostatistics. These electives include: STA 532, STA 533, STA 537, STA 539, STA 540, STA 541, STA 542, STA 601, or STA 609. Other STA electives may be substituted with permission of the Program Director. The concentration in Business and Marketing Analytics differs from the general Applied Statistics degrees shown above in requiring specific elective courses relevant to Business and Marketing Analytics. These electives include : STA 534, STA 535, STA 536, STA 537, STA 538, STA 543, STA 544, STA 601, or STA 609. Other STA electives may be substituted with permission of the Program Director.

Post-Master's Certificate of Advanced Study in Applied Statistics

Students must take four classes from the following list [1]

STA 531	Topics In Applied Statistics
STA 532	Survival Analysis
STA 533	Longitudinal Data Analysis
STA 534	Time Series
STA 535	Multivariate Data Analysis
STA 536	Data Mining
STA 537	Advanced Statistical Programming Using SAS
STA 538	Statistical Programming Using R
STA 539	Applied Bayesian Methods
STA 540	Statistical Consulting
STA 541	Categorical Data Analysis II
STA 542	Statistical Methods for Observational Studies
STA 543	Statistical Methods in Business and Finance
STA 544	Applied Marketing Analytics

[1] Selected courses must be different than courses already taken as part of preexisting Master's degree. Additional courses may be selected, or exceptions made, at the discretion of the Program Director.

(Accelerated) B.S. Mathematics – Applied Statistics

Sample Schedule and Advising Sheet

	Fall	Spring
Yr 1	MAT 125 MAT 161 Gen Ed Arts Gen Ed Humanities Gen Ed Behavioral/Social Science	Gen Ed Elective (MAT 122 Recommended) MAT 162 MAT 200 WRT 120 SPK 230
Yr 2	MAT 261 MAT 311 WRT 200 Related Elective I JW Course	STA 319 STA 311 Gen Ed Behavioral/Social Science Gen Ed Science Elective Related Elective II
Yr 3	MAT 421 STA 320 IW Course Gen Ed Elective Gen Ed Humanities	MAT 422 STA 321 ENG 368 W Gen Ed Science Elective Gen Ed Elective
Yr 4	MAT 343 STA 490 Related Elective III STA 505 STA 511	Related Elective IV MAT 423 STA 506 STA 512
Summer	STA 531 (Session I) STA 531 (Session II)	
Yr 5	STA 507 STA 513	STA 514 STA 531

Note that the graduate classes in Year 4 replace:
2 Related Electives (Students are encouraged to use their year three general education electives to complete any minor of interest)
2 Upper division math/stat electives (One of which was encouraged to be an internship)

MS in Applied Statistics
Tentative Course Schedule

	Fall 2018	Winter 2018/19	Spring 2019	Summer 1 2019	Summer II 2019	Fall 2019	Winter 2019/20	Spring 2020
STA 501 – Methodologies in Applied Statistics			√					√
STA 504 – Mathematics Statistics I with Calculus Review	√					√		
STA 505 – Mathematical Statistics I	√					√		
STA 506 – Mathematical Statistics II			√					√
STA 507 – Categorical Data Analysis	√					√		
STA 511 – Introduction to Statistical Programming	√					√		
STA 512 – Principles of Experimental Analysis			√					√
STA 513 – Intermediate Linear Models	√					√		
STA 514 – Modern Experimental Design and Sampling Methods			√					√
STA 531 –Topics in Applied Statistics – Advanced Topics in Applied Statistics				√				
STA 531 –Topics in Applied Statistics – Statistical Methods in Clinical Trials	√							
STA 532 – Survival Analysis				√		√		
STA 533 – Longitudinal Data Analysis								
STA 534 – Time Series								√
STA 535 – Multivariate Data Analysis								
STA 536 – Data Mining					√			
STA 537 – Advanced SAS Programming							√	
STA 538 – Statistical Programming Using R		√						
STA 539 – Applied Bayesian Methods								√
STA 540 – Statistical Consulting								
STA 541 – Categorical Data Analysis II			√					
STA 542 – Statistical Methods for Observational Studies								
STA 543 – Statistical Methods in Business and Finance			√					
STA 544 – Applied Marketing Analytics						√		

