Click to verify

Math department umd

4176 Campus Drive - William E. Kirwan Hall College Park, MD 20742-4015 P: 301.405.5047 | F: 301.314.0827Give to the Math Department Program Director: Larry Washington, Ph.D. The program in Mathematics leads to a degree of Bachelor of Science in Mathematics and offers students training in preparation for graduate work, teaching, and positions in government or industry. Mathematical training is integrated with computer use in several courses. Because a strong mathematical background is important in many fields, over half of UMCP Mathematics majors are double majors. Additional information on these topics and mathematics is available from the departmental website. Placement in Courses The Department of Mathematics has a large offering to accommodate a great variety of background, interests, and abilities. The department permits students to take any course for which they have the appropriate background, regardless of formal course work. For example, students with a high school calculus course may be permitted to begin in the middle of the calculus sequence even if they do not have advanced standing. Students may obtain undergraduate credit for mathematics courses in any of the following ways: passing the appropriate CEEB Advanced Placement Examination, passing standardized CLEP examinations, and through the department's credit-by-examinations. Students are urged to consult with advisors from the Department of Mathematics to assist with proper placements. Program Objectives The Department of Mathematics educates its majors in a broad range of modern mathematics while instilling in them a strong ability to solve problems, apply mathematics to other areas, and create rigorous mathematical arguments. The program prepares the majors to further their mathematical education in graduate school, or to teach at the secondary school level, or to work in government or business. Program Learning Outcomes Students will acquire problem-solving skills in a broad range of significant mathematics. Students will gain an understanding of what constitutes mathematical thinking, including the ability to produce and judge the validity of rigorous mathematical arguments. Students will be able to communicate mathematical ideas and arguments. Students will be prepared to use mathematics in their future endeavors, not only in the discipline of mathematics, but also in other disciplines. Statistics and Probability and Applied Mathematics Courses in statistics and probability, and applied mathematics are offered by the Department of Mathematics. These courses are open to non-majors as well as majors, and carry credit in mathematics. Students wishing to concentrate in the above may do so by choosing an appropriate program under the Department of Mathematics. There are four tracks for the major: the traditional track, the applied mathematics track, the secondary education track, and the statistics track. The secondary education track is for students seeking to become certified to teach mathematics at the secondary level. Each mathematics major must complete each required course with a grade of C- or better and with an overall major GPA of 2.0. Traditional Track Course Title Credits MATH140Calculus I4 MATH141Calculus II4 MATH240Introduction to Linear Algebra4 MATH241Calculus III4 MATH310Introduction to Mathematical Proof3 3 Differential Equations for Scientists and Engineers Differential Geometry of Curves and Surfaces I Partial Differential Equations 2 MATH410Advanced Calculus I3 3 Applications of Linear Algebra Introduction to Abstract Algebra Linear Algebra 3 Computational Methods Introduction to Numerical Analysis I 3 3-6 Advanced Calculus Iand Advanced Calculus II Introduction to Abstract Algebraand Field Theory Introduction to Abstract Algebraand Linear Algebra Introduction to Probability Theoryand Theory and Methods of Statistics 3, 46-9 3-4 Introduction to C Programming Object-Oriented Programming I Object-Oriented Programming II Computing Fundamentals for Engineers Intermediate Programming Concepts for Engineers Introduction to Scientific Programming 9-13 General Physics: Mechanics and Particle Dynamics General Physics: Electricity, Magnetism and Thermodynamicsand General Physics: Mechanics, Vibrations, Waves, Heat (Laboratory) General Physics: Waves, Optics, Relativity and Modern Physicsand General Physics: Electrodynamics, Light, Relativity and Modern Physics (Laboratory) Introductory Physics: Mechanics Introductory Physics: Fields Introductory Physics: Oscillations and Waves Mechanics I General Physics: Mechanics and Particle Dynamics Mechanics II Object-Oriented Programming I Object-Oriented Programming II Introduction to Computer Systems Principles of General Chemistryand Introduction to Laboratory Practices and Research in the Chemical Sciences Principles of Organic Chemistry I Principles of Organic Chemistry II Chemistry I - Fundamentals of General Chemistryand General Chemistry I Laboratory Organic Chemistry Iand Organic Chemistry Laboratory I Organic Chemistry IIand Organic Chemistry Laboratory II Principles of Microeconomics Principles of Macroeconomics Intermediate Macroeconomic Theory and Policy Intermediate Microeconomic Theory & Policy Intermediate Macroeconomic Analysis Intermediate Microeconomic Analysis Principles of Accounting I Principles of Accounting II Business Finance Total Credits55-66 Applied Mathematics Track Course Title Credits MATH140Calculus I4 MATH141Calculus II4 MATH240Introduction to Linear Algebra4 MATH241Calculus III4 MATH310Introduction to Mathematical Proof3 3 Differential Equations for Scientists and Engineers Differential Geometry of Curves and Surfaces I Partial Differential Equations 2 MATH410Advanced Calculus I3 STAT410Introduction to Probability Theory3 3 MATH401Applications of Linear Algebra3 or MATH405 Linear Algebra AMSC460Computational Methods3 or AMSC466 Introduction to Numerical Analysis I 3 Applied Harmonic Analysis: An Introduction to Signal Processing Mathematical Modeling Introduction to the Mathematics of Finance Geometry for Computer Applications Introduction to Dynamics and Chaos Cryptography Partial Differential Equations Complex Variables Transform Methods Combinatorics and Graph Theory 3 Advanced Calculus Iand Advanced Calculus II Applied Harmonic Analysis: An Introduction to Signal Processingand Transform Methods Partial Differential Equationsand Complex Variables Introduction to Probability Theoryand Theory and Methods of Statistics 3 Introduction to C Programming Object-Oriented Programming I Object-Oriented Programming II Computing Fundamentals for Engineers Intermediate Programming Concepts for Engineers Introduction to Scientific Programming 9-13 General Physics: Mechanics and Particle Dynamics General Physics: Electricity, Magnetism and Thermodynamicsand General Physics: Mechanics, Vibrations, Waves, Heat (Laboratory) General Physics: Waves, Optics, Relativity and Modern Physicsand General Physics: Electrodynamics, Light, Relativity and Modern Physics (Laboratory) Introductory Physics: Mechanics Introductory Physics: Fields Introductory Physics: Oscillations and Waves Mechanics I General Physics: Mechanics and Particle Dynamics Mechanics II Object-Oriented Programming I Object-Oriented Programming II Introduction to Computer Systems Principles of General Chemistryand Introduction to Laboratory Practices and Research in the Chemical Sciences Principles of Organic Chemistry I Principles of Organic Chemistry II Chemistry I - Fundamentals of General Chemistryand General Chemistry I Laboratory Organic Chemistry Iand Organic Chemistry Laboratory I Organic Chemistry IIand Organic Chemistry Laboratory II Principles of Microeconomics Principles of Macroeconomics Intermediate Macroeconomic Theory and Policy Intermediate Microeconomic Theory & Policy Intermediate Macroeconomic Analysis Intermediate Microeconomic Analysis Principles of Accounting I Principles of Accounting II Business Finance Principles of Molecular & Cellular Biologyand Principles of Molecular & Cellular Biology Laboratory Principles of Ecology and Evolutionand Principles of Ecology and Evolution Lab Chemistry I - Fundamentals of General Chemistryand General Chemistry I Laboratory Principles of General Chemistryand Introduction to Laboratory Practices and Research in the Chemical Sciences Introductory Astrophysics - Solar System Introductory Astrophysics II - Stars and Beyond 5 General Physics: Mechanics and Particle Dynamics Introductory Physics: Mechanics Physical Geology Mineralogy Geomorphology Structural Geology Introduction