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Anyone trying to solve a problem can make observations and use the scientific method. Kathryn Scott Osler/Getty Images Remember, this is an idealized methodology. Scientists don't sit around with a five-step checklist that they feel obligated to follow. In fact, the process is quite fluid and open to interpretation and modification. One scientist might spend much of his career in the observation stage. Another scientist may never spend a great deal of time designing and running experiments. Darwin spent nearly 20 years analyzing the data he collected before he acted on it. In fact, much of Darwin's work was an intellectual pursuit, trying to fit the pieces of a puzzle together. And yet no one would argue that his theory of natural selection is less valuable, or less scientific, because he did not stringently follow a five-step process. It would also be appropriate to mention again that this method is not reserved for highly trained scientists — anyone trying to solve a problem can use it. To illustrate, consider this example: You (or a family member) is driving to the store when the car starts to overheat. The problem is clear in this case, as is the observation (a temperature warning light) that launches the investigation. But what is causing the car to overheat? One hypothesis could be that the thermostat stopped working. Another hypothesis could involve the radiator. Still another could be that the fan belt has broken. The simplest solution is often a good place to start, and the easiest thing to test in this case is the condition of the fan belt. If you find that the belt is indeed broken, then you can feel pretty confident that it is the source of the problem. However, a test is still required to be sure. The test in this case involves replacing the belt and running the car to see if it overheats. If it doesn't, you can accept your hypothesis about the fan belt. If the belt wasn't broken to begin with, or if the car continues to overheat even after you replace the belt, you'll need to revise your hypothesis. Perhaps you noticed that the example above didn't contain an "if ... then" hypothesis. You may have also noticed it didn't contain control and experimental groups. That's because day-to-day problem-solving doesn't require such formality. But it does require a logical approach and a progression of thinking that results in a testable hypothesis. So if anyone can use the scientific method, why has it become so intimately associated with fields like biology, chemistry and physics? Because pure researchers apply the scientific method with a rigor that nonscientists don't. We'll explore why in the next section. Progress at your own speedOptional upgrade availableMathematics has been playing an important role in data analysis from the very beginning; for example, Fourier analysis is one of the main tools in the analysis of image and signal data. This course is to introduce some mathematical methods for data analysis. It will cover mathematical formulations and computational methods to exploit specific structures contained in the data. Some special machine learning algorithms are introduced in case studies.Institution: HKUSTXSubject: MathLevel: IntermediatePrerequisites: Language: EnglishVideo Transcript: EnglishAssociated programs:MicroMasters® Program in Big Data Technology Vector spaces, metrics and convergence Case study: Clustering, k-means, k-medians Inner product, Hilbert space Case study: Kernel trick, kernel k-means; metrics learning Linear functions and differentiation Case study: Regression and classification; optimality and gradient descent Chapter 1: Introduction to mathematical analysis tools for data analysis Chapter 2: Vector spaces, metics and convergence Chapter 3: Inner product, Hilber space Chapter 4: Linear functions and differentiation Chapter 5: Linear transformations and higher order differentiations Unfortunately, learners residing in one or more of the following countries or regions will not be able to register for this course: Iran, Cuba and the Crimea region of Ukraine. 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Read on to learn about costs, common classes, and potential jobs for graduates. View Our Rankings List Here Questions About Mathematics Degrees What kind of jobs do math majors get? According to the BLS, 47% of mathematicians and statisticians work for the federal government. Graduates with an online master's degree in mathematics may also work as economists, tax examiners, actuaries, or college professors. What are the different fields of math? Common math fields include geometry, algebra, and statistics. Other fields include topology and number theory. Is math a BA or a BS? Colleges offer math degrees in both formats. A BA provides more flexibility and opportunities for electives. A BS offers a practical, deep look into a math specialty. Find a program that meets your affordability, flexibility, and education needs through an accredited, online school. Why Get a Degree in Mathematics? Professionals in nearly every industry use math. For example, business owners use math to calculate profits, pay employees, and conduct inventory. Graduates also use their mathematical knowledge in practical applications. People use math to invest, create budgets, and calculate interest rates. Earning a master's degree can lead to higher pay. Professionals with a bachelor's in math earn an average annual salary of \$80,000, according to Jan. 2022 Payscale data. Math majors with a master's degree earn \$83,000 on average. How Much Does a Mathematics Degree Cost? Master's degrees cost an average of \$66,340, according to EducationData.org. However, tuition depends on many factors, including school type and learners' residency status. Students pursuing a degree from a public, in-state school usually pay the most affordable tuition. Some online programs charge enrollees the same tuition, regardless of residency. Learners attending an online master's program in mathematics can save money compared to their on-campus peers. They can often continue working and earning an income while completing their degree. Online enrollees also do not pay for campus housing or meal plans. Additional Online Student Fees Online learners should budget for extra expenses, such as materials and