Catalog Descriptions of Graduate Courses

MAT 500. Fundamentals of Applied Mathematics. 3 Credits.
This course is designed to provide an intense review of the core concepts essential to the study of applied mathematics. Topics include the main theorems of differential and integral calculus; techniques and theorems of vector analysis; sequences and power series; complex arithmetic and elementary complex-valued functions; first-order, second-order, and systems of linear differential equations; matrix algebra and vector spaces. The computer algebra systems Matlab and Mathematica will be introduced as computational tools for these topics.

MAT 503. History of Mathematics. 3 Credits.
This course will cover selected topics from the History of Mathematics. Many great mathematicians will be studied including Hippocrates, Euclid, Archimedes, Heron, Cardano, Newton, the Bernoulli Brothers, Euler, Gauss, and others. Mathematics problems will be approached using the methods and knowledge of the era studied. A solid background in undergraduate mathematics is required.

MAT 513. Linear Algebra. 3 Credits.
Vectors, vector spaces, determinants, linear transformations, matrices, and bilinear and quadratic forms.
Pre / Co requisites: MAT 513 requires prerequisite of MAT 512.

MAT 514. Theory of Numbers. 3 Credits.
Contact department for more information about this course.

MAT 515. Algebra I. 3 Credits.
This course investigates elements of the theory of groups and rings.
Topics include a brief review of elementary group- and ring theory, the fundamental theorem of finite Abelian groups, group actions, normal subgroups and the isomorphism theorems, the Sylow theorem, ideals and factor rings, prime and maximal ideals, ring homomorphisms and the ring isomorphism theorems, principal ideal domains, unique factorization domains, Euclidean domains.

MAT 516. Algebra II. 3 Credits.
This course is a continuation of MAT 515, and covers elements of field theory and Galois Theory.
Topics include the field of fractions of an integral domain, extension fields, Kronecker's Theorem, algebraic extensions, algebraic closure, transcendental extensions, splitting fields, finite fields, field automorphisms, separable and normal extensions, the fundamental theorem of Galois theory
Pre requisites: MAT 516 requires prerequisite of MAT 515.

MAT 517. Topics in Algebra. 3 Credits.
Contact department for more information about this course.
Repeatable for Credit.

MAT 521. Discrete Mathematics & Graph Theory. 3 Credits.
Topics from Discrete Mathematics including the study of logic, sets, relations, and counting will be introduced. From Graphs and Graph Theory, topics including Eulerian and Hamiltionian Graphs, Digraphs, Trees, Algorithms, Paths, Planarity, and Chromatic Numbers will follow. Applications such as Social Network Analysis will be stressed.

MAT 532. Geometry I. 3 Credits.
This course is a rigorous introduction to geometry from a transformational point of view, emphasizing Euclidean, hyperbolic, and/or projective geometry.
Pre requisites: MAT532 requires prerequisite of undergraduate Linear Algebra and Abstract Algebra.

MAT 533. Geometry II. 3 Credits.
A continuation of MAT 532. Topics covered include inversive geometry, hyperbolic geometry, and elliptic geometry from a transformational point of view.
Pre requisites: MAT533 requires prerequisite of undergraduate Linear Algebra and Abstract Algebra, MAT532 strongly recommended.

MAT 535. Topology. 3 Credits.
This course is a rigorous introduction to point-set topology. Topics covered include topological spaces and continuous functions, connectedness, compactness, separation axioms, metrization theorems, and function spaces.
Pre requisites: MAT535 requires prerequisite of undergraduate Topology and/or Real Analysis.

MAT 536. Algebraic Topology. 3 Credits.
This course is an introduction to the fundamental techniques of algebraic topology. Topics covered include fundamental groups and covering spaces, basic homological algebra, simplicial homology, singular homology, and cohomology.
Pre requisites: MAT536 requires prerequisite of undergraduate Topology and/or Real Analysis, and MAT535 strongly recommended.