to the Blue Ocean Weather and Climateand Weather and Climate Laboratory Total Credits52-56 Secondary Education Track Course Title Credits MATH140Calculus I4 MATH141Calculus II4 MATH240Introduction to Linear Algebra4 MATH241Calculus III4 MATH310Introduction to Mathematical Proof3 3-4 Differential Equations for Scientists and Engineers Multivariable Calculus, Linear Algebra, Differential Equations II (Honors) Applications of Linear Algebra Mathematical Modeling Introduction to Dynamics and Chaos Partial Differential Equations Computational Methods Introduction to Numerical Analysis I MATH410Advanced Calculus I3 MATH430Euclidean and Non-Euclidean Geometries3 MATH402Algebraic Structures3 or MATH403 Introduction to Abstract Algebra STAT400Applied Probability and Statistics I3 or STAT410 Introduction to Probability Theory 3 Introduction to Number Theory Elementary Mathematical Logic Axiomatic Set Theory Cryptography Combinatorics and Graph Theory 3 3-4 Introduction to C Programming Object-Oriented Programming I Object-Oriented Programming II Computing Fundamentals for Engineers Intermediate Programming Concepts for Engineers Introduction to Scientific Programming TLPL478Professional Seminar in Education (TLPL478D: Professional Seminar in Education: Mathematics)1 TLPL488Special Topics in Education (TLPL488B: Teaching Academically, Culturally and Linguistically Diverse Students in Secondary Education)2 TLPL489Internship in Education (TLPL489D: Internship in Education: Mathematics)12 7-8 Chemistry I - Fundamentals of General Chemistryand General Chemistry I Laboratory Organic Chemistry Iand Organic Chemistry Laboratory I General Physics: Mechanics and Particle Dynamics General Physics: Electricity, Magnetism and Thermodynamicsand General Physics: Mechanics, Vibrations, Waves, Heat (Laboratory) Principles of Molecular & Cellular Biologyand Principles of Molecular & Cellular Biology Laboratory Principles of Ecology and Evolutionand Principles of Ecology and Evolution Lab Introductory Astrophysics - Solar System Introductory Astrophysics II - Stars and Beyond Physical Geologyand Physical Geology Laboratory Mineralogy Geomorphology Structural Geology Introduction to the Blue Ocean Weather and Climateand Weather and Climate Laboratory Total Credits62-65 Statistics Track Course Title Credits MATH140Calculus I4 MATH141Calculus II4 MATH240Introduction to Linear Algebra4 MATH241Calculus III4 MATH310Introduction to Mathematical Proof3 3 Differential Equations for Scientists and Engineers Differential Geometry of Curves and Surfaces I Partial Differential Equations MATH410Advanced Calculus I3 STAT410Introduction to Probability Theory3 STAT430Introduction to Statistical Computing with SAS3 AMSC460Computational Methods3 or AMSC466 Introduction to Numerical Analysis I MATH401Applications of Linear Algebra3 or MATH405 Linear Algebra STAT401Applied Probability and Statistics II3 or STAT420 Theory and Methods of Statistics 6 3 Advanced Calculus II Mathematical Modeling Introduction to the Mathematics of Finance Transform Methods 3-4 Introduction to C Programming Object-Oriented Programming I Object-Oriented Programming II Computing Fundamentals for Engineers Intermediate Programming Concepts for Engineers Introduction to Scientific Programming 9-13 General Physics: Mechanics and Particle Dynamics General Physics: Electricity, Magnetism and Thermodynamicsand General Physics: Mechanics, Vibrations, Waves, Heat (Laboratory) General Physics: Waves, Optics, Relativity and Modern Physicsand General Physics: Electrodynamics, Light, Relativity and Modern Physics (Laboratory) Introductory Physics: Mechanics Introductory Physics: Fields Introductory Physics: Oscillations and Waves Mechanics I General Physics: Mechanics and Particle Dynamics Mechanics II Object-Oriented Programming I Object-Oriented Programming II Introduction to Computer Systems Principles of General Chemistryand Introduction to Laboratory Practices and Research in the Chemical Sciences Principles of Organic Chemistry I Principles of Organic Chemistry II Chemistry I - Fundamentals of General Chemistryand General Chemistry I Laboratory Organic Chemistry Iand Organic Chemistry Laboratory I Organic Chemistry IIand Organic Chemistry Laboratory II Principles of Microeconomics Principles of Macroeconomics