

Graduate Studies in
Mathematics

Graduate Studies in Mathematics Western Kentucky University

*www.wku.edu/math/grad_ms.php
www.wku.edu/math/grad_ma.php*

The Department

The Department of Mathematics at Western Kentucky University is one of ten departments in the Ogden College of Science and Engineering. The department has approximately 35 faculty members. All graduate faculty members are active in research and have published widely in pure and applied mathematics, statistics and mathematical education. The department has also established a strong record of research among graduate and undergraduate students. The department offers the Bachelor of Arts, the Master of Arts, and the Master of Science degrees.

The department has many specialized classrooms, a computer laboratory, a testing center, a tutoring facility and a student resource room.

All graduate student offices are equipped with computers. The library subscribes to over 50 professional journals in mathematics or mathematics education and has a large collection of mathematics' books and monographs.

All faculty and most graduate student offices, departmental classrooms, and computer laboratories are located in the College High Hall. For more information, visit:

www.wku.edu/math

The University

Western Kentucky University, A Leading American University with International Reach, is a comprehensive institution with approximately 20,000 undergraduate and graduate students. Western Kentucky University is committed to attracting students and faculty who are dedicated to academic excellence. The University offers an inviting, nurturing, and challenging environment that is responsive to the intellectual, social, and cultural needs of a diverse learning community. For more information, see:

www.wku.edu



My time in the Master's program at WKU is a cherished memory of mine. The professors are knowledgeable and friendly, always willing to help a student wanting to learn more about mathematics. The student body have a drive to learn that makes the teaching responsibilities all the more enjoyable. My thesis topic was challenging, exhausting, and absolutely thrilling. So much so, in fact, that it convinced me to apply to continue my education about Control Theory and PDEs. The courses taken in my Master's program helped prepare me well for my doctoral studies. I'm forever indebted to this lovely college on the hill and its many wonderful faculty. While you're at WKU, be sure to enjoy the local music and coffee shops to get the full Hilltopper experience.

Stephen Guffey
M.S., 2015
Ph.D. Student
The University of Memphis

The Community

Located in south-central Kentucky, Bowling Green is a city of 60,000 with a cultural and religious diversity not typically found in communities of its size. Bowling Green has expanding industrial and retail bases and offers many theater and concert opportunities. Numerous restaurants are available and recreational activities are offered at city, state, and national parks, golf courses, and lakes. Nearby attractions include Mammoth Cave National Park and the National Corvette Museum. More information can be found at

www.wku.edu/about/aboutbg/index.php

Master Degrees in Mathematics

The Department of Mathematics offers the Master of Science (M.S.) degree and the Master of Arts (M.A.) degree. Both degrees have thesis and non-thesis options, and both require 30 hours of graduate-level courses. The M.S. degree is designed for students who wish to obtain a Ph.D. degree, to teach in a community college, or to seek employment in industries needing mathematical or computational expertise. The M.A. is designed for secondary teachers and includes courses that will help students become more knowledgeable about the mathematics they teach in high school while exploring the connections and extensions of that knowledge to college and higher mathematics. The M.A. degree program is offered through online courses. The department also offers a five year BA/MS program, which includes undergraduate and graduate studies.

The Master of Science Program

The M.S. program offers three concentrations: general, computational, and mathematical economics. The M.S. general concentration requires traditional courses in analysis, algebra, topology, and applied mathematics, and is recommended for students who wish to obtain a Ph.D. degree, plan a teaching career at the community college level, or to seek employment in industry with an emphasis on conceptual foundations. This concentration is based to a large extent on traditional course work from applied and pure mathematics. The M.S. computational mathematics concentration is designed for students seeking employment in industry with an emphasis on computational mathematics and/or computer science in addition to knowledge in traditional areas. The concentration contains a large component of computer science graduate courses and has entry requirements that are tailored to meet the needs of this concentration. Many high-end positions in industry, the financial sector, or government require hands-on mathematical expertise that goes beyond what is provided by a bachelor's degree and is different in flavor from the general concentration. The mathematical economics concentration is designed for students seeking employment in industry with an emphasis on economics in addition to knowledge in traditional areas. It is also designed for students who completed an undergraduate degree program in mathematical economics at WKU.

The General Concentration

A. Admission Requirements The requirements listed below are as of August 2016. They may have changed, for current requirements see:

www.wku.edu/math/grad_ms.php

To be admitted to the M.S. program, students must meet the following criteria:

1. Satisfy one of the following conditions:
 - have a GAP score of at least 600 (or 3000 for students who took the GRE prior to August 2011) have a GRE general score of at least 300, or if students have graduated from WKU with a degree in mathematics, a GPA of at least 3.3 in their undergraduate major.
2. Completion of the following undergraduate courses, with at most one deficiency: (a) a calculus sequence through multivariable calculus; (b) linear algebra; (c) discrete mathematics; (d) an applied mathematics course (e.g. differential equations, probability, calculus-based statistics, numerical analysis); (e) abstract algebra.
3. A cumulative grade point average of at least 3.0 (on a 4.0 scale) in at least one of the following: (i) all mathematics courses that are applicable to the undergraduate mathematics major; or (ii) courses specified in (b) through (e) of Item 2 above.



