Department of Mathematics
West Chester University
Undergraduate Handbook
2020-2021

Covid-19 Pandemic with Reinfection
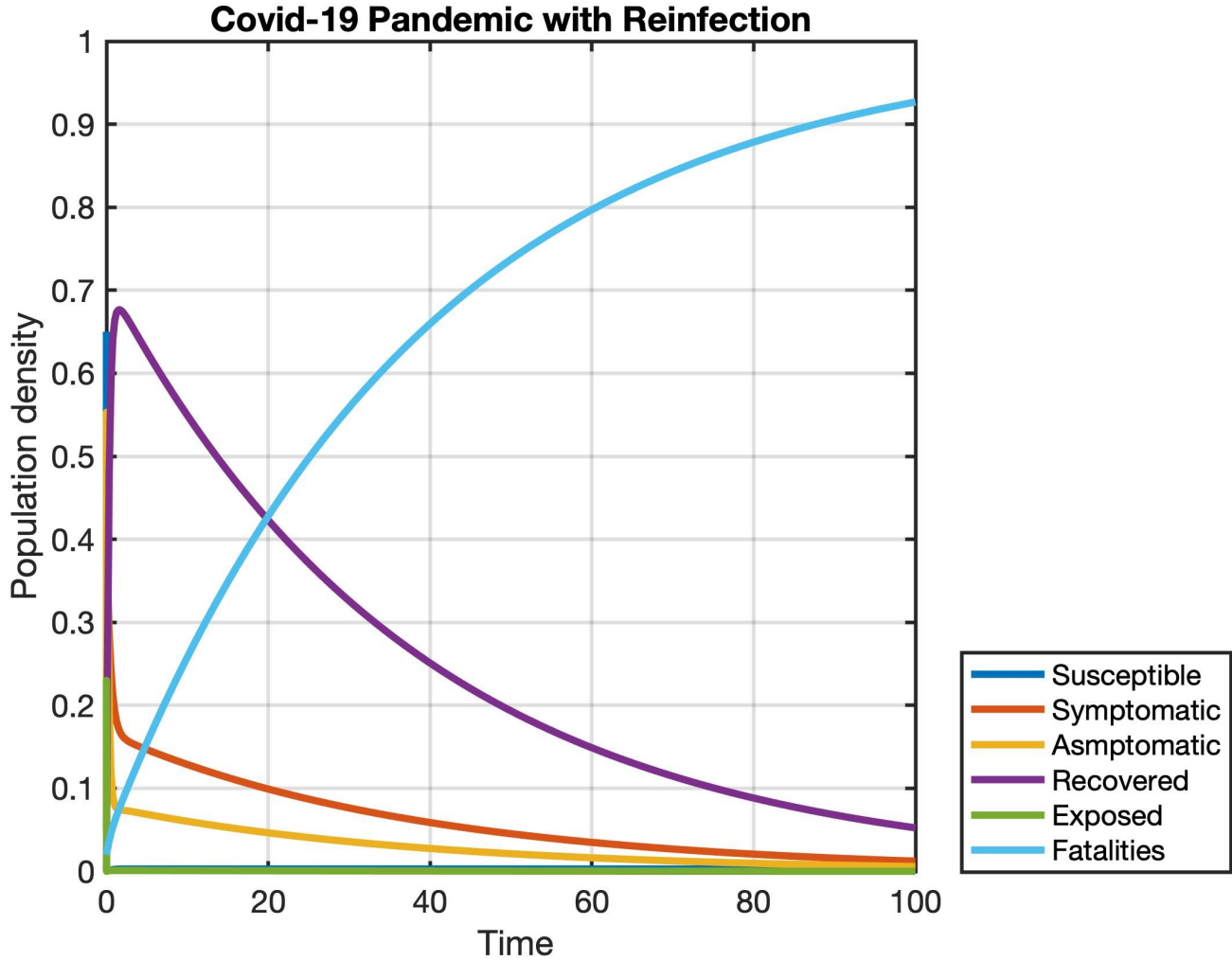
If you have any questions about any item in the *Handbook*, or if you wish to learn more about the Department of Mathematics at West Chester University, please do not hesitate to contact me:

Dr. Peter L. Glidden
Professor and Chair
Department of Mathematics
25 University Avenue - Room 101
West Chester University

E-mail: pglidden@wcupa.edu

Phone: 610-436-2440
Fax: 610-738-0578

Front cover art courtesy of Khanh Pham

The 14 days prediction of the influenza virus outbreak
versus the actual cases in the boarding school in England by
using Susceptible, Infected and Recovered model.

Updated Spring 2021

TABLE OF CONTENTS

Introduction

Mathematics is one of the oldest of all disciplines and it is fundamental for serious scholarship in all of the sciences. Mathematicians use the basic tools of mathematics, including: theory, computational techniques, algorithms, and advanced technology to solve a wide variety of real world problems. Mathematics is basic to the understanding of many disciplines, including: physics, chemistry, computer science, and astronomy.

Mathematics is playing an important role in understanding recent important developments in the biological sciences and many other fields. Mathematical models are frequently used in the social sciences, especially in economics and psychology, and are found throughout actuarial science and statistics. Mathematicians are broadly classified as either pure or applied. The distinction between the two is often somewhat "fuzzy" as the work of both often overlaps.

Pure mathematicians advance mathematical knowledge by proving new results. They generally seek to increase mathematical knowledge without necessarily having an eye on its practical use. Such abstract theoretical knowledge has often proved to be of practical value to science and other disciplines as evidenced by the applications of group theory to quantum mechanics and Riemannian geometry to Einstein's work in understanding the nature of the universe.

Applied mathematicians can also be focused on theoretical development, but in contrast with pure mathematicians, they develop and apply mathematical tools to define and solve practical problems arising in business; government; engineering; the physical, biological and social sciences; and elsewhere. For example, they may study the most efficient way to schedule postal deliveries between cities; the effectiveness and risks of new drugs; the aerodynamics of a proposed airplane design; or the secret coding used to transmit military, political, or financial information. Applied mathematicians also study, develop, and analyze the mathematical theory behind the efficient design and implementation of practical computational algorithms for solving various types of modeling equations.

Information about careers in mathematics and programs to prepare for students for these careers are described later in the *Handbook.*

Mathematics at West Chester University

Our programs provide close interaction between students and faculty, access to an excellent library, and extensive computer support services. These are all instrumental in providing our students with a solid, undergraduate background in mathematics.

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; for a career as a middle or secondary school mathematics teacher; or for a career as an actuary, an applied mathematician, a statistician, or an industrial mathematician.

Faculty

Our faculty hold advanced degrees from major universities. Many have gained both national and international recognition in research and teaching. A list of Department faculty members that includes their contact information is given later in the *Handbook*. Additional information may be found on the Department's website http://www.wcupa.edu/sciences-mathematics/mathematics/.

Quality Teaching

Students pursuing a major or minor in mathematics receive individual attention from our faculty members. The upper division classes for majors are small, ranging in size from five to about 25. We like to think of ourselves as being a friendly, warm, and student-centered department. Students are encouraged to visit their professors during office hours for extra help, if needed.

Auxiliary Teaching Support

The department maintains a Student/Tutorial Center (Room 105) staffed by advanced students. Those that qualify to staff the Tutorial Center acquire pre-professional teaching experience, help their peers, and develop communication skills.

Technical and Related Support

Students have access to several microcomputer labs with full internet access and mathematical, statistical, and programming software, including: Mathematica, Maple, MATLAB, MiniTab, and SAS. These computer labs are located in rooms 103 and 109 next to the Student Tutorial Center. Desktop computers also are available in the Student Tutorial Center (Room 105). The Department has a Seminar Room (Room 104) that includes a small mathematics library. The popular Wednesday afternoon "teas" for both students and faculty are held in room 105.

Careers in Mathematics and Statistics

A graduate who holds a bachelor's degree in mathematics can pursue entry-level positions leading to highly paid positions in both the private and public sectors. Some of these are described below.

Actuary
Actuaries determine future risk, make price decisions, and develop investment strategies. Many also design insurance, financial, and pension plans and help ensure their viability. Most actuaries specialize in life and health or property and causality insurance, others work in finance or employee benefit programs.

In general, actuaries assemble and analyze data to estimate probabilities of an event taking place, such as death, sickness, injury, disability, or property loss. Most are employed in the insurance industry, where they estimate the amount a company will pay in claims. They assure that the price charged for insurance coverage will enable their company to be profitable.

Applicants for beginning actuarial jobs usually have a bachelor's degree in mathematics, actuarial science, statistics, or a business-related discipline such as economics, finance or accounting. Most companies prefer that applicants have passed a few of the actuarial examinations required for professional designation. See BeAnActuary.org for more information.

Commercial Banker
Commercial banks hire more people than any other industry in the financial sector. A graduate may begin in an entry-level position at a branch office, but with the quantitative skills that a degree in mathematical finance offers, a graduate can easily advance into management and specialist positions that use her or his skills to manage the bank's investments. Moreover, this degree prepares graduates for careers in economic forecasting and analysis.

Cryptanalyst
Cryptanalysts develop techniques for the secure transmission of information and they develop techniques for reading information secured by others.

Financial Planner
Financial planners build investment plans for their clients. They gather information from individuals and families regarding their retirement plans and investment goals and decide the best way to reach these goals given their assets. There are a series of exams to take to become a Certified Financial Planner. With many Americans reaching retirement age, there is a growing demand for those with this certification. For more information, see http://www.cfp.net/.

Operations Research Analyst
Operations research and management science are often used to describe the discipline of applying quantitative techniques to make decisions or solve problems. Many of the tools of an operations researcher were developed during World War II in addressing problems related to the deployment of radar, submarine searches, deployment of supplies and weapons, and the breaking of enemy codes. Following the war, numerous peacetime applications emerged placing these specialists in demand.

The emergence of operations research in today's economy reflects the growing complexity of managing large organizations that require efficient use of human, material, and financial resources. In general operations research analysts address questions related to strategy, forecasting, resource allocation, facilities layout, inventory control, personnel allocation, and delivery or distribution systems.

Statistician
Statisticians apply their mathematical knowledge to the design of surveys and experiments. They collect, process, and analyze the data, and interpret the results. Statisticians apply their knowledge to a variety of fields including biology, economics, engineering, medicine, public health, psychology, marketing, and education.

Statisticians often have different professional designations depending on their area of specialization. For example, a statistician working primarily with economic data may be known as an econometrician, while those in public health or medicine may hold titles of biostatistician, biometrician, or epidemiologist.

Links to Information about Careers in Mathematics
WeUseMath.org
BeAnActuary.org
www.siam.org/careers
www.whydomath.org

Planning Your Program of Study

Starting At West Chester
If you are a first year student, the Department Chair will construct your Fall schedule and assign a Department faculty member as your advisor. If you are a transfer student, you will meet with the Chair, Assistant Chair, or your advisor to plan you first semester schedule.

Scheduling
Students should familiarize themselves with *myWCU*, which allows you to register for classes and monitor progress towards your degree. *myWCU* has a feature called "Degree Progress Report" or "DPR." The DPR allows students to see exactly what requirements have and have not been met. If you are considering changing majors, *myWCU* also has a feature called "What-If Degree Progress Report," which allows you to see what requirements have and have not been met for the program you are considering.

Students are strongly encouraged to prepare, print, and review their DPR <u>before</u> meeting with their advisor to schedule courses. Doing so will make your advising meetings more efficient and rewarding, because you will know in advance which requirements remain unmet. This allows more time for explaining required and elective mathematics courses; exploring potential minors; discussing your post-graduation plans; and, most importantly, having your advisor serve as a career mentor to whom you can turn for help and advice.

The scheduling of classes for a given semester typically takes place during the middle of the preceding semester. Students schedule classes online at *my.wcupa.edu*, using computers located in convenient locations throughout the campus. The *Handbook* contains sample four-year plans for each program.

General Education Requirements
As part of their baccalaureate degrees, all West Chester University students must meet the University's General Education requirements, which include the First Year Experience (FYE) and course work in: academic foundations (English composition and mathematics); the natural sciences, behavioral and social sciences; the arts; the humanities; diverse communities (denoted "J"), and interdisciplinary courses (denoted "I"). Additionally, students must complete nine credits in "Writing Emphasis" (denoted "W"), 9 credits in Speaking Emphasis (denoted "S"), and 3 credits in Ethics (denoted "E").

Planning Toward Graduation
In spring of your sophomore year, when you are scheduling your junior year, you should take the time to plan your last four semesters at West Chester. Some upper division courses are offered only during Spring or Fall, and others are offered only one semester every other year. Thus, if you miss out on a course, it may not be offered for another two years. Your advisor can be a valuable resource, but be advised that you are responsible to see that all graduation requirements are met.

Baccalaureate Programs

The Department of Mathematics offers two undergraduate degrees:

- **BA Mathematics**. This program prepares students for graduate work in mathematics, applied mathematics, or statistics. The program has a foreign language requirement (French, German, or Russian are recommended), so it is ideal for students who want to pursue graduate work at graduate schools that require mastery of a foreign language.

- **BS Mathematics**. This program, which has no foreign language requirement, offers concentrations in actuarial science, applied and computational mathematics, mathematical finance, mathematics, and statistics. The mathematics option prepares students for graduate work in pure mathematics and the other four concentrations prepare students for careers in applied mathematics.