MAT 541. Advanced Calculus. 3 Credits.
For students with background deficiencies in analysis. Ordinary and uniform limits; sequences of functions; and the Riemann integral.

MAT 543. Topics in Differential Equations. 3 Credits.
An advanced topics course. Existence and uniqueness theorems, stability theory, singular points, regular singular points, Sturm separation theorem, and the "method of Liapunov."

MAT 545. Real Analysis I. 3 Credits.
A rigorous study of the real number system, sequences and series, basic point-set topology, limits and continuity, differentiation, and the Riemann integral.

MAT 546. Real Analysis II. 3 Credits.
Continuation of MAT 545. Topics may include: sequences and series of functions, Taylor and Fourier series, functions of several variables, and the Lebesgue theory of measure and integration.
Pre / Co requisites: MAT 546 requires prerequisite of MAT 545.

MAT 548. Industrial Mathematics - Continuous Models. 3 Credits.
This course is designed to provide a survey of mathematical concepts, techniques, and numerical algorithms used to study real-world continuous mathematical models. Application areas include population dynamics, climatology, feedback and control systems, traffic flow, diffusion, fluids and transport, and epidemiology. Computer software packages such as Matlab, Mathematica, and Maple will be used in the analysis of the problems.
Pre / Co requisites: MAT 548 requires prerequisite of MAT 500.

MAT 549. Industrial Mathematics - Discrete Models. 3 Credits.
This course is designed to provide a survey of mathematical concepts, techniques, and numerical algorithms used to study real-world discrete mathematical models. Application areas include forestation, particle dynamics, image processing, genetics, queues, efficient call and traffic routing, and optimal scheduling. Computer software packages such as Matlab, Mathematica, and Maple will be used in the analysis of the problems.
Pre / Co requisites: MAT 549 requires prerequisite MAT 500.

MAT 552. Operations Research. 3 Credits.
This course provides an overview of deterministic operations research methodology including linear, integer, nonlinear, and dynamic programming, and classical optimization problems. The computer algebra system MATLAB and other software will be used as an investigative tool in analyzing the problems that arise.
Pre / Co requisites: MAT 552 requires prerequisite of MAT 500.

MAT 553. Stochastic Modeling. 3 Credits.
This course introduces topics in stochastic optimization and control (including Markov chains, queueing theory, reliability theory, inventory theory, and forecasting), discrete-event and Monte Carlo simulation, and stochastic differential equations. Applications are drawn from manufacturing, finance, logistics, and service systems. The computer algebra system MATLAB and other software will be used as an investigative tool in analyzing these models.
Pre / Co requisites: MAT 553 requires prerequisite of MAT 500.

MAT 554. Scientific Computing. 3 Credits.
This case-study driven course will illustrate the use of computational tools in multiple science and engineering domains. The focus is on using MATLAB and appropriate numerical methods (including solutions of linear and nonlinear algebraic equations, solutions of ordinary and partial differential equations, finite elements, linear programming, optimization algorithms, and fast-Fourier transforms) to assist in investigating mathematical models of phenomena in the physical, ecological, and financial realms.
Pre / Co requisites: MAT 554 requires prerequisite of MAT 500.

MAT 555. Industrial Practicum - Continuous Models. 3 Credits.
This is a case study, team problem-solving based course focused on solving real-world problems that can be modeled using continuous mathematics techniques and that emanate from industry. Ideally, the problems would be obtained from partnerships with local industry and they will ordinarily focus on topics arising in optimization, financial mathematics, and other stochastic models.
Pre / Co requisites: MAT 555 requires prerequisites of MAT 548, MAT 549, and one of MAT 552, MAT 553 or MAT 554.

MAT 556. Industrial Practicum - Discrete Models. 3 Credits.
This is a case study, team problem-solving based course focused on solving real-world problems that can be modeled using discrete mathematics techniques and that emanate from industry. Ideally, the problems would be obtained from partnerships with local industry and they will ordinarily focus on topics arising in the biological, natural, and physical sciences.
Pre / Co requisites: MAT 556 requires prerequisites of MAT 548, MAT 549, and at least one of the following: MAT 552, MAT 553, or MAT 554.