I cannot imagine attending graduate school anywhere other than WKU. The incredibly welcoming and helpful faculty members in the Department of Mathematics are some of the best on campus, and, along with the other graduate students, make you feel like you are part of a family. Also, the chance to teach undergraduates while obtaining my own degree was a valuable opportunity which I not only enjoyed immensely, but also provided invaluable experience for my desired career.

Tonja Miick
M.S., 2013
Instructor
Mathematics, WKU

B. Academic Requirements

The General Concentration requires a minimum of 30 hours of graduate-level mathematics courses. The following are required:

- (1) MATH 431G Intermediate Analysis I
MATH 450G Complex Variables
- (2) One course selected from MATH 417G, 435G, 439G. If equivalent courses were taken at the undergraduate level, then the student must substitute appropriate graduate mathematics courses selected in consultation with a graduate faculty member in the Mathematics Department.
- (3) One course selected from MATH 532, 535, 541, 550 or as approved by the Graduate Committee of the Mathematics Department.
- (4) Select 18 hours from MATH 405G, 406G, 415G, 417G, 423G, 435G, 439G, 470G, 500, 517, 529, 531, 532, 535, 536, 539, 540, 541, 542, 550, 570, 590, 598, 599, STAT 549 Statistical Methods I, or STAT 550 Statistical Methods II.
- (5) A maximum of 12 hours at the 400G-level may be included in the entire program. Graduate students are required to complete additional problem sets and/or papers to receive graduate credit for these courses, which are also open to undergraduate students.

- (6) Students who choose to write a thesis are required to complete 6 hours of MATH 599 – Thesis Research and Writing and to give an oral defense of the thesis.
- (7) A student may, upon prior approval of the Graduate Committee of the Mathematics Department, include in his/her program a maximum of 6 hours of course work from a related field.
- (8) Comprehensive exams are required for students who choose not to write a thesis.

Research Tool Requirement. A research tool is required which entails course work beyond the 30 hours of mathematics. The research tool must be completed during the first 15 hours of coursework. The purpose of the research tool is to provide a student with tools that make a graduating student more marketable and to assist the student in his/her research. A student who is interested in industry employment should look at options that might make him/her more marketable to potential employers. A student who plans to do a thesis should think about what would be helpful for the thesis.

The research tool can be fulfilled in a variety of ways, some of which are listed below:

- a) Courses in other disciplines. The research tool course should be in disciplines that have a strong relation to mathematics. Examples of such disciplines are computer science, physics or economics. The level (200/300/400/graduate) of the course needs to be appropriate to the student's background. For example, a graduate or 400 level computer science would be acceptable. However, a student with no prior programming experience cannot take such a course and instead could choose a first year undergraduate programming course.
- b) Learning how to use a standard statistical package (such as SAS or SPSS).
- c) A mathematics reading course such as MATH 598, if the reading course is aimed at exposing the student to research articles in an area of mathematics. A reading course that counts as a research tool is not a special topics course, i.e. the reading cannot be based on a single source or have a very narrow focus. It should also not be the continuation of a prior course. The offerings of such reading courses will be limited to exceptional cases. Reading courses should not be used to replace other course offerings of the department that a student could take at the same time.
- d) A foreign language examination (appropriate if this language is useful to the student in his or her research).

The choice of a research tool must be approved by the Graduate Committee of the Mathematics Department in advance or at the latest at the time when the student fills out the degree program form. The research tool must be completed during the first 15 hours of coursework.

The Computational Mathematics Concentration

A. Admission Requirements

1. Have a GAP score of at least 600 (or 3000 for students who took the GRE prior to August 2011), have a GRE general score of at least 300, or if students have graduated from WKU with a degree in mathematics, a GPA of at least 3.3 in their undergraduate major.
2. Completion of the following undergraduate courses: (a) a one-year calculus sequence; (b) linear algebra; (c) discrete mathematics (d) a one-year sequence of programming courses; (e) a B.A. degree with a major in either Computer Science, Engineering, Mathematics or Physics.
3. A cumulative grade point average of at least 3.0 (on a 4.0 scale) in at least one of the following: (i) all mathematics and computer science courses that are listed in (a) through (d) of Item 2 above; or (ii) all courses in the major listed in (e) of Item 2 above.