Both degrees require the same five, lower division courses:

MAT 161 Calculus I (4 credits)
MAT 162 Calculus II (4 credits)
MAT 261 Calculus III (4 credits)
MAT 200 The Nature of Mathematics (3 credits)
MAT 311 Linear Algebra (3 credits)

The Calculus sequence (MAT 161, MAT 162, and MAT 261) provides the foundation for nearly every upper division mathematics course. The Nature of Mathematics (MAT 200) includes mathematical notation and argument, structure of proofs, basic facts about logic, mathematical proofs, problem-solving techniques, and introductions to mathematical software packages. MAT 200 is designed to help students successfully transition from the Calculus sequence to upper division mathematics. Linear Algebra (MAT 311) includes matrices, systems of linear equations, vector spaces, linear transformation, determinants, eigenvalues, spectral theorem, and triangulation. Together, these five courses provide a solid foundation for success in upper division mathematics courses.

BA Mathematics

In the first two years, mathematics majors are given a solid foundation through courses that capture their interest and encourage them to continue in the mathematics program. As upper division students, mathematics majors are given a well-rounded introduction to higher mathematics. The curriculum requires two courses at an advanced level in each of the fundamental areas of algebra, analysis, and applied mathematics. Students in the BA program are also required to complete a minor in a related field (or an additional nine credits of upper division mathematics) in order to enhance their appreciation and preparation for applications of mathematics. By careful selection of courses in the major

and in the minor, students in the BA program will be prepared for critical analysis and problem-solving positions in many areas of industry, government, or education.

Lower Division, Required Core Courses
MAT 161 Calculus I (4 credits)
MAT 162 Calculus II (4 credits)
MAT 200 The Nature of Mathematics (3)
MAT 261 Calculus III (4 credits)
MAT 311 Linear Algebra (3)

Upper Division Required Courses
MAT 411 Algebra I (3)
MAT 421 Mathematical Statistics I (3)
MAT 441 Real Analysis I (3)

Upper Division Elective Courses[1]
Upper division electives in mathematics are to be taken as follows:
One course in algebra,
One course in analysis,
One course in applied mathematics, and
An additional 12 credits in upper division mathematics courses.

Cognate Requirements
PHY 170 Physics I (4 credits)
CSC 141 Computer Science I (3)

Foreign Language Requirement
The requirements for the BA degree include a foreign language. The equivalent of completing the second half of the intermediate year of an approved foreign language: Russian, French, or German (without the culture cluster option) is strongly recommended.

Requirement of a Minor
Students completing the BA degree are required to complete either a minor or, with the prior approval of the student's advisor and the Chair, an additional nine (9) credit hours of upper division mathematics. The discipline chosen for the minor should reflect the career goals of the student.

---

[1] The table that lists courses by area (e.g., algebra, analysis, applied mathematics) is given on page 27.

FALL 2020/SPRING 2021 - B.A. MATHEMATICS – 120 CREDITS

GENERAL EDUCATION REQUIREMENTS (40 LESS 9 ATTRIBUTED TO MAJOR REQUIREMENTS = 31 CREDITS)		
	CREDITS	SEMESTER
First Year Experience (FYE)	4	
WRT 120/ WRT 123§	3	
WRT 200-Level Course	3	
MATHEMATICS (MAT 311 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 SCIENCES	3	
BEHAVIOR & SOCIAL SCIENCES	3	
HUMANITIES	3	
HUMANITIES	3	
ARTS	3	
ADDITIONAL GENERAL EDUCATION REQUIREMENTS		
WRITING EMPHASIS COURSES: THREE "W" COURSES		
SPEAKING EMPHASIS COURSES: THREE "S" COURSES		
ETHICS REQUIREMENT: ONE "E" COURSE		
FOREIGN LANGUAGE REQUIREMENT (0-12 CREDITS)		
LANGUAGE 101	3	
LANGUAGE 102	3	
LANGUAGE 201	3	
LANGUAGE 202	3	
COGNATE REQUIREMENTS (7 CREDITS)		
CSC 141 COMPUTER SCIENCE I	3	
PHY 170 PHYSICS I	4	

MATHEMATICS CORE REQUIREMENTS (18 CREDITS)		
	CREDITS	SEMESTER
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	
BA MATHEMATICS REQUIREMENTS (24 CREDITS)		
MAT 411 ABSTRACT ALGEBRA	3	
MAT 421 MATHEMATICAL STATISTICS I	3	
MAT 441 REAL ANALYSIS I	3	
ALGEBRA ELECTIVE	3	
ANALYSIS ELECTIVE	3	
APPLIED MATHEMATICS ELECTIVE	3	
MATHEMATICS ELECTIVE (300 LEVEL AND HIGHER)*	3	
MATHEMATICS ELECTIVE (300 LEVEL AND HIGHER)*	3	
MINOR REQUIREMENTS AND FREE ELECTIVES (28 - 40 CREDITS)§		
MINOR ELECTIVE	3	
MINOR ELECTIVE	3	
MINOR ELECTIVE	3	
MINOR ELECTIVE	3	
MINOR ELECTIVE	3	
MINOR ELECTIVE	3	
FREE ELECTIVE	3	
FREE ELECTIVE	3	
FREE ELECTIVE	3	
FREE ELECTIVE	3	

GENERAL EDUCATION NOTES:
§ WRT 123 IS A 4-CREDIT COURSE, SO THE FOURTH CREDIT COUNTS AS A FREE ELECTIVE.
- TRANSFER STUDENTS SHOULD REFER TO THE CATALOG FOR GENERAL EDUCATION REQUIREMENTS.
- STUDENTS ARE ENCOURAGED TO TAKE COURSES THAT MEET MULTIPLE REQUIREMENTS, FOR EXAMPLE, COURSES THAT ARE BOTH "W" AND "J" COURSES.

PROGRAM SPECIFIC NOTES:
* ANY COURSES IN MATHEMATICS WITH COURSE NUMBERS ABOVE 311, WITH THE EXCEPTION OF THOSE COURSES WITH A PRIMARY FOCUS ON TEACHER EDUCATION OR THOSE COURSES RESTRICTED TO STUDENTS MAJORING IN ELEMENTARY EDUCATION.

B.A. Mathematics
Sample Course Plan
Students Admitted Fall 2020/Spring 2021

Year	Fall	Spring
1	FYE MAT 161 CSC 141 WRT 120/ WRT 123 Language 101	MAT 162 MAT 200 PHY 170 Gen Ed Behavioral/Social Science Language 102
2	MAT 261 MAT 311 WRT 200-level Free Elective Language 201	Applied Mathematics Elective Minor Elective Gen Ed Arts Free Elective Language 202
3	MAT 411 MAT 421 IW Course Minor Elective Gen Ed Humanities	MAT 441 Algebra Elective Mathematics Elective* Minor Elective JW Course
4	Analysis Elective Minor Elective Gen Ed Humanities Free Elective (W Course)	Mathematics Elective* Minor Elective Minor Elective Gen Ed Behavioral/Social Science Free Elective

General Education Notes:
- Transfer Students Should Refer to the Catalog for General Education Requirements.
- Students are encouraged to take courses that meet multiple requirements, for example, courses that are both "W" and "J" courses.
- Writing Emphasis Courses: Three "W" courses.
- Speaking Emphasis Courses: Three "S" courses.
- Ethics Requirement: One "E" course.

Program Specific Notes:
* Any courses in mathematics with course numbers above 311, with the exception of those courses with a primary focus on teacher education or those courses restricted to students majoring in elementary Education

BS in Mathematics

The BS degree prepares students for careers in applied mathematics (actuarial science, applied and computational mathematics, financial mathematics, or statistics) or pure mathematics. The main difference between the BA Mathematics Program and the BS Mathematics Program is that the BA has a foreign language requirement, while the BS does not.

Required Core Courses
        MAT 161 Calculus I (4 credits)
        MAT 162 Calculus II (4 credits)
        MAT 200 The Nature of Mathematics (3)
        MAT 261 Calculus III (4 credits)
        MAT 311 Linear Algebra (3)

Required Program Courses by Program

Actuarial Science	Applied & Computational
MAT 125	MAT 125
STA 319	STA 319
MAT 343	MAT 325
MAT 371	MAT 343
STA 419	MAT 413
MAT 421	MAT 425
MAT 422	MAT 443
MAT 478	MAT 445 or MAT 441
	MAT 455

Financial	Mathematics	Statistics
MAT 125	MAT 343	MAT 125
STA 319	MAT 411	STA 311
MAT 343	MAT 421	STA 319
MAT 371	MAT 441	STA 320
MAT 421	MAT 445	STA 321
MAT 422 or MAT 423	Analysis Elective	MAT 343
MAT 443	Applied Elective	MAT 421
MAT 479	Algebra Elective	MAT 422
	MAT Elective*	STA 490
	MAT Elective*	
	MAT Elective*	

*Mathematics MAT electives to be chosen above 311 but not MAT 350, MAT 354, MAT 360, or MAT 364.
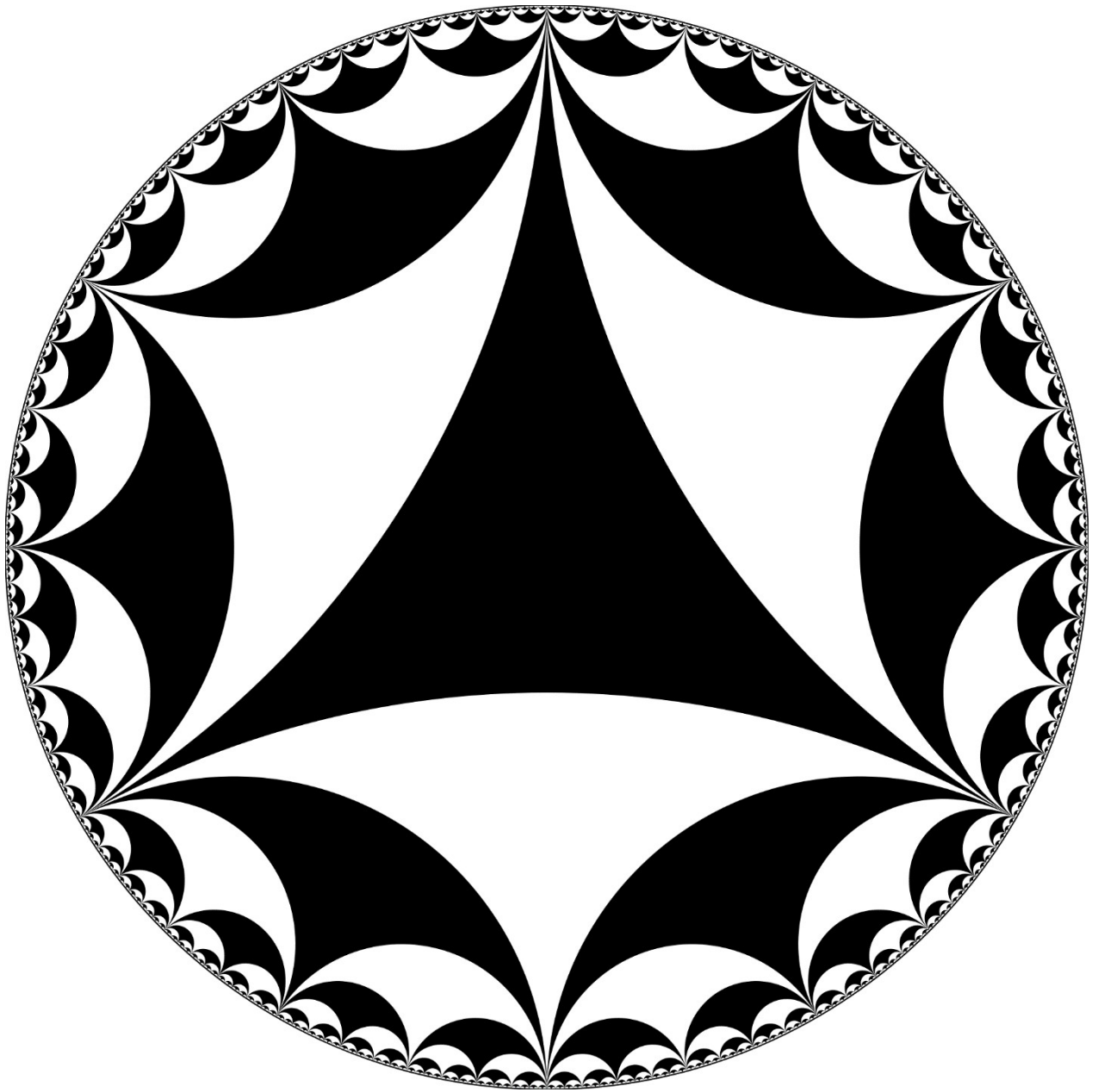
Submitted by Dr. Jeremy Brazas
"Hyperbolic parallelism"

FALL 2020/SPRING 2021 - B.S. MATHEMATICS: ACTUARIAL SCIENCE – 120 CREDITS

GENERAL EDUCATION REQUIREMENTS (40 - LESS 6 ATTRIBUTED TO MAJOR REQUIREMENTS = 34 CREDITS)		
	CREDITS	SEMESTER
First Year Experience (FYE)	4	
WRT 120/ WRT 123§	3	
WRT 200-Level Course	3	
MATHEMATICS (MAT 311 BELOW)	3	
DIVERSE COMMUNITIES "J" COURSE	3	
INTERDISCIPLINARY "I" COURSE	3	
SCIENCE	3	
SCIENCE	3	
BEHAVIOR & SOCIAL SCIENCES (ECO 111 BELOW)	3	
BEHAVIOR & SOCIAL SCIENCES	3	
HUMANITIES	3	
HUMANITIES	3	
ARTS	3	
ADDITIONAL GENERAL EDUCATION REQUIREMENTS		
WRITING EMPHASIS COURSES: TWO "W" COURSES IN ADDITION TO ENG 368, ENG 371, OR ENG 375		
SPEAKING EMPHASIS COURSES: THREE "S" COURSES		
ETHICS REQUIREMENT: ONE "E" COURSE		
INTERNSHIP OR ELECTIVES (23 CREDITS§)		
MAT 491 INTERNSHIP IN APPLIED MATHEMATICS** (OPTIONAL)	3	
FREE ELECTIVE***	3	
FREE ELECTIVE***	3	
FREE ELECTIVE***	3	
FREE ELECTIVE***	3	
FREE ELECTIVE***	3	
FREE ELECTIVE***	3	
FREE ELECTIVE***	2	

PROGRAM SPECIFIC NOTES
* MAT 421 SHOULD BE TAKEN IMMEDIATELY AFTER MAT 261
** MAY BE TAKEN FOR VARIABLE CREDIT AND REPEATED FOR CREDIT.
*** MUST BE APPROVED BY ADVISOR.