MAT 570. Math Models in Life, Phys & Soc Sciences. 3 Credits.
Contact department for more information about this course.

MAT 575. Complex Analysis I. 3 Credits.
Contact department for more information about this course.

MAT 583. Operations Research & Applied Mathematics. 3 Credits.
Contact department for more information about this course.

MAT 595. Topics in Mathematics. 1-3 Credits.
Topics announced at time of offering.
Consent: Permission of the Department required to add.
Repeatable for Credit.

MAT 599. Independent Study. 1-3 Credits.
Contact department for more information about this course.

MAT 609. Thesis I. 3 Credits.
Conduct literature search, develop thesis proposal and begin research under the guidance of a mathematics department faculty member.

MAT 610. Thesis II. 3-6 Credits.
Contact department for more information about this course.

MAT 999. Transfer Credits (Graduate). 3-9 Credits.
Transfer Credits.

MTE

MTE 501. Fundamental Concepts of Mathematics I. 3 Credits.
Selected topics that reflect the spirit and the content of the modern elementary school mathematics programs. Logic, sets, functions, number systems, integers, number theory, rational numbers, and problem solving, including estimations and approximations, proportional thinking, and percentages.

MTE 502. Fundamental Concepts of Mathematics II. 3 Credits.
A continuation of MTE 501. The real number system, probability, statistics, geometry, measurement (including the metric system), and problem solving.
Pre / Co requisites: MTE 502 requires prerequisite of MTE 501.

MTE 507. Foundations of Secondary Mathematics Education. 3 Credits.
Research methods in mathematics education; forces which have shaped mathematics education; classroom implications of 20th-century learning theorists; assessment in the classroom; methods of organizing for instruction; cultural and gender considerations.

MTE 508. Jr. High School Math - Curriculum, Instruction, and Assessment. 3 Credits.
This course will focus on the curricula, methods of instruction, and assessment techniques used to teach mathematics in a junior high school setting. Course topics will include elementary school mathematics from the perspective of a secondary school teacher, junior high school mathematics, algebra I, and general/consumer mathematics. Teachers also will explore strategies that can be used to integrate the calculator, computer, and new CD-ROM technologies into the mathematics classroom.
Pre / Co requisites: MTE 508 requires prerequisite of MTE 507.

MTE 510. Algebra for the Elementary Teacher. 3 Credits.
An introduction to modern algebra. A comparative study of mathematics systems.
Pre / Co requisites: MTE 510 requires prerequisite of MTE 501.

MTE 512. Sr. High School Math - Curriculum, Instruction, and Assessment. 3 Credits.
This course will focus on the curricula, methods of instruction, and assessment techniques used to teach mathematics in a senior high school setting. Course topics will include geometries, algebra II, trigonometry, precalculus, and discrete mathematics. Teachers also will explore strategies that can be used to integrate the scientific and graphing calculator, computer, and the new CD-ROM technologies into the mathematics classroom.
Pre / Co requisites: MTE 512 requires prerequisite of MTE 507.

MTE 530. Geometry for the Elementary Teacher. 3 Credits.
Basic concepts in geometry. Euclidean geometry and postulative systems.
Pre / Co requisites: MTE 530 requires prerequisite of MTE 501.

MTE 553. Teaching Children Mathematics I. 3 Credits.
In-depth treatment of strategies, methods, and materials for teaching the following concepts in an elementary classroom: place value; addition, subtraction, multiplication, and division of whole numbers; measurement; elementary number theory; geometry; fractions; and integers.
Pre / Co requisites: MTE 553 requires prerequisites of two mathematics courses.

MTE 555. Teaching Children Mathematics II. 3 Credits.
A continuation of the strategies and methods for teaching the topics covered in MTE 553 extended to real numbers, deeper concepts of geometry in the plane and space, percents, proportional thinking and algebra.
Pre / Co requisites: MTE 555 requires prerequisite MTE 553; field clearances.

MTE 560. Teaching Algebra in the Secondary School. 3 Credits.
Contact department for more information about this course

MTE 561. Calculus for Teachers. 3 Credits.
Contact department for more information about this course.