Students may not enter the program if they have a deficiency in the courses listed in Item 2 above.

B. Academic Requirements

The Computational Mathematics concentration requires a minimum of 30 hours of graduate-level mathematics and computer science courses. Students in the computational mathematics concentration must have a working knowledge of a high-level programming language. The computer science classes required in this concentration do not allow for additional courses in a related field. The following are required:

- (1) MATH/CS 405G Numerical Analysis I
MATH 406G Numerical Analysis II
MATH 470G Introduction to Operations Research
STAT 549 Statistical Methods I
CS 549 Analysis of Algorithms
- (2) At least two courses from the list below are required:
CS 562 Parallel and Distributed Computing
CS 565 Data Mining Techniques and Tools
CS 595 Advanced Topics in Computer Science (with permission of advisor, i.e. depending what the topic of the course will be)
- (3) The remaining courses will be chosen from the list below:
MATH 431G, 504, 540, 541, 542, 570, 590, 599, STAT 550 Statistical Methods II



I transferred to the Department of Mathematics at WKU after I earned my A.S. degree from ECTC, and fulfilled all the requirements for a B.A. degree in two years, then earned my M.S. degree two years right after that. It was tough to finish all the courses within four years with a two hour commute each school day. Thankfully, WKU has employed faculty and staff who were willing to work with me and made my teaching dream come true. I couldn't have achieved such accomplishment without my advisor's professional advising, Department Head's support, and Graduate School director's thoughtful scheduling of my GA position. Although I chose WKU because it was the closest university to where I live, I found myself making the best choice ever. Beautiful campus, great program, and awesome people were all combined at WKU..

Miky Wright
M.S., 2015
Instructor

Elizabethtown Community
and Technical College

- (4) A maximum of 12 hours at the 400G-level may be included in the entire program. Graduate students are required to complete additional problem sets and/or papers to receive graduate credit for these courses, which are also open to undergraduate students.
- (5) Comprehensive exams are required for students who choose not to write a thesis.
- (6) The research tool requirement is satisfied by the computer science classes.
- (7) Students who choose to write a thesis are required to complete 6 hours of MATH 599 – Thesis Research and Writing and to give an oral defense of the thesis.

All students in the M.S. program must have a working knowledge of a high-level programming language or computer algebra system.

The Mathematical Economics Concentration

A. Admission Requirements

1. Have a GRE score of at least 300 with a minimum quantitative score of 147, or if students have graduated from WKU with a degree in mathematics, a GPA of at least 3.3 in their undergraduate major. If students have graduated from WKU with a degree in mathematical economics, a GPA of at least 3.3 in their undergraduate major, or if students have graduated from WKU with a degree in economics or business economics, a GPA of at least 3.3 in their undergraduate major and 3.3 in the courses listed below (2.a,b,d, and e).
2. An undergraduate degree majoring in economics, mathematics, mathematical economics, or other related majors with completion of the following undergraduate courses: (a) a calculus sequence through multivariable calculus; (b) discrete mathematics; (c) principles of microeconomics and macroeconomics; (d) one semester of junior or senior level probability theory; (e) differential equations.

B. Academic Requirements

The Mathematical Economics Concentration requires a minimum of 30 hours of graduate-level mathematics and economics courses. The following are required:

- (1) ECON 465G Regression and Econometric Analysis
ECON 502 Applied Microeconomic Theory
ECON 503 Applied Macroeconomic Theory
STAT 549 Statistical Methods I

MATH 431G Intermediate Analysis I or MATH 482G Probability & Statistics II
MATH 531 Advanced Differential Equations or STAT 550 Statistical Methods II

- (2) Select 12 hours from the list below:
MATH 405G, 406G, 431G, 470G, 482G, 529, 531, 532, 540, 541, 542, 570, 590, 598, 599, STAT 550 Statistical Methods II, ECON 594 Forecasting
- (4) A maximum of 12 hours at the 400G-level may be included in the entire program. Graduate students are required to complete additional problem sets and/or papers to receive graduate credit for these courses, which are also open to undergraduate students.
- (5) Comprehensive exams are required for students who choose not to write a thesis.
- (6) Students who choose to write a thesis are required to complete 6 hours of MATH 599 – Thesis Research and Writing and to give an oral defense of the thesis.

Five Year BA/MS Program

Western Kentucky University's undergraduate students who have an interest in the Department of Mathematics program to obtain both a Bachelor of Arts in Mathematics (528) and a Master of Science in Mathematics (085) may apply to the five year BA/MS program. The course schedule can be found at:

www.wku.edu/math/grad_ms.php

The Master of Arts Program

This online program is intended for students who are secondary teachers who already hold teacher certification and are seeking rank change through earning a Master's degree. In addition, this program prepares teachers to teach dual credit classes and at a community college or technical school. This degree does not provide initial teacher certification or prepare a student for doctoral studies in mathematics.