SEE SAMPLE PLAN FOR INFORMATION REGARDING REQUIREMENTS FOR ADMISSIONS TO MBA PROGRAM.

ATHEMATICS CORE REQUIREMENTS (18 CREDITS)		
	CREDITS	SEMESTER
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	
BS ACTUARIAL SCIENCE CONCENTRATION COURSES (24 CREDITS)		
MAT 125 INTRODUCTION TO STATISTICS AND PROBABILITY	3	
STA 319 APPLIED STATISTICS	3	
MAT 343 DIFFERENTIAL EQUATIONS	3	
MAT 371 MATHEMATICAL FINANCE	3	
MAT 421 MATHEMATICAL STATISTICS I*	3	
MAT 422 MATHEMATICAL STATISTICS II	3	
MAT 478 FUNDAMENTALS OF ACTUARIAL SCIENCE	3	
STA 419 BASICS OF STATISTICAL LEARNING	3	
COGNATE REQUIREMENTS (21 CREDITS)		
ACC 201 ACCOUNTING 1	3	
ECO 111 PRINCIPLES OF MACROECONOMICS	3	
ECO 112 PRINCIPLES OF MICROECONOMICS	3	
ECO 340 INTERMEDIATE ECONOMICS	3	
FIN 325 CORPORATE FINANCE	3	
FIN 330 PRINCIPLES OF INSURANCE	3	
ENG 368, ENG 371, OR ENG 375 TECHNICAL /BUSINESS WRITING (W)	3	

GENERAL EDUCATION NOTES:
§ WRT 123 IS A 4-CREDIT COURSE, SO THE FOURTH CREDIT COUNTS AS A FREE ELECTIVE.
• TRANSFER STUDENTS SHOULD REFER TO THE CATALOG FOR GENERAL EDUCATION REQUIREMENTS.
• STUDENTS ARE ENCOURAGED TO TAKE COURSES THAT MEET MULTIPLE REQUIREMENTS, FOR EXAMPLE, COURSES THAT ARE BOTH "W" AND "J" COURSES.

B.S. Mathematics: Actuarial Science
Sample Course Plan
Students Admitted Fall 2020/Spring 2021

Year	Fall	Spring
1	FYE MAT 125 MAT 161 ECO 112 WRT 120/ WRT 123	MAT 162 MAT 200 ECO 111 Gen Ed Science Gen Ed Behavioral/Social Sciences
2	MAT 261* MAT 311 MAT 371 ACC 201 WRT 200-level	MAT 421* STA 319 FIN 325 Gen Ed Science Free Elective***
3	STA 419 FIN 330 IW Course Free Elective*** Gen Ed Humanities	MAT 422 MAT 343 ECO 340 JW Course Free Elective***
4	Gen Ed Arts ENG 368, ENG 371, or ENG 375 (W) Gen Ed Humanities Free Elective*** Free Elective***	MAT 478 MAT 491 Internship or Free Elective** Free Elective*** Free Elective***

General Education Notes:
- Transfer Students Should Refer to the Catalog for General Education Requirements.
- Students are encouraged to take courses that meet multiple requirements, for example, courses that are both "W" and "J" courses.
- Writing Emphasis Courses: Two "W" courses in addition to ENG 368, ENG 371, or ENG 375.
- Speaking Emphasis Courses: Three "S" courses.
- Ethics Requirement: One "E" course.

Program Specific Notes
- *   MAT 421 should be taken immediately after MAT 261
- ** May be taken for variable credit and repeated for credit.
- *** Must be approved by advisor.

Pre-MBA Courses must be passed with a "B" or better.
>   A GMAT score of 460 (or its equivalent GRE score) is required for admission to the M.B.A. program. The GMAT requirement will be waived, if your overall GPA is at least 3.3 and you earn a B or better in each of the following courses: Management, Accounting, Marketing, Economics, Finance, and Statistics.

FALL 2020/SPRING 2021 - B.S. MATHEMATICS: APPLIED AND COMPUTATIONAL MATHEMATICS – 120 CREDITS

GENERAL EDUCATION REQUIREMENTS (40 - LESS 9 ATTRIBUTED TO MAJOR REQUIREMENTS = 31 CREDITS)		
	CREDITS	SEMESTER
First Year Experience (FYE)	4	
WRT 120/ WRT 123§	3	
WRT 200-Level Course	3	
MATHEMATICS (MAT 311 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 SCIENCES	3	
BEHAVIOR & SOCIAL SCIENCES	3	
HUMANITIES	3	
HUMANITIES	3	
ARTS	3	
ADDITIONAL GENERAL EDUCATION REQUIREMENTS		
WRITING EMPHASIS COURSES: TWO "W" COURSES IN ADDITION TO ENG 368, ENG 371, OR ENG 375		
SPEAKING EMPHASIS COURSES: THREE "S" COURSES		
ETHICS REQUIREMENT: ONE "E" COURSE		
COGNATE REQUIREMENTS (21-23 CREDITS)		
CSC 141 COMPUTER SCIENCE I	3	
ENG 368, ENG 371, OR ENG 375 TECHNICAL /BUSINESS WRITING (W	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	

GENERAL EDUCATION NOTES:

MATHEMATICS CORE REQUIREMENTS (18 CREDITS)		
	CREDITS	SEMESTER
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	
BS APPLIED AND COMPUTATIONAL CONCENTRATION COURSES (27 CREDITS)		
MAT 125 INTRODUCTION TO STATISTICS AND PROBABILITY	3	
STA 319 APPLIED STATISTICS	3	
MAT 325 NUMERICAL ANALYSIS I	3	
MAT 343 DIFFERENTIAL EQUATIONS	3	
MAT 413 COMPUTER ALGEBRA	3	
MAT 425 NUMERICAL ANALYSIS II	3	
MAT 443 APPLIED ANALYSIS I	3	
ANY ONE: MAT 445 COMPLEX VARIABLES OR MAT 441 REAL ANALYSIS I	3	
MAT 455 INDUSTRIAL MATHEMATICS PRACTICUM	3	
INTERNSHIP OR FREE ELECTIVES (21 - 23 CREDITS§)		
MAT 491 INTERNSHIP IN APPLIED MATHEMATICS OR FREE ELECTIVES	2-4 OR 3	
FREE ELECTIVES*	3	
FREE ELECTIVES*	3	
FREE ELECTIVES*	3	
FREE ELECTIVES*	3	
FREE ELECTIVES*	3	
FREE ELECTIVES*	2-6	

PROGRAM SPECIFIC NOTES

B.S. Mathematics: Applied and Computational Mathematics
Sample Course Plan
Students Admitted Fall 2020/Spring 2021

Year	Fall	Spring
1	FYE MAT 125 MAT 161 CSC 141 WRT 120 / WRT 123	MAT 162 MAT 200 PHY 170, BIO 110, CHE 103, or ESS 101 Gen Ed Behavioral/Social Science Gen Ed Humanities
2	MAT 261 MAT 311 Cognate 1* WRT 200-level Gen Ed Humanities	MAT 343 MAT 325 Cognate 2* Gen Ed Behavioral/Social Science JW Course
3	MAT 413 MAT 425 Cognate 3* Gen Ed Arts Free Elective***	STA 319 MAT 443 ENG 368, ENG 371, or ENG 375 (W) Free Elective*** Free Elective***
4	MAT 445 or MAT 441 Cognate 4* IW Course Free Elective*** Free Elective***	MAT 491** MAT 455 Free Elective*** Free Elective***

General Education Notes:
- Transfer Students Should Refer to the Catalog for General Education Requirements.
- Students are encouraged to take courses that meet multiple requirements, for example, courses that are both "W" and "J" courses.
- Writing Emphasis Courses: Two "W" courses in addition to ENG 368, ENG 371, or ENG 375.
- Speaking Emphasis Courses: Three "S" courses.
- Ethics Requirement: One "E" course.

Program Specific Notes
- *   Select four Science Cognates (PHY, BIO, CHE, CSC, 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.
- ** May be taken for variable credit and repeated for credit.
- *** Must be approved by advisor. A minor may be obtained by electing appropriate additional classes in a single scientific discipline. Discuss this option with your advisor.

Fall 2020/Spring 2021 - B.S. Mathematics: Mathematical Finance – 120 credits

GENERAL EDUCATION REQUIREMENTS (40 LESS 9 ATTRIBUTED TO MAJOR REQUIREMENTS = 31 CREDITS)		
	CREDITS	SEMESTER
First Year Experience (FYE)	4	
WRT 120/ WRT 123§	3	
WRT 200-Level Course	3	
MATHEMATICS (MAT 311 BELOW)	3	
DIVERSE COMMUNITIES "J" COURSE	3	
INTERDISCIPLINARY "I" COURSE	3	
SCIENCE (CSC 141 BELOW)	3	
SCIENCE	3	
BEHAVIOR & SOCIAL SCIENCES (ECO 111 BELOW)	3	
BEHAVIOR & SOCIAL SCIENCES	3	
HUMANITIES	3	
HUMANITIES	3	
ARTS	3	
ADDITIONAL GENERAL EDUCATION REQUIREMENTS		
WRITING EMPHASIS: TWO "W" COURSES IN ADDITION TO ENG 368, ENG 371, OR ENG 375		
SPEAKING EMPHASIS: THREE "S" COURSES		
ETHICS REQUIREMENT: ONE "E" COURSE		
INTERNSHIP OR FREE ELECTIVES (26 CREDITS§)		
MAT 491 INTERNSHIP IN APPLIED MATHEMATICS* (OPTIONAL) OR FREE ELECTIVE**	3	
FREE ELECTIVE**	3	
FREE ELECTIVE**	3	
FREE ELECTIVE**	3	
FREE ELECTIVE**	3	
FREE ELECTIVE**	3	
FREE ELECTIVE**	3	
FREE ELECTIVE**	3	
FREE ELECTIVE**	2	

PROGRAM SPECIFIC NOTES

*   MAY BE TAKEN FOR VARIABLE CREDIT AND REPEATED FOR CREDIT.

**   MUST BE APPROVED BY ADVISOR.

SEE SAMPLE PLAN FOR INFORMATION REGARDING REQUIREMENTS FOR ADMISSIONS TO MBA PROGRAM.

MATHEMATICS CORE REQUIREMENTS (18 CREDITS)		
	CREDITS	SEMESTER
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	
BS MATHEMATICAL FINANCE CONCENTRATION REQUIREMENTS (24 CREDITS)		
MAT 125 INTRODUCTION TO STATISTICS AND PROBABILITY	3	
STA 319 APPLIED STATISTICS	3	
MAT 343 DIFFERENTIAL EQUATIONS	3	
MAT 371 MATHEMATICS OF FINANCE	3	
MAT 421 MATHEMATICAL STATISTICS I	3	
MAT 422 MATHEMATICAL STATISTICS II OR MAT 423 APPLIED PROBABILITY	3	
MAT 443 APPLIED ANALYSIS	3	
MAT 479 FINANCIAL CALCULUS	3	
COGNATE REQUIREMENTS (21CREDITS)		
ACC 201 ACCOUNTING I	3	
CSC 141 COMPUTER SCIENCE I	3	
ECO 111 PRINCIPLES OF MACROECONOMICS	3	
ECO 112 PRINCIPLES OF MICROECONOMICS	3	
ENG 368, ENG 371, OR ENG 371 TECHNICAL /BUSINESS WRITING (W)	3	
FIN 325 CORPORATE FINANCE	3	
ANY ONE: FIN 337 FINANCIAL MARKETS AND INSTITUTIONS OR FIN 344 INVESTMENTS	3	

GENERAL EDUCATION NOTES:

§   WRT 123 IS A 4-CREDIT COURSE, SO THE FOURTH CREDIT COUNTS AS A FREE ELECTIVE.

●   TRANSFER STUDENTS SHOULD REFER TO THE CATALOG FOR GENERAL EDUCATION REQUIREMENTS.

●   STUDENTS ARE ENCOURAGED TO TAKE COURSES THAT MEET MULTIPLE REQUIREMENTS, FOR EXAMPLE, COURSES THAT ARE BOTH "W" AND "J" COURSES.