MTE 567. Teaching Geometry in Secondary School. 3 Credits.
Contact department for more information about this course.

MTE 568. Seminar for Second School Math Teachers. 3 Credits.
Selected topics of current interest in secondary school mathematics for the in-service teacher.
Repeatable for Credit.

MTE 595. Topics in Mathematics Education. 1-3 Credits.
Topics announced at time of offering.
Consent: Permission of the Department required to add.

MTE 599. Independent Study. 1-3 Credits.
Contact department for more information about this course.

MTE 604. Research Seminar. 3 Credits.
This course will focus on the study of research in mathematics education. Contemporary topics of research will be discussed and perused. Students will be expected to report on a topic of research of their choosing. In addition, empirical study and design will be discussed along with data analysis and the reporting of results.

MTE 610. Thesis. 3-6 Credits.
Contact department for more information about this course.

STA

STA 501. Methodologies in Applied Statistics. 3 Credits.
This course will teach the commonly used statistical techniques that are most likely to be encountered in graduate research. Topics will include t-tests, multiple linear regression, ANOVA, chi-squared tests and power/sample size calculations.

STA 504. Mathematical Statistics I with Calculus Review. 4 Credits.
A rigorous treatment of probability spaces and an introduction to the estimation of parameters. This course will also review relevant calculus topics.

STA 505. Mathematical Statistics I. 3 Credits.
A rigorous treatment of probability spaces and an introduction to the estimation of parameters.

STA 506. Mathematical Statistics II. 3 Credits.
Continuation of STA 505. Correlation, sampling, tests of significance, analysis of variance, and other topics.
Pre / Co requisites: STA 506 requires a prerequisite of STA 505 or STA 504.

STA 507. Introduction to Categorical Data Analysis. 3 Credits.
Data-driven introduction to statistical techniques for analysis of data arising from medical and public health studies. Contingency tables, logistic regression survival models, non parametric methods and other topics.
Pre / Co requisites: STA 507 requires prerequisites of STA 511 and STA 512 or permission of instructor.

STA 510. Statistical Methods for Research. 3 Credits.
This course will provide the tools and methods for designing a research project, conducting the research, managing and manipulating a dataset, and finally analyzing data. This course is for students not enrolled in the Applied Statistics Graduate Degree Program. It requires no prior course in statistics or computer science. Topics covered will include: 1. Research Design 2. Basic Statistics 3. Introductory statistical programming using SAS and Excel 4. Statistical Analysis (including t-tests, linear regression, ANOVA, and chi-squared tests) 5. Writing a final report, including graphics, summarizing the results.

STA 511. Intro Stat Computing & Data Management. 3 Credits.
Course will give students the ability to effectively manage and manipulate data, conduct statistical analysis and generate reports and graphics, primarily using the SAS Statistical Software package.

STA 512. Principles of Experimental Analysis. 4 Credits.
Course provides technology-driven introduction to regression and other common statistical multivariable modeling techniques. Emphasis on interdisciplinary actions.
Pre / Co requisites: STA 512 requires prerequisite: STA 511 or permission of instructor.

STA 513. Intermediate Linear Models. 4 Credits.
Rigorous mathematical and computational treatment of linear models.
Pre / Co requisites: STA 513 requires prerequisites of STA 505 or STA 504, STA 506, STA 511, and STA 512 or permission of instructor.

STA 514. Modern Experimental Design. 3 Credits.
Focusing on recent journal articles, this course will investigate issues associated with design of various studies and experiments. Pharmaceutical clinical trials, case-controlled studies, cohort studies, survey design, bias, causality and other topics.
Pre / Co requisites: STA 514 requires prerequisites of STA 511 and STA 512 or consent of instructor.

STA 521. Statistics I. 3 Credits.
For nonmathematics majors. Emphasis on applications to education, psychology, and the sciences. Distributions, measures of central tendency and variability, correlation, regression and hypothesis testing, and other topics.

STA 531. Topics In Applied Statistics. 3 Credits.
Contact department for more information about this course.
Repeatable for Credit.