A. Admission Requirements

To be admitted to the M.A. program, students must meet the following criteria:

1. satisfy one of the following conditions: have a GAP score of at least 600, have a GRE general score of at least 300, or if students have graduated from WKU with a degree in mathematics, a GPA of at least 3.3 in their undergraduate major.



I'm really thankful for my time at WKU. I was able to make many friends with my peers, many of whom were international students. I hadn't had the opportunity to know many people from different countries so I am very thankful for that opportunity. My teachers were always very supportive of me. They encouraged me and were always available when I needed help; I also enjoyed the small class sizes and personal relationships I was able to have with the faculty/staff at WKU that I wouldn't have been able to have at a larger university. The teachers at WKU really care about each and every student who pursues a graduate degree in mathematics. The excellent education I received at WKU has allowed me to accomplish my goal of teaching math for Owensboro Community and Technical College.

Donna Daulton
M.S., 2013
Instructor
Owensboro Community
and Technical College

2. a bachelor's degree in mathematics, OR the completion of the following undergraduate courses, with at most one deficiency: (a) a calculus sequence through multivariable calculus, (b) linear algebra, (c) discrete mathematics, (d) probability or calculus-based statistics, (e) abstract algebra, and (f) geometry.

Applicants must also have, or be eligible for, a teaching certificate* for Secondary Mathematics (Grades 8-12). A copy of the certificate or statement of eligibility must be submitted with the application.

*Kentucky teachers whose certificates have expired may be admitted into the program, but they may enroll in no more than six hours before they must apply to the Kentucky Education Professional Standards Board for re-issued certificates. After completion of six hours, a student admitted with an expired certificate must submit a copy of the re-issued certificate before being allowed to register for any additional courses. Applicants from out-of-state with expired certificates must complete the requirements for their respective states to renew their certificates and submit a copy of the reissued certificate.

B. Academic Requirements

The M.A. degree in Mathematics requires 31 – 34 hours of graduate-level coursework. All required coursework is offered online so that students have the flexibility to complete coursework at non-traditional times. Access to the internet is required. The following are required:

1. Mathematics Content (18 hours)

- (i) Core Mathematics Courses: The student is required to complete the following courses:
 Math 501 Introduction to Probability and Statistics I
 Math 503 Introduction to Analysis
 MATH 511 Algebra from an Advanced Perspective
 MATH 512 Geometry from an Advanced Perspective

- (ii) Elective Mathematics courses: (Six hours of mathematics courses chosen from those listed below):
 MATH 405G, 406G, 409G, 415G, 417G, 421G, 423G, 431G, 432G, 435G, 439G, 450G, 470G, 475G, 500, 504, 509, 510, 514, 517, 523, 529, 531, 532, 535, 536, 539, 540, 541, 542, 550, 560, 570, 590, 599, STAT 549.

A maximum of 9 hours at the 400G-level may be included in the entire program.

Students are required to complete a thesis or comprehensive exams in mathematics. A student who chooses to do a thesis is required to complete 6 hours of MATH 599 Thesis Research and Writing and to give an oral defense of the thesis.

2. Secondary Education (13-16 hours)

This program is designed to develop Teacher Leaders who can positively impact student learning in their classrooms and schools. Courses and experiences include Professional Learning Communities in which students interact with other graduate students from various content areas and grade levels to discuss and work on real world challenges and promising practices they encounter in schools.

An Action Research Project for Teacher Leaders focusing on a classroom, school, or district issue is the capstone for the completion of the Secondary Education portion of the degree.

During the first course in the program, TCHL 500 Foundations of Teacher Leadership, students will complete an assessment process that will be used in determining which TCHL core courses they must take (see Important Note below). All students must complete either TCHL 545 and 555 or pass proficiency evaluations for these courses. TCHL 500, 530, 559, and 560 are required for all students, and there are no proficiency evaluations that may be substituted for these courses.

Important Note: While enrolled in TCHL 500, master's candidates will use several documents, including their KTIP assessments or in-kind examples, dispositions self-surveys, referrals from school personnel, and their respective School Improvement Plan, to develop with their respective program advisors individualized programs of study of 31-34 hours related to Kentucky Teacher Standards and professional goals.

- (i) Professional Education Core (9-16 hours) Courses denoted with an asterisk are required courses.