B.S. Mathematics: Mathematical Finance
Sample Course Plan
Students Admitted Fall 2020/Spring 2021

Year	Fall	Spring
1	FYE MAT 125 MAT 161 CSC 141 WRT 120/ WRT 123	MAT 162 MAT 200 ECO 111 Gen Ed Science Gen Ed Behavioral/Social Sciences
2	MAT 261 MAT 311 ACC 201 WRT 200-level Free Elective*	STA 319 MAT 343 ECO 112 Gen Ed Humanities Free Elective*
3	MAT 371 MAT 421 FIN 325 Free Elective* Free Elective*	MAT 422 or MAT423 (or JW Course) FIN 344 or FIN 337 Gen Ed Humanities IW Course Free Elective*
4	MAT 491** Internship/ Free Elective MAT 423* (or JW Course) ENG 368, ENG 371, or ENG 375 (W) Free Elective* Free Elective*	MAT 479 MAT 443 Gen Ed Arts Free Elective* Free Elective*

General Education Notes:
- Transfer Students Should Refer to the Catalog for General Education Requirements.
- Students are encouraged to take courses that meet multiple requirements, for example, courses that are both "W" and "J" courses.
- Writing Emphasis Courses: Two "W" courses in addition to ENG 368, ENG 371, or ENG 375.
- Speaking Emphasis Courses: Three "S" courses.
- Ethics Requirement: One "E" course.

Program Specific Notes:
*   Must be approved by advisor.
** May be taken for variable credit and repeated for credit.

Pre-MBA Courses must be passed with a "B" or better.
A GMAT score of 460 (or its equivalent GRE score) is required for admission to the M.B.A. program. The GMAT requirement will be waived, if your overall GPA is at least 3.3 and you earn a B or better in each of the following courses: Management, Accounting, Marketing, Economics, Finance, and Statistics

Fall 2020/Spring 2021 - B.S. Mathematics: Mathematics – 120 credits

GENERAL EDUCATION REQUIREMENTS (40 LESS 9 ATTRIBUTED TO MAJOR REQUIREMENTS = 31 CREDITS)	CREDITS	SEMESTER
First Year Experience (FYE)	4	
WRT 120/ WRT 123§	3	
WRT 200-Level Course	3	
MATHEMATICS (MAT 311 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 SCIENCES	3	
BEHAVIOR & SOCIAL SCIENCES	3	
HUMANITIES	3	
HUMANITIES	3	
ARTS	3	
ADDITIONAL GENERAL EDUCATION REQUIREMENTS		
WRITING EMPHASIS COURSES: TWO "W" COURSES IN ADDITION TO ENG 371		
SPEAKING EMPHASIS COURSES: TWO "S" COURSES IN ADDITION TO SPK 230		
ETHICS REQUIREMENT: ONE "E" COURSE		
INDEPENDENT STUDY; E, S, & W COURSES; AND FREE ELECTIVES (21 CREDITS§)		
FREE ELECTIVE** (W COURSE - MAT 401 RECOMMENDED)	3	
FREE ELECTIVE** (W COURSE)	3	
FREE ELECTIVE** (MAT 499 INDEPENDENT STUDY RECOMMENDED*)	3	
FREE ELECTIVE (MAT 125 RECOMMENDED)	3	
FREE ELECTIVE**	3	
FREE ELECTIVE**	3	
FREE ELECTIVE**	3	

MATHEMATICS CORE REQUIREMENTS (18 CREDITS)	CREDITS	SEMESTER
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	
BS MATHEMATICS CONCENTRATION COURSES (33 CREDITS)		
MAT 343 DIFFERENTIAL EQUATIONS	3	
MAT 411 ALGEBRA	3	
MAT 421 MATHEMATICAL STATISTICS I	3	
MAT 441 REAL ANALYSIS I	3	
MAT 445 COMPLEX VARIABLES	3	
ALGEBRA ELECTIVE	3	
ANALYSIS ELECTIVE	3	
APPLIED MATHEMATICS ELECTIVE	3	
MATHEMATICS ELECTIVE*	3	
MATHEMATICS ELECTIVE*	3	
MATHEMATICS ELECTIVE*	3	
MATHEMATICS ELECTIVE*	3	
COGNATE REQUIREMENTS (17 CREDITS)		
CSC 141 COMPUTER SCIENCE I	3	
PHY 170 PHYSICS I	4	
PHY 180 PHYSICS II	4	
ENG 371 TECHNICAL WRITING (W)	3	
SPK 230 BUSINESS SPEAKING (S)	3	

GENERAL EDUCATION NOTES:
- § WRT 123 IS A 4-CREDIT COURSE, SO THE FOURTH CREDIT COUNTS AS A FREE ELECTIVE.
- Transfer Students Should Refer to the Catalog for General Education Requirements.
- Students are encouraged to take courses that meet multiple requirements, for example, courses that are both "W" and "J" courses.

PROGRAM SPECIFIC NOTES:
- * MAY BE TAKEN FOR VARIABLE CREDIT AND REPEATED FOR CREDIT.
- ** MUST BE APPROVED BY ADVISOR.
- *** ANY COURSES IN MATHEMATICS WITH COURSE NUMBERS ABOVE 311, WITH THE EXCEPTION OF THOSE COURSES WITH A PRIMARY FOCUS ON TEACHER EDUCATION OR THOSE COURSES RESTRICTED TO STUDENTS MAJORING IN ELEMENTARY EDUCATION.

B.S. Mathematics: Mathematics
Sample Course Plan
Students Admitted Fall 2020/Spring 2021

Year	Fall	Spring
1	FYE MAT 161 MAT 125 (recommended) CSC 141 SPK 230 (S)	MAT 162 MAT 200 PHY 170 Gen Ed Humanities WRT 120/ WRT 123
2	MAT 261 MAT 311 PHY 180 WRT 200-level Gen Ed Behavioral/Social Science	MAT 343 Mathematics Elective *** Free Elective** (W Course MAT 401 recommended) Free Elective** Free Elective**
3	MAT 411 MAT 421 Mathematics Elective *** IW Course Gen Ed Arts	MAT 441 Algebra Elective Mathematics Elective *** JW Course Free Elective **
4	MAT 445 Analysis Elective ENG 371 (W) Gen Ed Humanities Free Elective (Foreign Language 201 recommended)	Free Elective** (MAT 499 recommended*) Applied Mathematics Elective Gen Ed Behavioral/Social Science Free Elective (Foreign Language 202 recommended)

General Education Notes:
- Transfer Students Should Refer to the Catalog for General Education Requirements.
- Students are encouraged to take courses that meet multiple requirements, for example, courses that are both "W" and "J" courses.
- Writing Emphasis Courses: Two "W" courses in addition to ENG 371 (W).
- Speaking Emphasis Courses: Two "S" courses in addition to SPK 230 (S).
- Ethics Requirement: One "E" course.

Program Specific Notes:
- * May be taken for variable credit and repeated for credit.
- ** Must be approved by advisor.
- *** Any courses in mathematics with course numbers above 311, with the exception of those courses with a primary focus on teacher education or those courses restricted to students majoring in early or middle grades education.

Fall 2020/Spring 2021 - B.S. Mathematics: Statistics – 120 Credits

GENERAL EDUCATION REQUIREMENTS (40 LESS 3 ATTRIBUTED TO MAJOR REQUIREMENTS = 37 CREDITS)	CREDITS	SEMESTER
First Year Experience (FYE)	4	
WRT 120/ WRT 123§	3	
WRT 200-Level Course	3	
MATHEMATICS (MAT 311 BELOW)	3	
DIVERSE COMMUNITIES "J" COURSE	3	
INTERDISCIPLINARY "I" COURSE	3	
SCIENCE	3	
SCIENCE	3	
BEHAVIOR & SOCIAL SCIENCES	3	
BEHAVIOR & SOCIAL SCIENCES	3	
HUMANITIES	3	
HUMANITIES	3	
ARTS	3	
ADDITIONAL GENERAL EDUCATION REQUIREMENTS		
WRITING EMPHASIS COURSES: TWO "W" COURSES IN ADDITION TO ENG 368, ENG 371, OR ENG 375		
SPEAKING EMPHASIS COURSES: THREE "S" COURSES		
ETHICS REQUIREMENT: ONE "E" COURSE		
SUPPLEMENTAL REQUIREMENTS (21 CREDITS)		
SUPPLEMENTAL ELECTIVE I	3	
SUPPLEMENTAL ELECTIVE II	3	
SUPPLEMENTAL ELECTIVE III	3	
SUPPLEMENTAL ELECTIVE IV	3	
SUPPLEMENTAL ELECTIVE V	3	
SUPPLEMENTAL ELECTIVE VI	3	
ENG 368, ENG 371, OR ENG 371 TECHNICAL /BUSINESS WRITING (W)	3	
FREE ELECTIVES (8 CREDITS§)		
FREE ELECTIVE (STA 200 RECOMMENDED)	3	
FREE ELECTIVE	3	
FREE ELECTIVE	2	

MATHEMATICS CORE REQUIREMENTS (18 CREDITS)	CREDITS	SEMESTER
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	
BS STATISTICS CONCENTRATION COURSES (30 CREDITS)		
MAT 125 STATISTICS I	3	
STA 311 STATISTICAL COMPUTING	3	
STA 319 APPLIED STATISTICS	3	
STA 320 EXPERIMENTAL DESIGN	3	
STA 321 TOPICS IN ADVANCED STATISTICS	3	
MAT 343 DIFFERENTIAL EQUATIONS	3	
STA 419 BASICS OF STATISTICAL LEARNING	3	
MAT 421 MATHEMATICAL STATISTICS I	3	
MAT 422 MATHEMATICAL STATISTICS II	3	
STA 490 CAPSTONE COURSE IN STATISTICS	3	
MAT/STA ELECTIVES (6 CREDITS)		
FREE MAT/STA ELECTIVE*	3	
FREE MAT/STA ELECTIVE*	3	

GENERAL EDUCATION NOTES:
- § WRT 123 IS A 4-CREDIT COURSE, SO THE FOURTH CREDIT COUNTS AS A FREE ELECTIVE.
- • TRANSFER STUDENTS SHOULD REFER TO THE CATALOG FOR GENERAL EDUCATION REQUIREMENTS.
- • STUDENTS ARE ENCOURAGED TO TAKE COURSES THAT MEET MULTIPLE REQUIREMENTS, FOR EXAMPLE, COURSES THAT ARE BOTH "W" AND "J" COURSES.

PROGRAM SPECIFIC NOTES:
- * MUST BE APPROVED BY ADVISOR AND MAY BE AN INTERNSHIP

B.S. Mathematics: Statistics
Sample Course Plan
Students Admitted Fall 2020/Spring 2021

Year	Fall	Spring
1	FYE MAT 125 MAT 161 WRT 120/ WRT 123 Gen Ed Humanities	MAT 162 MAT 200 Free Elective (STA 200 Recommended) Gen Ed Science Gen Ed Behavioral/Social Science
2	MAT 261 MAT 311 WRT 200-level Free Elective Supplemental Elective I	STA 311 STA 319 MAT 343 Gen Ed Arts Supplemental Elective II
3	STA 320 STA 419 MAT 421 IW Course Supplemental Elective III	STA 321 MAT 422 ENG 368 (W) Gen Ed Behavioral/Social Science Supplemental Elective IV
4	STA 490 JW Course Supplemental Elective V Supplemental Elective VI Gen Ed Humanities	Elective in MAT/STA* Elective in MAT/STA* Gen Ed Science Elective Free Elective

General Education Notes:
- Transfer Students Should Refer to the Catalog for General Education Requirements.
- Students are encouraged to take courses that meet multiple requirements, for example, courses that are both "W" and "J" courses.
- Writing Emphasis Courses: Two "W" courses in addition to ENG 368, ENG 371, or ENG 375.
- Speaking Emphasis Courses: Two "S" courses in addition to SPK 230.
- Ethics Requirement: One "E" course.

Program Specific Notes
- * Must be approved by advisor and may be an internship.

Minor Programs

Minor in Mathematics (21 Credits)

Required Courses (15 credits)

    MAT 161 Calculus I (4 credits)
    MAT 162 Calculus II (4 credits)
    MAT 261 Calculus III (4 credits)
    MAT 311 Linear Algebra (3 credits)

Approved Electives (6 credits)

    Any two courses in mathematics with course numbers above 311 with the exception of those courses with a primary focus on teacher education or those courses restricted to students majoring in elementary education.

In this minor, a student must earn a minimum grade of C- in each course and have an average of at least 2.0 over all the courses taken in the minor.

Minor in Mathematics: Grades PreK-8 (24 credits)

Required Courses

    MAT 101 Mathematics for Teachers of Children I (3 credits)
    MAT 102 Mathematics for Teachers of Children II (3 credits)
    MAT 121 Statistics (3 credits)
    MAT 312 Algebra for Teachers in Grades 4-8 (3 credits)
    MAT 313 Geometry for Teachers in Grades 4-8 (3 credits)
    MAT 351 Methods for Teaching Children Mathematics (3 credits)
    MAT 353 Methods for Teaching Middle School Mathematics (3 credits)
    MAT 390 Seminar in Mathematics Education (3 credits)

In this minor, a student must earn a minimum grade of C- in each course and have an average of at least 2.0 over all the courses taken in the minor.