STA 532. Survival Analysis. 3 Credits.
This course will provide students with the knowledge and tools to conduct a complete statistical analysis of time to event data. Students will get experience using common methods for survival analysis, including Kaplan-Meier Methods, Life Table Analysis, parametric regression methods, and Cox proportional Hazard Regression. Additional topics include discrete time data, competing risks, and sensitivity analysis.

STA 533. Longitudinal Data Analysis. 3 Credits.
Introduction to the application and theory of models for clustered and longitudinal data. Course will address the analysis for both continous and categorical response data. Course will be held in the statistics lab and use the statistical software package SAS. Other software

such as R, HLM, SPSS, MIXORMIXREG may be introduced.
Pre / Co requisites: STA 533 requires
prerequisites: STA 511, STA 512, STA 507 and STA 513 or permission of Director of M.S. Applied Statistics.

STA 534. Time Series. 3 Credits.
Time series analysis deals with the statistical study of random events ordered through time. This class will focus on the characteristics inherent in such processes such as repetitive cycles and deteriorating dependence. Course topics will include seasonal decomposition, exponential smoothing, and ARIMA models. Emphasis will be placed on real life data analysis and statistical communication. Data analysis will be done with a variety of programs such as SAS, R, and Excel.
Pre / Co requisites: STA 534 requires prerequisite of STA 511 and STA 512.

STA 535. Multivariate Data Analysis. 3 Credits.
Multivariate data typically consist of many records, each with readings on two or more variables, with or without an "outcome" variable of interest. Procedures covered in this course include multivariate analysis of variance (MANOVA), principal component analysis, factor analysis and classification techniques.
Pre / Co requisites: STA 535 requires prerequisite: STA 505, STA 506, STA 511, STA 512.

STA 536. Data Mining. 3 Credits.
LEC (0), LAB (0)
The purpose of this course is to give you an introduction to many of the modern techniques that are used to analyze a wide array of data sets. We will be applying these methods using the statistical programming language R.

STA 537. Advanced Statistical Programming Using SAS. 3 Credits.
This course will focus on skills and techniques considered essential to advanced SAS programming. The primary topics covered will be SAS SQL and SAS Macro Programming. Other advanced topics such as indices, efficient programming techniques, memory usage, graphics, and using best programming practices will also be covered.
Pre / Co requisites: STA 537 requires a prerequisite of STA 511.

STA 538. Statistical Programming Using R. 3 Credits.
The statistical programming language R is one of the most popular tools for data analysis. It is freely available to most common operating systems and also an extremely powerful and customizable programming language. This course will focus on performing many rigorous statistical analyses and simulating data in R. Some of the topics include: verifying concepts of statistical inference using simulations, fitting linear models, performing various statistical tests, along with advanced graphics and visualization.

STA 539. Applied Bayesian Methods. 3 Credits.
Review of conditional probability and Bayes' Theorem, conditional distributions and conditional expectations, and likelihood functions; prior and posterior distributions; conjugate priors; credible intervals; Bayes' factors; Bayesian estimation in linear models; predictive analysis; Markov Chain Monte Carlo methods. Use of appropriate technology.
Pre / Co requisites: STA 539 requires prerequisites of STA 506 and STA 511.

STA 540. Statistical Consulting. 3 Credits.
This course will discuss the skills needed to be successful in different consulting environments. It will provide detailed instruction on use of communication skills and consulting strategies. Several interactive case studies will be presented. Then, students will be required to work as part of a team on a real consulting project. Students will be involved in a consulting session with clients, research and carry out the data analysis, and present the final results in another consulting meeting. Statistical methods from previous courses may be applied to the data for the projects. In addition, new statistical techniques may be taught as part of the class if the projects require statistical methodologies not introduced in previous classes.
Pre / Co requisites: STA 540 requires prerequisites of STA 511 and STA 512.