Intermediate Macroeconomic Theory and Policy Intermediate Microeconomic Theory & Policy Intermediate Macroeconomic Analysis Intermediate Microeconomic Analysis Principles of Accounting I Principles of Accounting II Business Finance Total Credits58-63 Other Requirements for the Major Areas of Study Within the Department of Mathematics there are a number of identifiable areas which students can pursue to suit their own goals and interests. They are briefly described below. Note that they do overlap and that students need not confine themselves to one of them. 1. Pure Mathematics Courses that belong to this area include: Course Title Credits MATH402Algebraic Structures3 MATH403Introduction to Abstract Algebra3 MATH404Field Theory3 MATH405Linear Algebra3 MATH406Introduction to Number Theory3 MATH410Advanced Calculus I3 MATH411Advanced Calculus II3 MATH430Euclidean and Non-Euclidean Geometries3 MATH432Introduction to Topology3 MATH436Differential Geometry of Curves and Surfaces I3 MATH437Differential Forms3 MATH445Elementary Mathematical Logic3 MATH452Introduction to Dynamics and Chaos3 MATH456Cryptography3 STAT410Introduction to Probability Theory3 STAT420Theory and Methods of Statistics3 MATH403Introduction to Abstract Algebra3 MATH405Linear Algebra3 MATH410Advanced Calculus I3 MATH411Advanced Calculus II3 MATH463Complex Variables3 or MATH660 Complex Analysis I MATH432Introduction to Topology (is also desirable)3 or MATH730 Fundamental Concepts of Topology Other courses from the above list and graduate courses are also appropriate. 2. Secondary Teaching In addition to the courses required by the Secondary Education Track, the following courses are particularly suited for students preparing to teach: Course Title Credits MATH401Applications of Linear Algebra3 MATH406Introduction to Number Theory3 MATH445Elementary Mathematical Logic3 MATH470Mathematics for Secondary Education3 MATH475Combinatorics and Graph Theory3 Students who are interested in secondary teaching should contact also the College of Education for certification requirements and other information: www.education.umd.edu/studentinfo. 3. Statistics For a student with a Bachelor's degree seeking work requiring some statistical background, the minimal program is STAT400-STAT401. To work primarily as a statistician, one should combine STAT400-STAT401 with STAT430 and at least one more statistics course, most suitably, STAT440. A deeper sequence is STAT410, STAT420, STAT430. This offers a better understanding and wider knowledge of statistics and is a general purpose program (i.e., does not specify one area of application). For economics applications, 4. Computational Mathematics There are a number of math courses which emphasize the computational aspects of mathematics including the use of the computer. They are: Course Title Credits AMSC460Computational Methods3 AMSC466Introduction to Numerical Analysis I3 MATH431Geometry for Computer Applications3 MATH456Cryptography3 MATH475Combinatorics and Graph Theory3 STAT430Introduction to Statistical Computing with SAS3 Students interested in this area should take the CMSC supporting sequence as soon as possible. 5. Applied Mathematics The courses that lead most rapidly to applications are the courses listed above in 3 and 4 and Course Title Credits MATH401Applications of Linear Algebra3 MATH416Applied Harmonic Analysis: An Introduction to Signal Processing3 MATH420Mathematical Modeling3 MATH452Introduction to Dynamics and Chaos3 MATH462Partial Differential Equations3 MATH464Transform Methods3 A student interested in applied mathematics should obtain, in addition to a solid training in mathematics, a good knowledge of at least one area in which mathematics is currently being applied. Concentration in this area is good preparation for employment in government and industry or for graduate study in applied mathematics. Click here for roadmaps for graduation plans in the College of Computer, Mathematical, and Natural Sciences. Additional information on developing a graduation plan can be found on the following pages: HomeGraduate CatalogProgramsMathematics (MATH) Graduate Degree Program College: Computer, Mathematical, and Natural Sciences Abstract Three programs are currently closely affiliated with the Mathematics Department: the