Minor in Applied Statistics (18 credits)
Required Courses
Complete one of the following calculus courses: (3 or 4 credits)

MAT 143 Brief Calculus (3 credits)
MAT 145 Calculus for the Life Sciences (3 credits)
MAT 161 Calculus I (4 credits)

Complete one of the following courses:

MAT 125 Introduction to Statistics and Probability (3 credits)
MAT 121 Introduction to Statistics 1 (3 credits)
ECO 251 Quantitative Business Analysis I (3 credits)

Complete the following course:

STA 200 Introduction to Statistics II

Complete at least one of the following:

STA 311 Intro Statistical Computing and Data Management (3 credits)
STA 319 Applied Statistics (3 credits)
STA 320 Experimental Design (3 credits)
MAT 421 Mathematical Statistics I (3 credits)

Elective Courses
Select from the following courses as necessary to complete a total of 18 credits:

BIO 310 Biostatistical Applications (3 credits)
CSC 321 Data Base Management Systems (3 credits)
CSC 241 Data Structures and Algorithms (3 credits)
ECO 351 Quantitative Business Analysis II (3 credits)
ECO 401 Introduction to Econometrics (3 credits)
GEO 326 Geographical Analysis (3 credits)
HEA 419 Research Methods in Health (3 credits)
MAT 421 Mathematical Statistics I (3 credits)
MIS 300 Introduction to Management Information Systems (3 credits)
MKT 360 Marketing Research (3 credits)
PPD 481 Drug Design I (3 credits)
PSY 245 Statistics for the Behavioral Sciences (3 credits)
PSY 246 Research Methods in Psychology (3 credits)
STA 201 Statistical Methods for Political Polling (3 credits)
STA 202 Sports Analytics (3 credits)
STA 203 Probability and Statistics in Gaming (3 credits)
STA 311 Intro Statistical Computing and Data Management (3 credits)
STA 319 Applied Statistics (3 credits)
STA 320 Experimental Design

In this minor, a student must earn a minimum grade of C- in each course and have an average of at least 2.0 overall the courses taken in the minor

Interdisciplinary Minor in Computational Science (21 credits)
Required Fundamental Courses

      MAT   161   Calculus I (4 credits)
      MAT   162   Calculus II (4 credits)
      PHY   170   Physics I (4 credits)

Required Computational Courses [1,2]

      MAT   325   Numerical Analysis 1 (3 credits)
      CSC   141   Computer Science 1 (3 credits)
      PHY   175   Computational Physics (3 credits)

Total Minimum Credits Required (21)

1. **Internship:** A 3 credit hour internship with sufficient computational component could replace one of the three core computational courses after approval from the program coordinator.
2. **Grade Requirement:** Students need to earn in each of the three computational courses, MAT325, PY175, CSC141 of the minor, a grade of B or higher.

Calendar of Planned Course Offerings

Developmental and 100-Level Courses				
Course	**Semester or Session Offered**			
	Fall	**Spring**	**Summer**	**Winter**
MAT Q20	√	√	√	
MAT Q30	√	√	√	
MAT 101	√	√	√	
MAT 102	√	√	√	
MAT 103	√	√	√	√
MAT 104	√	√	√	
MAT 113	√	√	√	
MAT 115	√	√		
MAT 121	√	√	√	√
MAT 125	√	√		
MAT 131	√	√	√	
MAT 143	√	√	√	
MAT 145	√	√		
MAT 151	√	√	√	
MAT 161	√	√	√	
MAT 162	√	√	√	

200-Level Courses				
Course	**Semester Offered***			
	Fall Even Numbered Years	**Spring Odd Numbered Years**	**Fall Odd Numbered Years**	**Spring Even Numbered Years**
MAT 200	√	√	√	√
MAT 261§	√	√	√	√
STA 200§	√	√	√	√
STA 201	√			
STA 202			√	
STA 203				√

§Also offered in Summer.

300-Level Courses				
	Semester Offered*			
Course	Fall Even Numbered Years	Spring Odd Numbered Years	Fall Odd Numbered Years	Spring Even Numbered Years
MAT 311§	√	√	√	√
MAT 312		√		√
MAT 313	√		√	
MAT 315		√		√
MAT 321			√	
MAT 325		√		√
MAT 331		√		√
MAT 343		√		√
MAT 351†	√	√	√	√
MAT 352†	√		√	
MAT 353†	√		√	
MAT 371	√	√	√	√
MAT 390	√	√	√	√
STA 311	√	√	√	√
STA 319	√	√	√	√
STA 320	√		√	
STA 321		√		√

*If there is sufficient demand, 300-level courses will be offered during the summer.

§Also offered in Summer.

†MAT 351, MAT 352 and MAT 353 are offered during a special session from mid-May to mid-June.

400-Level Courses				
Course	**Semester Offered***			
	Fall Even Numbered Years	**Spring Odd Numbered Years**	**Fall Odd Numbered Years**	**Spring Even Numbered Years**
MAT 401	√	√	√	√
MAT 411	√	√	√	√
MAT 412		√		√
MAT 413	√		√	
MAT 414		√		√
MAT 415		√		√
MAT 421	√	√	√	√
MAT 422		√		√
MAT 423		√		√
MAT 425	√		√	
MAT 427			√	
MAT 432		√		
MAT 441	√	√	√	√
MAT 442	√		√	
MAT 443		√		√
MAT 445	√		√	
MAT 455		√		√
MAT 478		√		√
MAT 479		√		√
MAT 493	√		√	
STA 419	√		√	
STA 490	√		√	

*If there is sufficient demand, 400 level courses will be offered during the summer.

†MAT 351, MAT 352 and MAT 353 are offered during a special session from mid-May to mid-June.

Placement of Electives in Groups

Algebra	Analysis	Applied Mathematics
MAT 321 Combinatorics MAT 412 Algebra II MAT 414 Number Theory *MAT 415 Introduction to Cryptography§§*	MAT 343 *Differential Equations*** MAT 432 Topology MAT 442 Real Analysis II MAT 443 Applied Analysis I MAT 444 Applied Analysis II MAT 445 Complex Variables	MAT 325 Computational Mathematics *MAT 343 Differential Equations*** MAT 371 Mathematics of Finance MAT 413 Computer Algebra *MAT 415 Introduction to Cryptography§§* MAT 422 Mathematical Statistics II MAT 423 Applied Probability MAT 425 Numerical Analysis MAT 427 Optimization MAT 478 Fundamentals of Actuarial Science MAT 479 Financial Calculus MAT 493 Modeling STA 319 Applied Statistics

MAT 343 **cannot be credited to both areas.
§§MAT 415 **cannot** be credited to both areas.

Other Upper-Division Electives:

> MAT 332 Differential Geometry
> MAT 401 History of Mathematics
> MAT 405 Special Topics in Mathematics
> MAT 432 Topology
> MAT 490 Seminar in Mathematics

Note: Mathematics courses designed for education majors or as general education courses may not count as mathematics electives, namely, MAT 301, MAT 302, MAT 309, MAT 312, MAT 313, MAT 350, MAT 351, MAT 352, MAT 353, MAT 354, MAT 360, MAT 364, and MAT 390.

Special Opportunities for Undergraduates

Accelerated, 3 + 2 Graduate Programs

The Department offers four accelerated, 3+2 graduate programs for capable and motivated students. These programs allow students to complete their baccalaureate and master's degree in five years comprised of three years of undergraduate study followed by two years of graduate study. Accelerated programs are offered in:

- Mathematics B.A. - M.A. in Mathematics Accelerated Program
- Mathematics B.S. - Applied and Computational Mathematics Concentration to M.S. in Applied and Computational Mathematics Accelerated Program
- Mathematics B.S. - Mathematics Concentration to M.A. in Mathematics Accelerated Program
- Mathematics B.S. - Statistics Concentration to M.S. in Applied Statistics Accelerated Program

For program requirements and sample course plans see:
> http://catalog.wcupa.edu/general-information/index-course-prefix-guide/program-index/

Actuarial Science Recognition

Most students in the Actuarial Science program take preliminary exams of the Society of Actuaries (SOA). Our courses prepare students fully for the Probability (P) exam, the Financial Mathematics (FM) exam, and the Statistics of Risk Modeling* (SRM) exams. In addition, we have several courses that contain material to prepare students for both the Short- and Long- Term Actuarial Mathematics* (STAM and LTAM) exams, the Financial Markets (IFM) exam and the Predictive Analytics* (PA) exam. We also have courses which will earn students Validation by Educational Experience (VEE) credit from the SOA. As an incentive for passing an actuarial exam, our students receive the *Actuarial Recognition Award*, a $100 cash award, and recognition at our Annual Awards Banquet. (*These are new exams of the SOA and will be offered for the first time after July 2018.)

Annual Actuarial Science and Mathematics Interview Day

West Chester University and Arcadia University co-host our Annual Actuarial Science and Mathematics Interview Day each September. At this event, WCU students interview for internships and jobs in the actuarial or other related fields. Alumni of the program often interview our students. Participating companies often include: Penn Mutual, TransAmerica, Willis Towers Watson, LTCG, Lincoln Financial Group, Voya, Venerable, Independence Blue Cross, Aon, and CBIZ.

Cayman Islands Summer Experience

Actuarial Science and Mathematical Finance majors can enroll in summer courses at the University College of the Cayman Islands. Students take either HIS 120, Caymanian Society, or HIS 121, Survey of Caribbean History, both of which count as Diversity "J" courses and for their second course students select one of:

ENG 231 Business Communication – [Transfers as ENG 368]
ACC 121 Introduction to Accounting – [Transfers as ACC 201]
ECO 221 Principles of Microeconomics – [Transfers as ECO 111]
ECO 222 Principles of Macroeconomics – [Transfers as ECO 112]

Research Experiences for Undergraduates (REU)

Summer research programs for undergraduate mathematics students are available at various sites across the country. These are particularly valuable for students who are considering graduate school, and the summer following the junior year is an ideal time to participate. Application deadlines typically fall in February or March, and most programs provide a stipend. More information about specific programs is available from the American Mathematical Society at http://www.ams.org/programs/students/emp-reu and the National Science Foundation at https://www.nsf.gov/crssprgm/reu/.

Recommended Preparation for Graduate Study

Recommended Mathematics Courses

The following courses are recommended for students intending to enter a graduate program in pure or applied mathematics:

MAT 343 Differential Equations
MAT 412 Algebra II
MAT 414 Theory of Numbers
MAT 421 Mathematical Statistics I
MAT 422 Mathematical Statistics II
MAT 432 Topology
MAT 442 Real Analysis II (or MAT 444 Applied Analysis II)
MAT 445 Complex Variables

Recommended Computer Science Courses

Mathematics and statistics majors generally are encouraged to take courses in computer science. The following courses are recommended.

CSC 141 Computer Science I
CSC 142 Computer Science II
CSC 240 Computer Science III
CSC 241 Data Structures & Algorithms
CSC 321 Database Management Systems

General Department Information

Advanced Placement Credit
The University's policy for granting credit is as follows:

AP Course	AP SCORE	Credits Awarded	Credit Given For
Calculus AB	3	3	MAT 143(Formerly MAT 108) or MAT 145 (for BIO majors)
Calculus AB	4, 5	4	MAT 161

Calculus BC
    Calculus AB Sub-score
    Calculus BC Score
	
	4, 5
	4, 5
		
		4
		4
			
			MAT 161
			MAT 162

Statistics	3	3	MAT 121
Statistics	4, 5	3	MAT 125

Computer Labs
The Mathematics Department has two computer labs, UNA 103 and UNA 109. These computers have all the mathematics software needed for classes. Mathematics majors can obtain access to these labs Monday through Friday 8 a.m.-10 p.m.

Individualized Instruction
Individualized instruction is the teaching of a regular, listed catalog course to a single student. Individualized instruction is offered only when the University has cancelled or failed to offer a course according to schedule. The Individualized Instruction Form is available from the Registrar's Office web page.

Independent Study
Qualified students may take a course on an independent study basis. This alternative is appropriate when a student has a specialized and compelling interest that cannot be pursued within the framework of a regular course. A GPA of at least 2.00 both overall and within the student's major are required. Independent Study Forms may be obtained from the Registrar's Office web page.

Mathematics Colloquia
The Department of Mathematics frequently hosts a colloquia on important topics in mathematics or mathematics education. The talks are presented by our faculty, visiting faculty members, former students, and sometimes even current upper-class undergraduate or graduate students.

Pi Mu Epsilon
Pi Mu Epsilon is a national mathematics honor society. Induction is by invitation based on mathematics GPA.

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

Tutoring
When you need help, you should first visit your professor during his/her office hours. These office hours are posted on the bulletin boards throughout 25 University Avenue and on the instructor's course syllabus.

Free tutoring is also usually available to mathematics students. The tutors often are undergraduate or graduate mathematics majors. The tutoring hours are posted on the door of room 105 of 25 University Avenue and on the bulletin boards throughout the mathematics building

University Avenue Mathematics Club (formally Anderson Math Club)
The University Avenue Mathematics Club is open for all Mathematics and Mathematics education majors to join. Meeting times are posted on bulletin boards of 25 University Avenue. The Club exists to help promote social and academic activities for our majors. Activities include: speakers on careers in mathematics; an open forum with current student teachers; visits to schools or to regional mathematics or mathematics education activities; the annual Thanksgiving Dinner, in which 25 UNA Mathematics Club students prepare a Potluck dinner for current and retired mathematics and mathematics education faculty.

The Department's Scholarship/Award Programs

The Department of Mathematics Scholarship Program was founded in 1974 by Dr. James L'heureux. The scholarships and awards are given annually at an awards ceremony held each fall. The ceremony is attended by faculty, award recipients, friends, and family members.

The Mathematics Scholarship (1974)
The Mathematics Scholarship was created in 1974 by the faculty of the Department of Mathematical Sciences. The initial purpose was to raise funds for an endowment that would generate enough interest to provide several monetary awards to undergraduate majors of the department for their high academic achievements.

Class of '43 Scholarship (1991)
Two class members of the Class of 1943, Jean Stevenson and Oreste Leto established this fund in celebration of their 50th Class Reunion.

