MATHEMATICS, MASTER OF SCIENCE (085)

Program Coordinator
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The M.S. in Mathematics offers three concentrations: general, computational mathematics, and mathematical economics. The 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, to teach in a community college, or to seek employment in industry with an emphasis on conceptual foundations. The 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 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.

Concentration(s)

- General (MAGN)
- Computational Mathematics (MACM)
- Mathematical Economics (MAME)

Joint Undergraduate Master's Program (JUMP)

This degree offers a Joint Undergraduate Master's Program (JUMP) which provides academically outstanding students the opportunity to complete both an undergraduate and graduate degree in approximately five years. Contact the graduate program coordinator for additional information.

Program Admission

General Concentration

1. One of the following:
   a. A minimum GAP score of 600 [GAP = (GRE-V + GRE-Q) + (Undergraduate GPA x 100)] or a minimum GAP score of 3000 for students who took the GRE prior to August 2011 [GAP = (GRE-V + GRE-Q) x Undergraduate GPA] **Students who took the GRE prior to 2002 should contact the graduate advisor of the program;*
   b. A GRE score of at least 300;
   c. For students that graduate from WKU with a mathematics major, a GPA of at least 3.3 in their mathematics major.
2. Completion of the following undergraduate courses:
   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 3.0 (on a 4.0 scale) in at least one of the following:
   a. all mathematics courses that are applicable to the undergraduate mathematics major;
   b. courses specified in (b) through (e) of Item 2 above.

Computational Mathematics Concentration

1. One of the following:
   a. A minimum GAP score of 600 [GAP = (GRE-V + GRE-Q) + (Undergraduate GPA x 100)] or a minimum GAP score of 3000 for students who took the GRE prior to August 2011 [GAP = (GRE-V + GRE-Q) x Undergraduate GPA] **Students who took the GRE prior to 2002 should contact the graduate advisor of the program;*
   b. A GRE score of at least 300;
   c. For students that graduate from WKU with a mathematics major, a GPA of at least 3.3 in their mathematics major.
2. Completion of the following undergraduate courses:
   a. one year calculus sequence;
   b. linear algebra;
   c. discrete mathematics;
   d. one year sequence of programming courses;
   e. 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:
   a. all mathematics and computer science courses that are listed in (a) through (d) of Item 2 above; or
   b. all courses in the major listed in (e) of Item 2 above. Students cannot enter the program if they have a deficiency in the courses listed in Item 2 above.

Mathematical Economics Concentration

1. One of the following:
   a. GRE score of at least 300 with a minimum quantitative score of 147
   b. WKU graduates majoring in mathematics, minimum GPA of 3.3 in the major
   c. WKU graduates majoring in mathematical economics, minimum GPA of 3.3 in the major
   d. WKU graduates majoring in economics or business economics, minimum GPA of 3.3 in the major and 3.3 in 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

Please refer to the admission section (http://catalog.wku.edu/graduate/admission) of this catalog for Graduate School admission requirements.

Program Requirements (30 hours)

The Master of Science in Mathematics requires a minimum of 30 hours of graduate level mathematics courses. A research tool is required and may entail coursework beyond the 30 hours of mathematics. The research tool must be completed during the first 15 hours of coursework and may be fulfilled by a mathematics reading course such as MATH 598, a computer science course, a foreign language examination, or a research course in anther discipline which has a strong relation to mathematics as approved

by the student's graduate advisor. A maximum of 12 hours at the 400G level may be included on the program of study.

A student may, upon prior approval of the Mathematics Department Graduate Committee, include in his/her program a maximum of 6 hours of coursework from a related field. Comprehensive exams are required only for students who choose not to write a thesis.