*TCHL 500 Foundations of Teacher Leadership (3 hours)

*TCHL 530 Curriculum Development (3 hours)

TCHL 545 Classroom Instruction Strategies and Management (3 hours)

TCHL 555 School and Classroom Assessment (3 hours)

*TCHL 559 Action Research Design (1 hour)

*TCHL 560 Action Research Capstone for Teacher Leaders (3 hours)

- (ii) Education Electives (0-3 hours) Students who successfully complete the proficiency examinations for either TCHL 545 or TCHL 555 may graduate with 31 hours. However, students who successfully complete the proficiency examinations for both TCHL 545 and TCHL 555 must substitute at least one education course with advisor approval to have a minimum of 31 hours to graduate.

Secondary Education Mid-Point Assessment Requirements: Students are expected to enroll in TCHL 500 at the beginning of their program and in TCHL 560 toward the end. Students should consult with their advisors regarding the optimal sequence of course work to meet their professional goals. Students must achieve an average of 3.0 on all Critical Performances and an average score of 3 on dispositions even though a candidate's program of studies does



My experience in the mathematics graduate program was extraordinary. I had many opportunities to engage in novel research and publications. Classes were small enough for one-on-one interaction, but large enough to be exposed to interesting questions and viewpoints.

Anthony Montemayor
M.S., 2012



The math department at WKU means amazing professors, great education and quite well research opportunities for me. The classes in the graduate program are perfect to get prepared for being a good researcher. In addition, the professors care a lot about how much students learn and they are always ready to help students to improve their selves. The M.S. program in math at WKU is one of the best steps for the next level.

Menevse Eryuzlu
M.S., 2016
Ph.D. Student
Arizona State Univ.

not include the courses. Additional course work may be required based on the assessment results.

Secondary Education Completion Requirements:

1. Successfully complete TCHL 560 (Course grade of C or higher).
2. Give acceptable presentation of action research in approved venue.
3. Achieve a minimum 3.0 GPA overall and in secondary education course work.

Thesis Preparation and Presentation

The department requires all students who are supported by an assistantship to take the thesis option (can be waived by the Graduate Director). Writing a thesis is usually a wonderful and rewarding experience for students. It represents a high point in their academic careers, and is a necessary tool for doctoral dissertation research and writing. Students who choose to write a thesis are required to complete 6 hours of MATH 599 – Thesis Research and Writing and to give an oral defense of the thesis. Students who start on the thesis process will be given departmental and college guidelines by the graduate director.

For the thesis preparation and presentation, see the university guidelines at:

www.wku.edu/graduate/students/thesis/

Comprehensive Exams

A student selecting to write a thesis is required to present an oral defense of the thesis. Non-thesis students must complete comprehensive written exams approved by the departmental Graduate Committee. A student can decide which courses she/he wants the comprehensive exams based on, subject to the rules outlined for the selected concentration within our graduate program. Students who plan to take comprehensive exams need to check with the graduate director for the current policy of the exams.

Graduate Assistantships

Graduate assistantships are available, on a competitive basis, from the Department of Mathematics. A student with an assistantship will conduct several recitation or support sessions for standard undergraduate courses. Such courses include the following : Calculus I (Math 136) and Calculus II (Math 137). The total work load of a graduate assistant (including preparation,

grading, and office hours for the recitation or support sessions) is estimated at about 20 hours per week. The department expects that first year graduate assistants are arriving on the WKU campus before the semester starts so that the necessary paperwork (background check, paperwork to put the student on payroll, key and office assignments) can be completed and the student can prepare for the teaching assistant duties. For the details of when to arrive, the student should contact the Graduate Director once an assistantship has been awarded. The monetary value of a graduate assistantship is currently (2016) valued at \$9,000 per semester (or \$18,000 for the academic year), however this may increase in future years.

Graduate assistants are reviewed each semester and may be re-appointed. Competitive summer graduate assistantships may be available. Students should submit applications for admission to the Graduate School. For information, see

www.wku.edu/graduate/prospective_students/

Application for assistantships are found at the departmental webpage, see

www.wku.edu/math/grad_ms.php

For second year graduate students who have excelled in the program the department has a limited number of Premium assistantships available. The monetary value of a premier assistantship is currently valued at \$11,000 per semester (or \$22,000 for the academic year); however, this may increase in future years. These premium assistantships are given out on a highly competitive

basis for students that have promise in teaching and research. These students must complete the Best Practices in Mentoring and College Teaching Program (BPMCT), a basic training program for students wanting to become Instructor of Record. Teaching assistants with premium assistantships will be employed teaching a section. Examples of such section could include College Algebra (Math 116), Trigonometry (Math 117) as an instructor of record and are assigned a faculty research mentor who also directs their Master's thesis.

All graduate assistants pay tuition at the rates published on the Office of the Bursar web site:

<http://www.wku.edu/bursar>

Tuition has to be payed from the assistantship funds allocated to the student.

All students who are on assistantship are expected to write a thesis, i.e., to chose the thesis option on their degree program.