Mark Weiner Memorial Scholarship (1992)
Mark Wiener was a Professor of Mathematics, Mathematics Education, and Computer Education at West Chester University. He was the sponsor of the Anderson Math Club and was President of the Association of Teachers of Mathematics of Philadelphia and Vicinity (ATMOPAV).

Michael P. Montemuro Memorial Scholarship (1998)
Dr. Michael P. Montemuro, who served as Chair of the Department of Mathematics and Professor of Mathematics, was a member of the University faculty for 34 years. He was very active in the faculty union and served as president of ASPCUF for 18 years. Dr. Montemuro received the Distinguished APSCUF Service Award, the West Chester University Presidential Service Award, and was coach of the University ski team.

Dr. and Mrs. Albert E. Filano Mathematics Scholarship (2000)
Dr. Albert E. Filano was a long-serving faculty member and administrator, serving the University for more than 35 years as Professor of Mathematics, Department Chair, Division Director, Academic Vice President, Interim President and advisor to the Newman Center. The scholarship fund was established as part of the naming of Filano Hall dedicated on August 19, 2000, the couple's 50th wedding anniversary.

Benjamin E. Faber Endowed Scholarship (2002)
This scholarship was created by George and Karin Faber, parents of Benjamin, after his death in an automobile accident on October 30, 2001, when a deer struck his car. Ben was a 1996 graduate of Unionville High School. He received an associate degree with honors from Delaware County Community College and was a senior at West Chester University pursuing both mathematics and physics. Ben was also a member of Phi Theta Kappa national honor fraternity. Ben earned the rank of Eagle Scout while a member of Troop 22.

Applied Statistics Endowment (2008)
The Applied Statistics Graduate Degree Program was created in Fall of 2003 and this fund was created to provide an award to graduate students in the Program who have shown exceptional academic achievement in their studies.

Frank Milliman Endowed Scholarship (2008)
For 48 years Professor Frank Milliman taught, mentored, and advised thousands of West Chester University students. Among his former students, one can easily find university professors, professional mathematicians, actuaries, and literally hundreds of current secondary school mathematics teachers who constantly tell us how they strive to teach mathematics, to assess student achievement (with high standards), and to be available for students the way Professor Milliman was for them. Professor Milliman's name will always be synonymous with the Department of Mathematics.

Mary Pinder Nunan '43 Endowed Scholarship (2015)
When Mary Pinder was a junior at West Chester State Teachers College she won a mathematics award for excellence. This event, in the spring of 1942, had a great impact on Mary and she always knew that one day she would create her own scholarship for West Chester mathematics majors. In the spring of her senior year, her dean asked her if she would be willing to substitute teach math at Pierre S. du Pont High School in Delaware. Mary accepted the position and took the bus from outside (Old) Main Hall to Delaware every day to teach. In May, Mary attended her West Chester graduation and returned to du Pont Monday, as its school year did not end until mid-June. She graduated with the highest honors and three majors: mathematics, English, and social studies.

Actuarial Science Award Fund (2016)
Established by the Department of Mathematics, the purpose of this fund is twofold: (a) to reimburse, either partially or fully, those West Chester students who have passed one of the actuarial examinations offered by the Society of Actuaries, Casualty Actuarial Society, or other certifying organization; and (b) to recognize excellence in actuarial science.

Class of 1963 Scholarship for Promising Math Education Majors (2016)
Jim Rubillo credits Albert E. Filano and Frank Milliman for recognizing and supporting students who demonstrated promise in mathematics education. After graduating in 1963, Jim embarked on a 47 year career in public education. He remained active within several mathematics professional associations at the state and national levels and provided teacher professional development programs in fifty states and across Canada. Most recently, Jim served as the Executive Director of the National Council of Teachers of Mathematics (NCTM) for eight years. Jim received the Ross Taylor/Glenn Gilbert National Leadership Award of the National Council of Supervisors of Mathematics, and the NCTM Lifetime Achievement Award for Distinguished Service to Mathematics Education. Jim also received the University's Distinguished Alumni Award and an honorary Doctor of Science degree. This scholarship awards a math education senior who demonstrates leadership and excellence in mathematics education courses.

Grosshans Hirsch Applied Mathematics Endowment (2016)
Dr. Michael Hirsch graduated in 1996 with a Bachelor of Arts in Mathematics and Computer Science. He later attained a Masters in Applied Mathematics from the University of Delaware and a Doctor of Philosophy in Operations Research from the University of Florida. Dr. Hirsch credits Dr. Frank Grosshans, an accomplished West Chester University faculty member and mathematician, for introducing him to the government defense field, where he has spent over 20 years developing solutions for both defense and commercial problems. Today, Michael is the owner and President of ISEA TEK (Industrial & Systems Engineering Analysis Technologies). This scholarship recognizes a mathematics major who demonstrates potential and excellence in several core mathematics courses.

Katherine Smith Math Endowment (2016)
Katherine Smith graduated from West Chester University in 2011 with a Bachelor of Science in Mathematics Education. Katherine's father, Richard, and mother, Patricia who is a 1977 West Chester University alumna, established this scholarship in honor of their daughter. This scholarship recognizes a student majoring in mathematics who demonstrates high academic achievement in the view of mathematics faculty.

M.S. Applied Statistics Fund (2016)
Established following the generous contribution of alumna. April Taylor M'11, this fund offers support for programming, speakers or events that enhance the experience of students and alumni of the Applied Statistics Graduate Program.

James L'heureux Scholarship (2017)
Dr. James L'heureux joined the faculty of West Chester State College in 1969. In 1974, Professors L'heureux, Branton, Morgan, and Verno raised $112 from selling books, which marked the beginning of the Mathematics Scholarship Fund. Under the leadership of Dr. L'heureux, this fund grew to over $100,000 by his retirement in 2000 and today it has a balance of well over $640,000. In addition to the Mathematics Scholarship Fund, Dr. L'heureux also encouraged friends of the Department to establish other scholarship funds for our students. The L'heureux Endowment was established by colleagues of Dr. L'heureux in recognition of and gratitude for all he has done for the Department and our students.

Catalog Descriptions of Mathematics Courses

MAT Q20. Fundamental Skills in Arithmetic. 3 Credits.
This course is designed to strengthen basic arithmetic skills and to introduce the elements of algebra. Mathematics placement required. Credits earned in Q00-level courses do not count toward the 120 hours of credit needed for graduation.
Pre / Co requisites: MAT Q20 requires a prerequisite of an appropriate score on the Mathematics Placement Examination.
Typically offered in Fall, Spring & Summer.

MAT Q30. Fundamentals of Algebra. 3 Credits.
This course is designed to strengthen basic algebraic skills. Credits earned in Q00-level courses do not count toward the 120 hours of credit needed for graduation.
Pre / Co requisites: MAT Q30 requires an appropriate score on the Mathematics Placement Examination.
Typically offered in Fall, Spring & Summer.

MAT 101. Mathematics for Teachers of Children I. 3 Credits.
Sets; functions; logic; development of whole numbers, integers, and rationals (including ratios, proportions, and percents); number theory; problem solving. For students seeking Certification in Grades PK-4 or 4-8 only.
Pre / Co requisites: MAT 101 requires a grade of C- or better in MAT Q20 or an appropriate score on the Mathematics Placement Examination.
Typically offered in Fall, Spring & Summer.

MAT 102. Mathematics for Teachers of Children II. 3 Credits.
Development of real numbers; geometry; measurement; probability and statistics; problem solving. For students seeking Certification in Grades PK-4 or 4-8 only.
Pre / Co requisites: MAT 102 requires prerequisite of MAT 101.
Typically offered in Fall, Spring & Summer.

MAT 103. Introduction to Mathematics. 3 Credits.
This course is a liberal arts introduction to the nature of mathematics. Topics are chosen from among logic, graph theory, number theory, symmetry (group theory), probability, statistics, infinite sets, geometry, game theory, and linear programming. These topics are independent of each other and have as prerequisite the ability to read, reason, and follow a logical argument.
Pre / Co requisites: MAT 103 requires a prerequisite of a grade of C- or better in MAT Q20 or an appropriate score on the Mathematics Placement Examination.
Distance education offering may be available.
Typically offered in Fall, Spring, Summer, Winter.

MAT 104. Introduction to Applied Mathematics. 3 Credits.
The course is designed to help prepare students to understand almost any quantitative issues they will encounter in contemporary society. Topics are selected from the following: principles of reasoning, problem-solving tools, financial management, exponential growth and decay, probability, putting statistics to work, mathematics and the arts, discrete mathematics in business and society and the power of numbers.
Pre / Co requisites: MAT 104 requires a prerequisite of a grade of C- or better in MAT Q20 or an appropriate score on the Mathematics Placement Examination.
Typically offered in Fall, Spring & Summer.

MAT 113. Algebra and Functions. 3 Credits.
A review of basic algebra, followed by a thorough treatment of polynomial, rational, exponential, and logarithmic functions. Successful completion of this course prepares students for MAT 143.
Pre / Co requisites: MAT 113 requires a prerequisite of a grade of C- or better in MAT Q30 or an appropriate score on the Mathematics Placement Examination.
Typically offered in Fall, Spring & Summer.

MAT 115. Algebra, Functions, and Trigonometry. 3 Credits.
Topics include polynomial, rational, exponential, logarithmic, and trigonometric functions. An emphasis is placed on using technology to understand topics of importance in the life and earth sciences. Successful completion of this course prepares students for MAT 143 or MAT 145.
Pre / Co requisites: MAT 115 requires a grade of C- or better in MAT Q30 or an appropriate score on the Mathematics Placement Examination.
Typically offered in Fall & Spring.

MAT 121. Introduction to Statistics I. 3 Credits.
Introduction to statistics and statistical inference. Concepts include: descriptive statistics, sampling distributions, confidence intervals, hypothesis testing, along with a formal introduction to linear regression and categorical data analysis. Statistical software including, but not limited to SPSS and Excel, will be used to facilitate the understanding of important statistical ideas and for the implementation of data analysis in many areas of application.
Pre / Co requisites: MAT 121 requires a prerequisite of a grade of C- or better in MAT Q20 or an appropriate score on the Mathematics Placement Examination.
Distance education offering may be available.
Typically offered in Fall, Spring, Summer, Winter.

MAT 125. Introduction to Statistics and Probability. 3 Credits.
Introduction to probability, statistics, and statistical inference. Concepts include: descriptive statistics, probability, probability distributions, sampling distributions, confidence intervals, hypothesis testing, along with a formal introduction to linear regression and categorical data analysis. Statistical software, including but not limited to SPSS and Excel, will be used to facilitate the understanding of important statistical ideas and for the implementation of data analysis in many areas of application.
Pre / Co requisites: MAT 125 requires an appropriate score on the Mathematics Placement Exam.

MAT 131. Precalculus. 3 Credits.
Topics include polynomial, rational, exponential, logarithmic, and trigonometric functions. An emphasis is placed on understanding function properties and graphs without the use of technology. Successful completion of this course prepares students for MAT 161.
Pre / Co requisites: MAT 131 requires a prerequisite of a grade of C- or better in MAT Q30 or an appropriate score on the Mathematics Placement Examination.
Typically offered in Fall, Spring & Summer.

MAT 143. Brief Calculus. 3 Credits.
An intuitive approach to calculus with emphasis on conceptual understanding and applications to business. Topics include differentiation, curve-sketching, optimization, integration, and partial derivatives.
Pre / Co requisites: MAT 143 requires a prerequisite of a grade of C- or better in MAT 113, MAT 115, or MAT 131; or an appropriate score on the Mathematics Placement Examination.
Typically offered in Fall, Spring & Summer.

MAT 145. Calculus for the Life Sciences. 3 Credits.
An overview of differential and integral calculus, motivated through biological problems. Topics include mathematical modeling with functions, limits, continuity, differentiation, optimization, and integration. Graphing calculators are used as an aid in the application of calculus concepts and methods to realistic biological problems.
Pre / Co requisites: MAT 145 requires a prerequisite of a grade of C or better in MAT 115 or MAT 131; or an appropriate score on the Mathematics Placement Examination.
Typically offered in Fall & Spring.

MAT 151. Introduction to Discrete Mathematics. 3 Credits.
Set theory, Boolean logic, elementary combinatorics, proofs, simple graph theory, and simple probability.
Pre / Co requisites: MAT 151 requires a prerequisite of a grade of C- or better in MAT Q30 or an appropriate score on the Mathematics Placement Examination.
Typically offered in Fall, Spring & Summer.

MAT 161. Calculus I. 4 Credits.
Differential and integral calculus of real-valued functions of a single real variable with applications.
Pre / Co requisites: MAT 161 requires prerequisites of a C or better in MAT 131 or an appropriate score on the Mathematics Placement Examination.
Typically offered in Fall, Spring & Summer.

MAT 162. Calculus II. 4 Credits.
Continuation of MAT 161 including the study of series, methods of integration, transcendental functions, and applications to the sciences.
Pre / Co requisites: MAT 162 requires prerequisite of C or better in MAT 161.
Typically offered in Fall, Spring & Summer.

MAT 190. Topics in Mathematics. 3 Credits.
Topics announced at time of offering.
Consent: Permission of the Department required to add.

MAT 200. The Nature of Mathematics. 3 Credits.
Topics include the role of mathematics in contemporary society, career opportunities, mathematical notation and argument, structure of proofs, basic facts about logic, mathematical proofs, problem-solving techniques, and introductions to mathematical software packages.
Pre / Co requisites: MAT 200 requires a prerequisite of C or better in MAT 161. Course should be taken by the end of sophomore year.
Typically offered in Fall, Spring & Summer.