STA 541. Categorical Data Analysis II. 3 Credits.
This course will extend the information presented in the STA 507 course. We will cover statistical methods for producing Receiver Operating Characteristic Curves and the Optimal operating point from logistic regression. Goodness-of-link and complex modeling issues for count data such as overdispersion and underdispersion will be presented. Students will be exposed to discussion of techniques for both cross-sectional and longitudinal count data. Techniques to assess goodness of fit for count data will be introduced. Students will be exposed to various programming techniques to fit such data within the SAS software using procedures such as PROC GENMOD, PROC COUNTREG, PROC FMM, PROC GLIMMIX, and PROC NLMIXED. Upon completion of this second part of Categorical Data Analysis, students will be comfortable with the analytical techniques for a variety of count outcomes in the real world setting. Proper communication and interpretation of these models is an essential component of the course.
Pre / Co requisites: STA 541 requires a prerequisite of STA 507.

STA 542. Statistical Methods for Observational Studies. 3 Credits.
In the assessment of the association between a predictor and a response confounding by another factor might yield wrong answers. One standard technique to protect against confounding is randomization, which is the standard for conducting randomized clinical trials (RCT). In the setting where randomization cannot be applied, such as cohort or case-control studies, the potential for confounding exists; therefore, analytical techniques must be developed to address this potential confounding. These studies where the respective predictor is observed (i.e. gender, case versus control, etc...) rather than randomized (i.e. drug versus placebo, Treatment 1 versus Treatment 2, etc...) are referred to as observational studies. This course will cover statistical methods for the design and analysis of observational studies. Students will be exposed to discussion of differences between experimental, observational, and quasi-experimental studies. Techniques to assess statistical effects while addressing confounding (both measured and unmeasured) and selection bias will be introduced. Various techniques introduced are: propensity scores, inverse probability weighting, instrumental variables, Marginal Structural Models, Structural Nested Mean Models. Students additionally will be introduced to the Rubin Causal Model framework in the assessment of Causal effects.
Pre / Co requisites: STA 542 requires prerequisites of STA 511 and STA 512.

STA 543. Statistical Methods in Business and Finance. 3 Credits.
This course will cover the application of statistics to modeling, estimation, inference and forecasting in the business and financial world through real world problems with an emphasis on critical evaluation. It will cover selected topics from econometrics, decision

theory, and financial modeling, as well as business optimization and simulation.
Pre / Co requisites: STA 543 requires prerequisites of STA 505 or STA 504; STA 511; STA 512.

STA 544. Applied Marketing Analytics. 3 Credits.
In this course we will learn how to provide in-depth insights about core big data assets commonly used in business analytics, as well as research in pharmaceutical, package goods, and financial industries. Additional topics will include national and customer level data assets, projection methodologies, business analytics techniques, and specific applications of statistical and analytic techniques to the marketing industry..

STA 599. Independent Study. 1-3 Credits.
Individual exploration of a topic in statistics.
Repeatable for Credit.

STA 601. Internship In Applied Statistics. 1-6 Credits.
In cooperation with a regional industrial company student will perform an internship in applied statistics.
Repeatable for Credit.

STA 609. Thesis I. 3-6 Credits.
Preliminary research under the guidance of a mathematics faculty member. Students must present oral preliminary findings before proceeding to STA 610.
Repeatable for Credit.

STA 610. Thesis II. 3-6 Credits.
Research project under the guidance of the mathematics faculty.
Pre / Co requisites: STA 610 requires prerequisite of STA 609.
Repeatable for Credit.

Faculty and Staff

25 University Avenue (UNA)

Department Chair
Glidden, Peter, Ph.D., Columbia University — UNA 101A x 2440
Mathematics Education — pglidden@wcupa.edu

Department Secretary — UNA 101 x 2440
Sally Malarney — smalarney@wcupa.edu

Tenured & Tenure-Track Faculty

Andreas Aristotelous, Ph.D., University of Tennessee — UNA 115 610-436-3495
Applied and Computational Mathematics — aaristotelous@wcupa.edu

Bowen, Brian, Ph.D., University of Delaware — UNA 108 610-436-2351
Mathematics Education — bbowen@wcupa.edu