My name is Nihan Acar from Turkey and I earned my Master's degree in Mathematics at WKU. I would definitely recommend every qualified student to join the Mathematics Graduate School at WKU. The professors are quite experienced, helpful, and encouraging. Since they are experts in their respective areas, students are provided with a wealth of knowledge in Mathematics. WKU offers many Teaching Assistantship opportunities for graduate students. As a Graduate Teaching Assistant, I was able to cover all my expenses and I gained valuable teaching experiences while obtaining my Masters' degree. Overall, WKU's Department of Mathematics is a very welcoming and great place for whom wants to pursue a prestigious Master's Degree.

Nihan Acar
M.S., 2012
Ph.D. Student
Florida State Univ.

Application timeline

Because assistantships are offered on a competitive basis, the earlier the student applies, the better. However, applications for assistantships are considered at any time until the available departmental funds have been exhausted.

To receive maximum consideration for a graduate assistantship, all application materials (application and three professional letters of recommendation for first-time students; application for continuation for students wishing to extend the current assistantship) need to be received in the Graduate School on time. Please check the following web page for applications:

www.wku.edu/graduate/aid/ga/

Mathematics Graduate Courses

Up to 12 hours of 400G level mathematics courses may be applied toward the M.S. and up to 9 hours of 400G level mathematics courses may be applied toward the M.A. degree. Graduate students are required to complete additional problem sets and/or papers to receive graduate credit for 400G level courses, which are also open to undergraduate students.

All prerequisites require a grade of C or better and equivalent courses taken at other institutions with equivalent grades of C or better may serve as prerequisites. For a listing of the courses which may be applied to the concentration of your choice, please refer to the descriptions above. For the most current listing of available courses, see the current graduate catalog at

www.wku.edu/graduate/prospective_students/catalog.php

MATH 403G Geometry for Elementary and Middle School Teachers.

MATH 405G Numerical Analysis I (CS 405G).

MATH 406G Numerical Analysis II.

MATH 409G History of Mathematics.

MATH 411G Problem Solving for Elemen. and Mid. School Teachers.

MATH 413G Algebra and Technology for Middle Grades Teachers.

MATH 415G Algebra and Number Theory.

MATH 417G Algebraic Systems.

MATH 421G Problem Solving for Secondary Teachers.

MATH 423G Geometry II.

MATH 429G Probability and Statistics II.

MATH 431G Intermediate Analysis I.

MATH 435G Partial Differential Equations.

MATH 439G Topology I.

MATH 450G Complex Variables.

MATH 470G Introduction to Operations Research.

MATH 500 Readings in Mathematics.

MATH 501 Introduction to Probability and Statistics I.

MATH 502 Introduction to Probability and Statistics I.

MATH 503 Introduction to Analysis.

MATH 504 Application of Technology to Problems in Mathematics.

MATH 506 Mathematical Applications for Middle Grades Teachers.

MATH 507 Mathematics Concepts for Elementary Teachers.

MATH 508 Number Concepts for Elemen. and Mid. Grades Teachers.

MATH 510 Intermediate Statistics.

MATH 511 Algebra from an Advanced Perspective I.

MATH 512 Geometry from an Advanced Perspective II.

MATH 514 Mathematical Modeling with Applications.

MATH 517 Topics from Algebra.

MATH 529 Applied Probability.

MATH 531 Advanced Differential Equations.

MATH 532 Real Analysis.

MATH 535 Advanced Applied Mathematics I.

MATH 536 Advanced Applied Mathematics II.

MATH 539 Topology II.

MATH 540 Stochastic Processes.

MATH 541 Graph Theory.

MATH 542 Advanced Topics in Discrete Mathematics.

STAT 549 Statistical Methods I.

STAT 550 Statistical Methods II.

MATH 550 Complex Analysis.

MATH 570 Topics in Operations Research.

MATH 590 Special Topics in Mathematics.

MATH 598 Graduate Seminar: Commun. Math. and Tech. Writing.

MATH 599 Thesis Research and Writing.

MATH 600 Maintaining Matriculation.



The faculty and staff at Western Kentucky University have constantly motivated me to pursue an academic career in mathematics. The Master's of Science program prepares students for professional success in many ways. The classes offered by the department further mathematical knowledge in various material which can be tailored to different students future goals. The graduate seminars in particular aided my efforts and taught me about mathematical research and publication. WKU helped me in many ways and I couldn't imagine going anywhere else to pursue my Master's degree.

Zac Bettersworth

M.S., 2016

Instructor

Univ. College at WKU

The Graduate Faculty

Ferhan Atıcı, Professor, Ph.D. University of Nebraska at Lincoln, 1995. Difference equations, differential equations, dynamic equations, fractional calculus, and modeling in economics and medical sciences.