MAT 201. Elementary Functions Essential Calculus I. 3 Credits.
Elementary functions from an advanced viewpoint with detailed discussion of formal manipulations. Special emphasis on applications and the use of technology. Open only to prospective Grade 4-8 certification students.
Pre / Co requisites: MAT 201 requires prerequisite MAT 102.

MAT 202. Elementary Functions and Essential Calculus II. 3 Credits.
Elementary functions from an advanced viewpoint with detailed discussions of formal manipulations. Special emphasis on applications and the use of technology. Open only to prospective Grade 4-8 certification students.
Pre / Co requisites: MAT 202 requires prerequisite MAT 201.

MAT 203. Elementary Functions and Essential Calculus II. 3 Credits.
Continued discussion of elementary functions. Introduction to the intuitive ideas of derivative and integral with applications.
Pre / Co requisites: MAT 203 requires prerequisite of MAT 202.

MAT 243. Calculus and Linear Algebra for Applied Statistics. 4 Credits.
This course is designed to survey concepts from calculus and linear algebra that are relevant to the study of applied statistics. Topics include a review of differentiation and the Fundamental Theorem of Calculus, techniques and applications of integration, infinite series, partial derivatives, multiple integrals, matrix operations, linear transformations, and eigenvectors.
Pre / Co requisites: MAT 243 requires a prerequisite of a C or higher in MAT 143 or MAT 161 or equivalent.
Typically offered in Spring & Summer.

MAT 261. Calculus III. 4 Credits.
The calculus of several variables. Topics include polar coordinates, vectors and three-dimensional analytic geometry, differentiation of functions of several variables, multiple integrals, and line and surface integrals.
Pre / Co requisites: MAT 261 requires a prerequisite of MAT 162 with a C or better.
Typically offered in Fall, Spring & Summer.

MAT 301. The Scientific Revolution. 3 Credits.
This course addresses how modern science began in the 17th century by examining its origins and including introductions to the heroes of science - Copernicus, Kepler, Galileo, and Newton.
Typically offered in Fall & Spring.

MAT 302. Mathematics and Social Justice. 3 Credits.
In this course we will explore several social issues and we will discuss methods which can quantitatively illustrate that are taking place. By doing so, the hope is that each student will learn mathematical skills and techniques. This tool kit of basic mathematical skills is often referred to as Quantitative Literacy (QL). Moreover as attainment of QL is itself a social justice issue, we will explore ways to carry these skills to historically marginalized groups through service learning projects.

MAT 309. Topics in Math for Elementary Teachers. 3 Credits.
Introduction to programming in BASIC; computer uses for the classroom teacher; descriptive statistics with applications for teaching; and measurements of length, area, volume, and temperature that focus on the SI metric system with practice in the classroom. Additional topics in applied mathematics will be considered.
Pre / Co requisites: MAT 309 requires prerequisite of MAT 102.
Repeatable for Credit.

MAT 311. Linear Algebra. 3 Credits.
An introduction to linear algebra. Topics covered include matrices, systems of linear equations, vector spaces, linear transformation, determinants, eigenvalues, spectral theorem, and triangulation.
Pre / Co requisites: MAT 311 requires Concurrent or Prerequisite of MAT 162.
Typically offered in Fall, Spring & Summer.

MAT 312. Algebra for Teachers in Grades 4-8. 3 Credits.
Formal structure of groups, rings, and fields with examples from the elementary curriculum. Topics from linear algebra including matrices, determinants, and linear programming.
Pre / Co requisites: MAT 312 requires prerequisite of MAT 102.
Typically offered in Spring.

MAT 313. Geometry for Teachers in Grades 4-8. 3 Credits.
Modern informal approach to two- and three-dimensional geometric figures, measurement, similarity, congruence, coordinate geometry, and the postulational method.
Pre / Co requisites: MAT 313 requires prerequisite of MAT 102.
Typically offered in Fall.

MAT 315. Differential Equations and Linear Algebra. 3 Credits.
An introduction to linear algebra and differential equations. Topics include matrices, vector spaces, linear dependence, determinant, eigenvalues and eigenvectors, ordinary differential equations, initial value problems, and systems of linear ordinary differential equations. Applications to physics and engineering will be emphasized.
Pre / Co requisites: MAT 315 requires a prerequisite of C or better in MAT 162.
Typically offered in Spring.

MAT 321. Combinatorics and Graph Theory. 3 Credits.
Introduction to set theory, graph theory, and combinatorial analysis. Includes relations, cardinality, elementary combinatorics, principles of inclusion and exclusion, recurrence relations, zero-one matrices, partitions, and Polya's Theorem.
Pre / Co requisites: MAT 321 requires prerequisites of C or better in MAT 162 and MAT 200..

MAT 325. Numerical Analysis I. 3 Credits.
A basic introduction to numerical analysis and scientific computing. Topics which will be studied include: Computer arithmetic, approximation and interpolation of functions, numerical quadratures, solutions of linear systems by direct methods, numerical solutions of nonlinear scalar equations, numerical differentiation, introduction to one step methods for the numerical solution of ordinary differential equations.
Pre / Co requisites: MAT 325 requires a prerequisite of MAT 162 with a "C" or better.
Typically offered in Spring.

MAT 331. Foundations of Geometry. 3 Credits.
Geometric foundations from an advanced viewpoint. Topics are chosen from euclidean and noneuclidean geometrics.
Pre / Co requisites: MAT 331 requires prerequisite of C or better in MAT 162.
Typically offered in Spring.

MAT 332. Differential Geometry. 3 Credits.
Classical differential geometry from a modern viewpoint. Curves and surfaces and shape operators. Introduction to Riemann geometry.
Pre / Co requisites: MAT 332 requires prerequisites of C or better in MAT 200, MAT 261 and MAT 331.

MAT 343. Differential Equations. 3 Credits.
The general theory of nth order, and linear differential equations including existence and uniqueness criteria and linearity of the solution space. General solution techniques for variable coefficient equations, series solutions for variable coefficient equations, and study of systems of linear equations.
Pre / Co requisites: MAT 343 requires a prerequisite of C or better in MAT 162 and MAT 311.
Typically offered in Fall & Spring.

MAT 351. Methods for Teaching Children Math. 3 Credits.
In-depth treatment of current pedagogical strategies and materials for teaching concepts, including: early number sense; place value; addition, subtraction, multiplication, and division of whole numbers; and fractions in an elementary classroom.
Pre / Co requisites: MAT 351 requires prerequisites of MAT 101 and MAT 102.
Typically offered in Fall & Spring.

MAT 352. Methods for Teaching Children Mathematics II. 3 Credits.
A continuation of the pedagogical strategies and methods for teaching the topics covered in MAT 351 extended to topics such as real numbers, geometry, percent, proportional reasoning, measurement, and algebra.
Pre / Co requisites: MAT 352 requires prerequisites of MAT 351, field clearances, and Teacher Candidacy.
Typically offered in Fall.

MAT 353. Methods for Teaching Middle School Mathematics. 3 Credits.
Techniques for teaching children mathematical concepts in the middle school standards.
Topics covered include number, algebra, geometry, and probability and statistics.
Pre / Co requisites: MAT 353 requires prerequisites of MAT 121, MAT 312, MAT 313,
MAT 351, field clearances, and FATE.
Typically offered in Fall.

MAT 371. Mathematics of Finance. 3 Credits.
The purpose of this course is to introduce the mathematical theory behind the concepts of:
measurement of interest, annuities, yield rates, amortization of loans, sinking funds, and yield
rates. Understanding the fundamental concepts of financial mathematics, and how these
concepts can be applied to calculate present and future values of various financial
instruments, is the prevailing theme of the course.
Pre / Co requisites: MAT 371 requires prerequisite of MAT 162 with a "C" or better.
Typically offered in Fall & Spring.

MAT 390. Seminar in Mathematics Education. 3 Credits.
This course is the capstone course for grades 4-8 certification students completing the 30-
credit mathematics certification option. Topics selected from mathematics, statistics, the
history of mathematics, and mathematics education for their significance and interest. Field
experience may be required.
Pre / Co requisites: MAT 390 requires prerequisite of Formal Admission to Teacher
Education.
Typically offered in Fall & Spring.
Repeatable for Credit.

MAT 400. History of Mathematics for Elementary Teachers. 3 Credits.
History and development of elementary mathematics from primitive times to the discovery of
calculus. Problems of the period are considered.
Pre / Co requisites: MAT 400 requires prerequisites of MAT 312 and MAT 313.

MAT 401. History of Mathematics. 3 Credits.
Development of mathematics from the Babylonian era to the 18th Century. Some modern
topics included.
Pre / Co requisites: MAT 401 requires prerequisite of C or better in MAT 261.
Gen Ed Attribute: Writing Emphasis.
Typically offered in Fall & Spring.

MAT 405. Special Topics in Mathematics. 3 Credits.
Topics announced at the time of offering.
Consent: Permission of the Department required to add.
Repeatable for Credit.

MAT 411. Algebra I. 3 Credits.
Abstract algebra. Algebraic systems, groups, rings, integral domains, and fields.
Pre / Co requisites: MAT 411 requires prerequisites of C or better MAT 200, MAT 261, and
MAT 311.
Typically offered in Fall & Spring.

MAT 412. Algebra II. 3 Credits.
Abstract algebra. Algebraic systems, groups, rings, integral domains, and fields.
Pre / Co requisites: MAT 412 requires prerequisite of C or better in MAT 411.
Typically offered in Spring.

MAT 413. Computer Algebra. 3 Credits.
The focus of this course is to introduce students to computer algebra packages and review important topics in algebra, calculus and linear algebra.
Pre / Co requisites: MAT 413 requires prerequisites of MAT 162 and MAT 311 with a "C" or better.
Typically offered in Fall.

MAT 414. Theory of Numbers. 3 Credits.
Properties of integers; primes, factorization, congruences, and quadratic reciprocity.
Pre / Co requisites: MAT 414 requires prerequisites of C or better in MAT 200 and MAT 261.
Typically offered in Spring.

MAT 415. Introduction to Cryptography. 3 Credits.
An introduction to the mathematics behind various aspects of modern cryptography, including matrix cryptosystems, quadratic ciphers such as the Rabin cipher, exponential ciphers such as the Diffie-Hellman Key Exchange, the RSA algorithm and DES encryption.
Pre / Co requisites: MAT 415 requires prerequisites of MAT 161 and MAT 151 OR MAT 161 and MAT 200.
Typically offered in Spring.

MAT 421. Mathematical Statistics I. 3 Credits.
Probability; discrete distributions; continuous distributions; mathematical expectation; moment generating functions; bivariate distributions; distributions of functions of random variables. Use of appropriate technology.
Pre / Co requisites: MAT 421 requires a prerequisite of C or better in MAT 261 or a corequisite of MAT 261.
Typically offered in Fall & Spring.

MAT 422. Mathematical Statistics II. 3 Credits.
Order statistics; point estimation; interval estimation; tests of statistical hypotheses; statistics power; least squares regression. Use of appropriate technology.
Pre / Co requisites: MAT 422 requires prerequisite of C or better in MAT 421 and either MAT 121 or MAT 125.
Typically offered in Spring.

MAT 423. Applied Probability. 3 Credits.
Standard Concepts and methods of stochastic modeling and applications of stochastic processes.
Pre / Co requisites: MAT 423 requires prerequisites of MAT 261, MAT 311, and MAT 421 with a "C" or better.
Typically offered in Spring.

MAT 425. Numerical Analysis II. 3 Credits.
An examination of advanced topics in numerical analysis and scientific computing. Topics include: Approximation and interpolation of functions, numerical quadratures, matrix norms, iterative methods of numerical linear algebra, numerical solution of nonlinear systems of equations, and methods for the numerical solution of ordinary differential equations.
Pre / Co requisites: MAT 425 requires a prerequisite of C or better in MAT 325.
Typically offered in Fall.

MAT 427. Introduction to Optimization Techniques. 3 Credits.
Nature of optimization problems: deterministic and stochastic, and discrete and continuous. Computer methods of solution, systematic and random search, linear quadratic, dynamic programming, and others.
Pre / Co requisites: MAT 427 requires prerequisites of C or better in MAT 261 and C or better in MAT 311. Typically offered in Fall.

MAT 432. Topology. 3 Credits.
Elements of point set topology. Separation axioms. Connectedness, compactness, and metrizability.
Pre / Co requisites: MAT 432 requires prerequisites of C or better in MAT 200 and MAT 261.
Typically offered in Spring.

MAT 441. Real Analysis I. 3 Credits.
Introduces the real line, limits of sequences, Cauchy sequences, limits of real functions, continuous functions, intermediate value theorem, the derivative, mean value theorems and Riemann integral.
Pre / Co requisites: MAT 441 requires prerequisites of C or better in MAT 200 and MAT 261.
Typically offered in Fall & Spring.

MAT 442. Real Analysis II. 3 Credits.
A continuation of MAT 441. Introduces infinite series, sequences and series of functions, Taylor's Theorem with applications and topics from integration theory.
Pre / Co requisites: MAT 442 requires prerequisite of C or better in MAT 441.
Typically offered in Fall.

MAT 443. Applied Analysis I. 3 Credits.
The techniques of analysis applied to problems in the physical sciences. Topics include partial differential equations, orthogonal functions, complex integration, and conformal mapping.
Pre / Co requisites: MAT 443 requires prerequisite of C or better MAT 261, MAT 311 and MAT 343.
Typically offered in Spring.