books. Learners can save money by buying used or digital books. Some companies also rent books. Many math courses require textbooks or workbooks. Some programs charge technology fees to access a virtual classroom platform. Students may need to pay for a premium plan to a video conferencing service. Other costs may include advanced calculators and computing software. Specializations for Mathematics Learners pursuing an online master's degree in mathematics can typically choose a concentration. Some schools call them specializations, tracks, or minors. Students should consider their ideal career before choosing a specialization. See below for three common specializations in online master's programs in mathematics. Degree-seekers should check with their prospective schools to learn about specific offerings. Algebra involves the study of mathematical equations. These equations lead to answers for everyday problems. Enrollees study variables, constants, and expressions. They also learn how to apply linear and quadratic equations. Most STEM jobs require advanced algebraic knowledge. Graduates may work as market research analysts, professors, or carpenters.A subfield of geometry, trigonometry refers to the relationship between angles and triangle sides. Since many of the earth's features resemble triangles, this field features many real-world applications. Statisticians, actuaries, and architects need trigonometry knowledge.This specialization involves interpreting and presenting data. Enrollees learn how to draw conclusions from data using logic. Learners also discover how to present data in graphs and reports. Graduates may work as statisticians, business analysts, or software engineers. Find a program that meets your affordability, flexibility, and education needs through an accredited, online school. Career and Salary Outlook for Mathematics Jobs The BLS projects math jobs to grow 28% from 2020-2030. This rate exceeds the projected 8% growth for all occupations. Professionals working in math jobs earn a median annual wage of \$93,170. See below for three possible careers for students who graduate from an online master's program in mathematics. These professionals collect and analyze data. They present their findings to help solve problems and make business decisions. They must know how to communicate data in easy-to-understand terms. Statisticians often work for research organizations. Mathematicians typically work for the federal government.Economists also analyze data. However, they focus on researching trends for economic issues. They use gathered information to make projections on the distribution of goods. Economists also make recommendations to solve financial issues like inflation. The federal government employs 25% of economists.Actuaries use a combination of math subjects to analyze risk and uncertainty. They must understand statistics and financial theory. These workers study how natural disasters and sicknesses can impact economic health. Actuaries often design insurance policies and make investment recommendations. They design business strategies that produce the lowest financial risk. Source: Bureau of Labor Statistics Top Online Master's Programs in Mathematics true#1 –Ball State University Website Points: 15 Ball State University offers two online master's in mathematics education degree programs: a Masters in Mathematics Education (K-12) and a Masters in Post-Secondary Mathematics Education. The K-12 program offers further customization options through 3 concentrations: elementary and middle school teachers, secondary school teachers, and elementary and middle school specialists. Sample course titles include Teaching Mathematics through Problem Solving, Research Methods in Mathematics Education, and Technology for Math Teachers. Course delivery is asynchronous, meaning students of the master's in mathematics can complete the online program at their own pace. In-State Tuition: \$8,554 true#2 –Texas A&M University- College Station Website Points: 10 Texas A&M University- College Station offers an online master's in mathematics degree program featuring specializations in Mathematics Teaching and Computational Mathematics. This 36-semester hour program is a non-certification offering that can be completed within two to three years. The curriculum is prescribed and features courses such as History of Mathematics, Numerical Analysis, Iterative Techniques, and Linear Algebra. Master's in mathematics online students receive the same diploma as on-campus students. In-State Tuition: \$5,941 true#3 –University of Texas- Rio Grande Valley Website Points: 9 The University of Texas- Rio Grande Valley offers a versatile online masters in mathematics program featuring four distinct tracks: Mathematics, Industrial and Applied Mathematics, Mathematics Teaching, and Statistics. Depending on their chosen concentration, enrolled students will take courses like Ordinary Differential Equations, Mathematics Teaching and Learning, Algebraic Geometry, Integrating Technology into Mathematics, and Numerical Methods for Partial Differential Equations. As a capstone, online masters in mathematics degree students will complete a thesis, project, or comprehensive exam. In-State Tuition: \$5,550 true#4 –Kansas State University Website Points: 9 Kansas State University's College of Education offers a 31-credit hour online master's in mathematics education. The curriculum for the program is comprehensive and covers topics such as teaching and learning, educational technology, diversity, curriculum, and research and scholarship. Specific course titles include Advanced Methods for Teaching Mathematics K-12, Theoretical Methods of Mathematics Teaching and Learning, Assessment in Mathematics Education, and History of Mathematics Education. Scholarships are available for qualified master's in mathematics online students. In-State Tuition: \$9,960 true#5 –Chadron State College Website Points: 8 Chadron State College offers a masters in mathematics program online that features two tracks: a thesis track and a scholarly project track. Despite which track they choose, students will take educational core courses such as Statistical Methods and Data Analysis, Curriculum Development, Research Design and Data Analysis, and Sampling Techniques. 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