Melanie Autin, Associate Professor, Ph.D. University of South Carolina, 2007. Statistics education, applied statistics.

Tilak Bhattacharya, Associate Professor, Ph.D. Purdue University, 1988. Analysis of degenerate quasi-linear and fully non-linear equations of elliptic and parabolic type.

Daniel Clark, Assistant Professor, Ph.D. Michigan State University, 2016. Mathematics education.

Kanita DuCloux, Assistant Professor, Ph.D. University of Georgia, 2009. Mathematics education.

Molly Dunkum, Associate Professor, Ph.D. University of Kentucky, 2005. Homological algebra, discrete mathematics.

Claus Ernst, Professor, Ph.D. Florida State University, 1988. Low dimensional geometric topology and knot theory; physical knots and their applications to molecular biology and chemistry.

Natasha Gerstenschlager, Assistant Professor, Ph.D. Middle Tennessee State University, 2015. Improving pre- and in-service teachers' mathematical knowledge for teaching.

Nezam Iraniparast, Professor, Ph.D. University of California at Davis, 1984. Partial differential equations, and specifically, hyperbolic characteristic initial boundary value problems, which can be described as determining waves from prescribed initial data and the data along the paths of propagation.

Bruce Kessler, Professor and Department Head, Ph.D. Vanderbilt University, 1997. Wavelet theory and its applications to signal processing and pattern recognition, mathematical modeling, curriculum development in mathematics education.

Mikhail Khenner, Associate Professor, Ph.D. Perm State University, Russia and Universite Aix-Marseille, France, 1998. Physical applied mathematics, modeling for materials science, fluid dynamics, numerical methods for free-boundary problems.

Dominic Lanphier, Professor and Graduate Director, Ph.D. University of Minnesota, 1999. Number theory, automorphic forms and L-functions, discrete mathematics.

Hope Marchionda, Associate Professor, Ph.D. Clemson University, 2006. Mathematics education.

Samangi Munasinghe, Associate Professor, Ph.D. Texas A&M University, 2006. Several complex variables and analytic spaces.

David Neal, Professor, Ph.D. University of Florida, 1988. Probability theory, stochastic processes, random walks, statistical inference.

Lan Nguyen, Professor, Ph.D. Ohio University, 2002. Semigroups of operators and Cauchy problems, autonomous and non-autonomous differential equations in abstract spaces.

Ngoc Nguyen, Associate Professor, Ph.D. Bowling Green State University, 2010. Stochastic frontier analysis, multiple comparison, economical statistics.

Ozkan Ozer, Assistant Professor, Ph.D. Iowa State University, 2011. Control theory of partial differential equations, mathematical modeling, continuum mechanics for smart material composites, nonharmonic Fourier series.

Attila Pór, Associate Professor, Ph.D. Eötvös Loránd University, Budapest, Hungary, 2003. Combinatorial geometry, combinatorics, convex geometry.

Tom Richmond, Professor, Ph.D. Washington State University, 1986. General topology, ordered sets, partially ordered topological spaces, compactifications.

Mark Robinson, Professor, Ph.D. University of Kentucky, 1991. Numerical solutions of differential equations.

Richard Schugart, Associate Professor, Ph.D., North Carolina State University, 2005. Mathematical biology.

John Spraker, Professor, Ph.D. Indiana University, 1987. Complex variables, operator theory, and differential equations.

Recent Publications with Graduate Students

The graduate faculty engages graduate students in their research and publishes joint papers in mathematical journals. Some recent publications with students include:

- **M. D. Russell** and David K. Neal, A Generalized Martingale Betting Strategy, *Missouri Journal of Mathematical Sciences*, 21(2009), no. 3, 183-197.
- F. M. Atıcı and **S. Şengül**, Modeling with Fractional Difference Equations, *Journal of Mathematical Analysis and Applications*, 369(2010), 1–9.
- C. Ernst, **B. M. Rountree**, The mean integrity of paths and cycles. *Ars Combinatoria*, The Charles Babbage Research Centre, 95(2010), 499-509.
- **A. Almusharff** and N. Nguyen, A combination of time-scale calculus and a cross validation technique used in fitting and evaluating fractional models, *Applied Math Letters*, 25(2011), no.3, 550-554.
- Y. Diao, C. Ernst and **A. Montemayor**, Nullification of knots and Links, *J. of Knot Theory and Its Ramifications*, 21(2012), no. 6, 1250046 (24 pages).
- **T. Clark** and Tom Richmond, Cantor sets arising from continued radicals, *Ramanujan Journal*, 33 (2014), no. 3, 315-327.
- C. Ernst, **A. Montemayor**, Nullification of torus knots and links, *J. of Knot Theory and Its Ramifications*, 23 (2014), no. 11, 19pp.
- F. M. Atıcı and **Meltem Uyanık**, Analysis of discrete fractional operators, *Applicable Analysis and Discrete Mathematics*, Vol. 9, (2015), 139–149.
- **Aykut Arslan** and F. M. Atıcı, Discrete Hermite-Hadamard Inequality and Its Applications, *Applicable Analysis and Discrete Mathematics*, to appear.