MAT 444. Applied Analysis II. 3 Credits.
The techniques of analysis applied to problems in the physical sciences. Topics include partial differential equations, orthogonal functions, complex integration, and conformal mapping.
Pre / Co requisites: MAT 444 requires prerequisite of C or better in MAT 443.

MAT 445. Complex Variables. 3 Credits.
Introduction to functions of a complex variable. Analytic functions, mappings, differentiation and integration, power series, and conformal mappings.
Pre / Co requisites: MAT 445 requires prerequisite of C or better in MAT 261.
Typically offered in Fall.

MAT 455. Industrial Mathematics Practicum. 3 Credits.
This is a case study, team problem-solving based course focused on solving real-world problems that can be modeled using discrete or continuous mathematics techniques and which emanate from industry. Ideally, the problems would be obtained from partnerships with local industry. Until these relationships develop, extant problems or problems arising in WCU faculty research (in math, physics, biology, geology, finance, etc.) will be used.
Pre / Co requisites: MAT 455 requires prerequisites of STA 319, MAT 425, and MAT 413 and any one of MAT 493 or MAT 427.
Typically offered in Spring.
Repeatable for Credit.

MAT 478. Fundamentals of Actuarial Science. 3 Credits.
Students completing this course will have a better understanding of actuarial models of life contingencies, more specifically, students will understand that life insurance payments, life annuity payments, pension payments, etc. are determined by financial random variables dependent on human life.
Pre / Co requisites: MAT 478 requires prerequisite of MAT 371 and MAT 421 with a "C" or better.
Typically offered in Spring.

MAT 479. Financial Calculus. 3 Credits.
This course aims to provide the undergraduate mathematics major with an introduction to the mathematics behind derivative pricing and portfolio management. Pricing theory is first developed through the typical binomial model and then is extended to continuous time via the Black-Scholes model. In addition, the student will be exposed to how arbitrage can be used to aid in the pricing more complicated derivatives, such as call options on dividend-paying securities and exotic options.
Pre / Co requisites: MAT 479 requires prerequisite of MAT 371 and MAT 421 with a "C" or better.
Typically offered in Spring.

MAT 491. Internship in Applied Mathematics. 2-4 Credits.
In cooperation with regional businesses and industrial companies, student will perform an internship in applied mathematics.
Repeatable for Credit.

MAT 493. Mathematical Modeling. 3 Credits.
The idea of a mathematical model of a real situation. Techniques and rationales of model building. Examples from the life, physical, and social sciences.
Pre / Co requisites: MAT 493 requires prerequisites of C or better in MAT 261 and C or better in MAT 343.
Typically offered in Fall.

MAT 499. Independent Study in Mathematics. 1-3 Credits.
Independent investigation of an area of mathematics not covered in the department's course offerings.
Consent: Permission of the Department required to add.
Repeatable for Credit.

MTE

MTE 340. Using Technology Teaching Elementary Mathematics. 3 Credits.
Using computer software, calculators, and the Internet as aids in teaching elementary school mathematics.
Pre / Co requisites: MTE 340 requires prerequisites of MAT 101 and MAT 102.

STA

STA 200. Introduction to Statistics II. 3 Credits.
Continuation of MAT 121/MAT 125. Inference about the means, standard deviations and proportions, goodness of fit, analysis of variance, regression analysis, correlation, and nonparametric tests.
Pre / Co requisites: STA 200 requires a prerequisite of a grade of C- or better in MAT 121, MAT 125 or ECO 251.
Typically offered in Fall, Spring & Summer.

STA 201. Statistical Methods for Political Polling. 3 Credits.
The purpose of this course is to introduce students to the statistical methodology used in the analysis of data from a political survey. Topics will include sampling techniques, hypothesis testing, sample size calculation, categorical data analysis, simple linear regression, and ANOVA. There will be a field trip to the Center for Opinion Research at Franklin and Marshall College at the beginning of the semester.
Pre / Co requisites: STA 201 requires prerequisites of MAT 121 and PSC 200.
Typically offered in Fall.

STA 202. Sports Analytics. 3 Credits.
In this course we will apply concepts such as regression, classification, clustering, decision trees and others to evaluate players and teams from baseball, basketball, football, hockey and soccer. We will also introduce the statistical programming language R in order to analyze recent (and large!) data sets.
Pre / Co requisites: STA 202 requires a prerequisite of a C- or higher in MAT 121 and MAT 125, or ECO 251.
Typically offered in Fall.

STA 203. Probability and Statistics in Gaming. 3 Credits.
In this class students will learn the important role that probability and statistics play in the enjoyment and development of games ranging from blackjack and the lottery to Battleship and World of Warcraft. Statistical topics include descriptive statistics, probability, discrete random variables, and multivariate linear modeling. Throughout the course students will use statistical tools to not only develop optimal strategies while gaming but also to analyze the current trends in contemporary gaming, determine which factors correlate with a game's popularity, and how to develop algorithms for computer opponents.

Pre / Co requisites: STA 203 requires a prerequisite of MAT 121 or MAT 125.
Typically offered in Spring.

STA 311. Intro Statistical Computing and Data Management. 3 Credits.
Course will give students the ability to manage and manipulate data effectively, conduct basic statistical analysis, and generate reports and graphics primarily using the SAS Statistical Software Program.
Pre / Co requisites: STA 311 requires a prerequisite of MAT 121 or MAT 125.
Typically offered in Fall & Spring.

STA 319. Applied Statistics. 3 Credits.
This course will cover simple and multiple linear regression methods and linear time series analysis with an emphasis on fitting suitable models to data and testing and evaluating models against data.
Pre / Co requisites: STA 319 requires a prerequisite of C or better in (MAT 121 or MAT 125) and (MAT 143 or MAT 145 or MAT 161).
Typically offered in Fall & Spring.

STA 320. Experimental Design. 3 Credits.
The purpose of this course is to guide students in learning how to design, conduct and analyze the results of scientific studies so that valid and objective inferences about the population are obtained. It will cover ANOVAs, block, factorial, and split plot designs, as well as response surface analysis.
Pre / Co requisites: STA 320 requires a prerequisite of C or better in MAT 121 or MAT 125.
Typically offered in Fall.

STA 321. Topics in Advanced Statistics. 3 Credits.
Course will cover select topics in categorical analysis, nonparametrics and time series analysis. Emphasis will be placed on statistical programming, particularly simulations.
Pre / Co requisites: STA 321 requires prerequisites of C or better in STA 311, STA 319, STA 320, and MAT 421.
Typically offered in Spring.

STA 419. Basics of Statistical Learning. 3 Credits.
This course will provide an introduction to statistical learning and predictive modeling. Tools will be developed for visualizing and understanding complex data sets. All data analysis will be done using the statistical programming language R.
Pre / Co requisites: STA 419 requires a prerequisite of a C or better in STA 319.
Distance education offering may be available.
Typically offered in Fall.

STA 490. Capstone Course in Statistics. 3 Credits.
Course will synthesize lessons learned throughout the students career with the goal of preparing students for work as professional statisticians. Topics will include report writing, presentations, statistical consulting, sampling design, and resume writing.
Pre / Co requisites: STA 490 requires prerequisites of ENG 368 or ENG 375 or ENG 371 and a C or better in STA 320 and STA 321. Typically offered in Fall.

Faculty and Staff
25 University Avenue (UNA)

Department Chair
Glidden, Peter, Ph.D., Columbia University   UNA 101A   610-436-2440
     Mathematics Education   pglidden@wcupa.edu

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

Administrative Assistant
Sally Malarney   UNA 101   610-436-2440
                                                       smalarney@wcupa.edu

Tenured & Tenure-Track Faculty

Bowen, Brian, Ph.D., University of Delaware
     Mathematics Education   bbowen@wcupa.edu

Brazas, Jeremy, Ph.D., University of New Hampshire
     Algebraic & General Topology   jbrazas@wcupa.edu

Crossett, Andrew, Ph.D., Carnegie Mellon University
     Applied Statistics   acrossett@wcupa.edu

Fisher, Michael, Ph.D., Lehigh University
     Graph Theory & Combinatorics   mfisher@wcupa.edu

Gallitano, Gail, Ed. D., Columbia University
     Mathematics Education   ggallitano@wcupa.edu

Gallop, Robert, Ph.D., Drexel University
     Applied Statistics, Biostatistics   rgallop@wcupa.edu

Gupta, Shiv, Ph.D., Case Western Reserve University
     Algebra (Group Theory, Number Theory)   sgupta@wcupa.edu

Johnson, Kim, Ph.D., Penn State University
     Mathematics Education   kjohnson2@wcupa.edu

Johnston, Clifford, Ph.D., Temple University
     Partial Differential Equations, Stochastic Processes   cjohnston@wcupa.edu

Junius, Premalatha, Ph.D., University of Northern Colorado
     Applied Mathematics   pjunius@wcupa.edu

Li, Chuan, Ph.D., University of Tennessee
    Applied Mathematics   cli@wcupa.edu

Marano, Lisa, Ph.D., Lehigh University
    Stochastic Processes & Financial Mathematics   lmarano@wcupa.edu

McClintock, Scott, Ph.D., University of Kentucky
    Statistics   smcclintock@wcupa.edu

McKibben, Mark, Ph.D., Ohio University
    Differential Equations, Stochastic Analysis   mmckibben@wcupa.edu

McLaughlin, James, Ph.D., University of Illinois
    Number Theory, Special Functions   jmclaughlin@wcupa.edu

Miller, Emily, Ph.D., University of Delaware
    Mathematics Education   emiller@wcupa.edu

Nitica, Viorel, Ph.D., Penn State University
    Dynamical Systems and Discrete Mathematics   vnitica@wcupa.edu

Parsell, Scott, Ph.D., University of Michigan
    Analytic Number Theory   sparsell@wcupa.edu

Peng, Cheng, Ph.D., University of Toledo
    Statistics   cpeng@wcupa.edu

Perkoski, Andre, M.S., West Chester University
    Mathematics   aperkoski@wcupa.edu

Pyott, Laura Connell, M.S., University of Delaware
    Statistics   lpyott@wcupa.edu

Rieger, Randall, Ph.D., University of North Carolina
    Applied Statistics, Biostatistics   rrieger@wcupa.edu

Sullivan, Rosemary, Ph.D., Lehigh University
    Geometric Probability Theory   rsullivan@wcupa.edu

Swartz, Barbara, Ph.D., University of Virginia
    Mathematics Education   bswartz@wcupa.edu

Tan, Lin, Ph.D., University of California (Los Angeles)
    Algebra (Algebraic Groups, Combinatorics)   ltan@wcupa.edu

Zimmer, Peter, Ph.D., University of Kansas
    Partial Differential Equations, Stochastic Processes   pzimmer@wcupa.edu

Back Cover Art courtesy of Dr. Jeremy Brazas
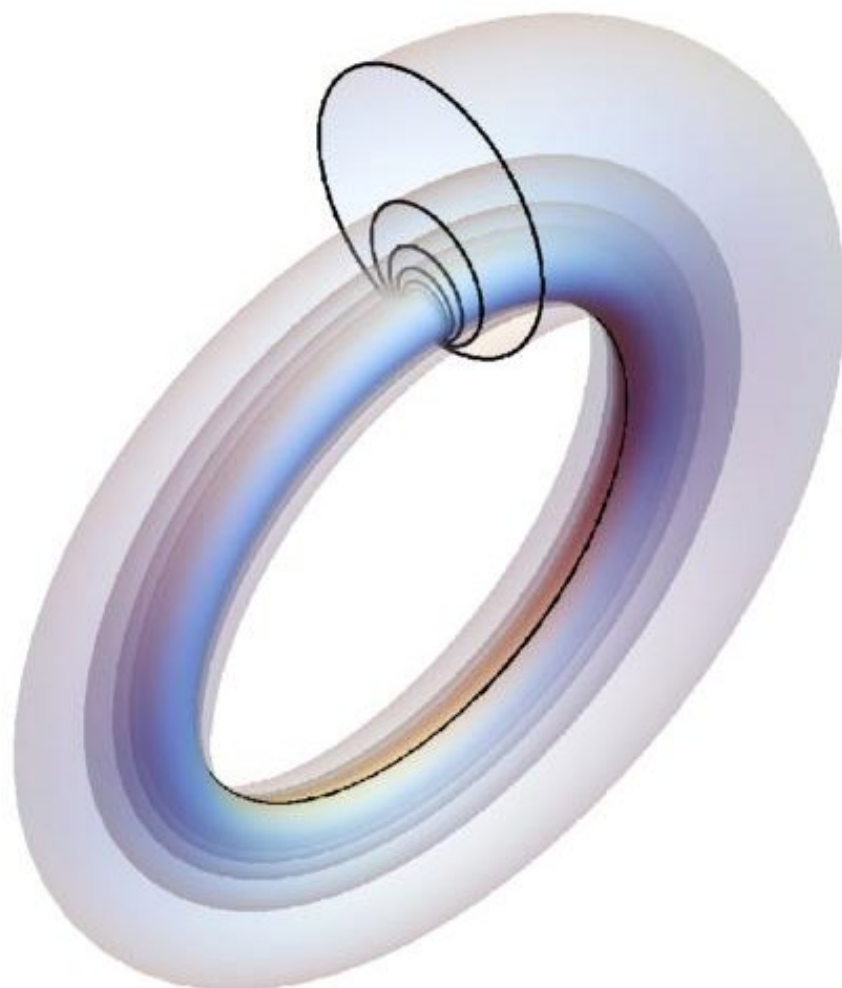
Department of Mathematics
25 University Avenue, Room 101
West Chester, Pennsylvania 19383