General Concentration

Code	Title	Hours
Required Courses		
MATH 431G	Intermediate Analysis I	3
MATH 450G	Complex Variables	3
MATH 417G	Algebraic Systems [1]	3
or MATH 435G	Partial Differential Equations	
or MATH 439G	Topology I	
MATH 532	Real Analysis	3
or MATH 535	Advanced Applied Mathematics- I	
or MATH 541	Graph Theory	
or MATH 550	Complex Analysis	
Electives		
Select 18 hours from the following:		18
MATH 405G	Numerical Analysis I	
MATH 406G	Numerical Analysis II	
MATH 415G	Algebra and Number Theory	
MATH 417G	Algebraic Systems	
MATH 423G	Geometry II	
MATH 435G	Partial Differential Equations	
MATH 439G	Topology I	
MATH 470G	Introduction to Operations Research	
MATH 500	Readings in Mathematics	
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	
MATH 550	Complex Analysis	
MATH 570	Topics in Operations Research	
MATH 590	Special Topics in Mathematics	
MATH 598	Graduate Seminar: Communicating Mathematics and Technical Writing	
MATH 599	Thesis/Research [2]	
STAT 549	Statistical Methods I	
STAT 550	Statistical Methods II	
Total Hours		30

[1] If equivalent courses were taken at the undergraduate level, then the student must substitute appropriate graduate mathematics courses selected in consultation with a Mathematics Department graduate advisor.

[2] Students who choose to write a thesis are required to complete 6 hours of MATH 599 and give an oral defense of the thesis.

Computational Mathematics Concentration

Students in the computational mathematics concentration must have a working knowledge of a high-level programming language. The computer science classes required in this option do not allow for additional courses in a related field.

Code	Title	Hours
Required Courses		
MATH 405G	Numerical Analysis I [1]	3
MATH 470G	Introduction to Operations Research [1]	3
CS 549	Analysis of Algorithms [1]	3
STAT 549	Statistical Methods I	3
MATH 406G	Numerical Analysis II	3
Select two courses from the following:		6
CS 562	Parallel and Distributed Computing	
CS 565	Data Mining Techniques and Tools	
CS 595	Advanced Topics/Computer Science [2]	
Electives		
Select 9 hours from the following:		9
MATH 431G	Intermediate Analysis I	
MATH 504	Application of Technology to Problems in Mathematics	
MATH 540	Stochastic Processes	
MATH 541	Graph Theory	
MATH 542	Advanced Topics in Discrete Mathematics	
MATH 570	Topics in Operations Research	
MATH 590	Special Topics in Mathematics [2]	
MATH 599	Thesis/Research [3]	
STAT 550	Statistical Methods II	
Total Hours		30

[1] If equivalent courses were taken at the undergraduate level, then the student must substitute appropriate graduate mathematics courses selected in consultation with a mathematics department graduate advisor.

[2] With advisor approval.

[3] Students who choose to write a thesis are required to complete 6 hours of MATH 599 and give an oral defense of the thesis.

Mathematical Economics Concentration

Students in the computational mathematics concentration must have a working knowledge of a high-level programming language. The computer science classes required in this option do not allow for additional courses in a related field. Comprehensive exams are not required.

Code	Title	Hours
Required Courses		
ECON 465G	Regression and Econometric Analysis [1]	3
ECON 502	Applied Microeconomic Theory	3
ECON 503	Applied Macroeconomic Theory	3
STAT 549	Statistical Methods I	3
MATH 431G	Intermediate Analysis I [1]	3
or MATH 482G	Probability & Statistics II	

MATH 531	Advanced Differential Equations	3
or STAT 550	Statistical Methods II	
Electives		
Select 12 hours from the following: [1]		12
MATH 405G	Numerical Analysis I	
MATH 406G	Numerical Analysis II	
MATH 431G	Intermediate Analysis I	
MATH 470G	Introduction to Operations Research	
MATH 482G	Probability & Statistics II	
MATH 529	Applied Probability	
MATH 531	Advanced Differential Equations	
MATH 532	Real Analysis	
MATH 540	Stochastic Processes	
MATH 541	Graph Theory	
MATH 542	Advanced Topics in Discrete Mathematics	
MATH 570	Topics in Operations Research	
MATH 590	Special Topics in Mathematics [2]	
MATH 598	Graduate Seminar: Communicating Mathematics and Technical Writing [3]	
MATH 599	Thesis/Research [4]	
STAT 550	Statistical Methods II	
ECON 594	Forecasting	
Total Hours		30

1 If equivalent courses were taken at the undergraduate level, then the student must substitute appropriate graduate mathematics courses selected in consultation with a mathematics department graduate advisor.

2 With advisor approval.

3 Required for non-thesis students.

4 Students who choose to write a thesis are required to complete 6 hours of MATH 599 and give an oral defense of the thesis.