I have been awarded the degree of Master of Mathematics from Western Kentucky University. During two years at graduate study, on one hand, I have learned quite a bit from the courses themselves, which have cultivated my desire to do scientific research, and developed my analytical and problem solving abilities. My coworkers and professors in the Mathematics department are all people who share me love of math, so we were able to discuss questions and do research together, emphasizing teamwork in all that we accomplished. On the other hand, the campus life is harmonious and fascinating. I made many friends who are from all over the world in WKU. I also got a lot of help from people who were around me on campus. I miss and love WKU. All Hilltoppers remember the motto of WKU: The Spirit Makes the Master. Go Toppers!

Meltem Uyanık
M.S., 2015
Ph.D. Student
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at Chicago

For More Information. . .

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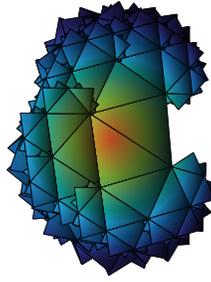
- For Mathematics MA Program, please contact **Dr. Hope Marchionda**, at hope.marchionda@wku.edu or (270) 745-2961.

About the Cover

Buildings are simplicial complexes used to study groups. The triangles in the picture are simplices and sequences of triangles which share an edge form apartments. If more than two triangles share an edge then the building is called a thick building. This picture is a piece of a two-dimensional thick building. It is a geometric interpretation of an infinite group of Lie type.

The image is courtesy of Paul Garrett and Tom Meacham.

Graduate Studies in Mathematics



Master of Science (M.S.) Degree

A General Concentration, a Computational Mathematics Concentration, a Mathematical Economics Concentration, and a Five Year BA/MS program are offered. The M.S. general concentration offers courses in analysis, algebra, topology, and applied mathematics, and prepares students to enter a Ph. D. program, plan a teaching career at the community college level, or seek employment in industry. The computational mathematics concentration is designed for students who are seeking employment in industry with an emphasis on computational mathematics. The mathematical economics concentration is designed for students seeking employment in industry with an emphasis on economics in addition to knowledge in traditional areas. The department also offers a five year BA/MS program, which includes undergraduate and graduate studies.

Master of Arts (M.A.) Degree

The M.A. degree is an online program designed specifically for secondary teachers. The purpose of the program is to encourage secondary teachers to broaden their knowledge of the mathematics well beyond what they teach. The program (consisting of 18 hours of mathematics and 13-16 hours of Teacher Leader courses) is offered entirely online; however, electives are also available on the main campus. The expertise of the WKU mathematics faculty together with the convenience and flexibility of online classes make this an ideal program for current teachers. For more information, visit the website: http://www.wku.edu/math/grad_ma.php

Graduate Assistantships

The monetary value of a graduate assistantship is currently (2016) valued at \$9,000 per semester (or \$18,000 for the academic year), however this may increase in future years. Graduate assistants are reviewed each semester and may be reappointed. Competitive summer graduate assistantships may be available. For second year graduate students who have excelled in the program the department has a limited number of Premium assistantships available. The monetary value of a premier assistantship is currently valued at \$11,000 per semester (or \$22,000 for the academic year), however this may increase in future years. Students should submit applications for admission to the Graduate School. For more information, visit: http://www.wku.edu/graduate/prospective_students

Department and University

The Mathematics Department at WKU is part of the Ogden College of Science and Engineering. The faculty consists of over 40 members and all graduate faculty members are active in research and have published widely in pure and applied mathematics, statistics and mathematical education. The department has also established a strong record of research among graduate and undergraduate students.

Western Kentucky University enrolls about 20,000 undergraduate/graduate students, including many minority students and international students. The University offers an inviting, nurturing, and challenging environment that is responsive to the intellectual, social, and cultural needs of a diverse learning community.

Community

Located in south-central Kentucky, Bowling Green is a city of 63,000 with a cultural and religious diversity not typically found in communities of its size. Bowling Green has expanding industrial and retail bases and offers many theater and concert opportunities. Numerous restaurants are available and recreational activities are offered at city, state, and national parks, golf courses, and lakes. Nearby attractions include Mammoth Cave National Park and the National Corvette Museum. For more information, visit: <http://www.wku.edu/about/aboutbg/index.php>

For further information, please visit http://www.wku.edu/math/grad_ms.php, or contact:

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