Mathematics Program (MATH), the Applied Mathematics & Statistics, and Scientific Computation Program (AMSC), and the Mathematical Statistics Program (STAT). Students applying for admission should use the appropriate symbol to indicate their program of interest. The interdisciplinary Applied Mathematics & Statistics, and Scientific Computation Program offers three concentrations, one in Applied Mathematics, one in Scientific Computation, and one in Applied Statistics. The Statistics Program is concerned with mathematical statistics and probability. The AMSC and STAT programs are described in detail elsewhere in this catalog. Students can earn a Doctor of Philosophy degree in the Mathematics Program. The Master's degree is not offered unless it is en route to a Ph.D. The master’s degree is not required for entrance to the Ph.D. program. The Mathematics Program offers graduate programs in Algebra and Algebraic Geometry, Complex Analysis, Dynamical Systems and Chaos, Geometry, Harmonic Analysis, Mathematical Logic, Number Theory, Numerical Analysis, Ordinary Differential Equations, Partial Differential Equations, Probability, Real and Functional Analysis, Representation Theory, Statistics and Topology. Financial Assistance The MATH program is expecting to support about 12 new doctoral students each Fall. Offers of support are generally made for up to six years, contingent on the student making satisfactory academic progress. Except for unusual circumstances, offers of financial aid will not be made to applicants seeking a Master’s degree. The normal teaching load is four to six hours per week of classroom teaching in addition to the duties of meeting with students and grading papers. Sometimes fellowships and research assistantships are also available. Contact Trystan Denhard, Program Manager Jemma Natanson, Program Coordinator Department of Mathematics 1106 William E Kirwan Hall 4176 Campus Drive University of Maryland College Park, MD 20742 Telephone: 301.405.5058 Email: math-grads@umd.edu Website: Courses: MATH Relationships: Applied Mathematics & Statistics, and Scientific Computation (AMSC) Mathematical Statistics (STAT) Letters of Recommendation (3) Graduate Record Examination (GRE) (optional) GRE Subject (Math) (Optional) CV/Resume Supplementary Application Writing Sample (optional) Advanced Textbooks (section of application) For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions Application Deadlines Type of Applicant Fall Deadline Domestic Applicants US Citizens and Permanent Residents December 10, 2024 International Applicants F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants December 10, 2024 Other Deadlines: Please visit the program website at The Department is actively involved in research in a number of areas, strengthened further by a complement of mathematicians from the Institute for Physical Science and Technology. The Department fosters a lively program of seminars and colloquia; about half of these talks are given by outside specialists. In addition the department has a tradition of hosting distinguished long term visitors who give series of seminar talks or teach semester long courses. The Engineering and Physical Sciences Library is located on the ground floor of the Mathematics Building and contains more than 95,000 volumes in mathematics, physics and engineering, and more than 280 journals in pure and applied mathematics. The Library of Congress, with its extensive collection of books and technical reports, is only a half hour from campus. The Department has a large network of computers mostly running Linux. The Department houses a computer classroom and a Mathematical Visualization Lab, and similar labs are scattered across campus. There are computers in almost all graduate student offices, and many of the other computers on campus are available for student use. The Department cooperates closely with the Institute for Physical Science and Technology and with the Department of Computer Science. Faculty members of both groups offer courses in the Department. Computer facilities are available to serve the research needs of both faculty and graduate students. Members of the Department participate actively in the interdisciplinary AMSC Program, and they also staff the Mathematical Statistics Program.