Brazas, Jeremy, Ph.D., University of New Hampshire — UNA 106 610-436-2613
Algebraic and General Topology

Crossett, Andrew, Ph.D., Carnegie Mellon University — UNA 106 610-436-2613
Applied Statistics — acrossett@wcupa.edu

Fisher, Michael, Ph.D., Lehigh University — UNA 123 x 4196
Graph Theory & Combinatorics — mfisher@wcupa.edu

Gallitano, Gail, Ed. D., Columbia University — UNA 114 610-436-2452
Mathematics Education — ggallitano@wcupa.edu

Gallop, Robert, Ph.D., Drexel University — UNA 180 610-436-2419
Applied Statistics, Biostatistics — rgallop@wcupa.edu

Gupta, Shiv, Ph.D., Case Western Reserve University — UNA 112 610-436-3459
Algebra (Group Theory, Number Theory) — sgupta@wcupa.edu

Ilaria, Daniel, Ph.D., Rutgers University — UNA 108 610-436-3248
Mathematics Education — dilaria@wcupa.edu

Johnson, Kim, Ph.D., Penn State University — UNA 118 610-436-3249
Mathematics Education — kjohnson2@wcupa.edu

Johnston, Clifford, Ph.D., Temple University — UNA 173 610-738-0432
Partial Differential Equations, Stochastic Processes — cjohnston@wcupa.edu

Junius, Premalatha, Ph.D., University of Northern Colorado — UNA 111 610-436-2199
Applied Mathematics — pjunius@wcupa.edu

Kolpas, Allison, Ph.D., University of California, Santa Barbara — UNA 106 610-436-4964
Applied Mathematics — akolpas@wcupa.edu

Li, Chuan, Ph.D., University of Tennessee — UNA 115 610-436-1081
Applied Mathematics — cli@wcupa.edu

Marano, Lisa, Ph.D., Lehigh University — UNA 173A 610-436-0585
Stochastic Processes & Financial Mathematics — lmarano@wcupa.edu

McAneny, Kathleen "Taffy", Ph.D., University of Delaware — UNA 122 610-436-5670
Mathematics Education — kmcaneny@wcupa.edu

McClintock, Scott, Ph.D., University of Kentucky — UNA 121 610-436-4963
Statistics — smcclintock@wcupa.edu

McKibben, Mark, Ph.D., Ohio University — UNA 113 610-436-2148
Differential Equations, Stochastic Analysis — mmckibben@wcupa.edu

McLaughlin, James, Ph.D., University of Illinois — UNA 179 610-436-4417
Number Theory — jmclaughlin@wcupa.edu

Miller, Emily, Ph.D., University of Delaware — UNA 107 610-436-2436
Mathematics Education — emiller@wcupa.edu

Nitica, Viorel, Ph.D., Penn State University — UNA 172 610-430-4411
Dynamical Systems, Operator Algebras, and Discrete Mathematics — vnitica@wcupa.edu

Parsell, Scott, Ph.D., University of Michigan — UNA 175 610-436-3465
Analytic Number Theory — sparsell@wcupa.edu

Pyott, Laura Connell, M.S., University of Delaware — UNA 115 610-436-3451
Statistics — lpyott@wcupa.edu

Rieger, Randall, Ph.D., University of North Carolina — UNA 116 610-436-2893
Applied Statistics, Biostatistics — rrieger@wcupa.edu

Short, Thomas, Ph.D., Carnegie-Mellon University — UNA 111 610-436-2369
Applied Statistics — tshort@wcupa.edu

Sullivan, Rosemary, Ph.D., Lehigh University — UNA 128 610-430-4418
Geometric Probability Theory — rsullivan@wcupa.edu

Tan, Lin, Ph.D., University of California (Los Angeles) — UNA 117 610-436-3455
Algebra (Algebraic Groups, Combinatorics) — ltan@wcupa.edu

Zimmer, Peter, Ph.D., University of Kansas — UNA 178 610-436-2696
Partial Differential Equations, Stochastic Processes — pzimmer@wcupa.edu

Department of Mathematics
25 University Avenue, Room 101
West Chester, Pennsylvania 19383