

What Can I Do With a Mathematics Degree?

Careers in Mathematics

**MATHEMATICS
AT
MACON STATE COLLEGE**

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An undergraduate major in mathematics is good preparation for a variety of careers, many of which make no special use of mathematics itself, but do require the ability to reason carefully and express oneself clearly. Listed below are some of the careers that make explicit use of undergraduate training in mathematics:

Actuary

An actuary is a business professional who deals with the financial impact of risk and uncertainty. Actuaries are experts in financial security systems; their reasons for being, their complexity, and their mathematics. They evaluate the likelihood of events and quantify the outcomes in order to minimize losses associated with uncertain undesirable events. Actuaries are employed by insurance companies, pension plans, businesses, consulting firms and government agencies such as the Social Security Administration, all which face risk and uncertainty. To become an actuary, one must pass a series of examinations administered by the Society of Actuaries. The initial exams are primarily mathematics, including probability and statistics, and can be taken while still an undergraduate student.

Benefits Specialist

Benefits specialists are responsible for overall design, implementation, communication, and administration of the organization's compensation and benefits program. They ensure that compensation and benefit programs support the organization's strategic objectives. They are also responsible for the development and administration of all benefits programs that are designed to attract and retain employees within budgetary constraints.

Financial Analyst

Financial analysts read company financial statements and analyze commodity prices, sales, costs, expenses, and tax rates in order to determine a company's value and to project its future earnings. They often meet with company officials to gain a better insight into the firm's prospects and to determine its managerial effectiveness. Usually, financial analysts study an entire industry, assessing current trends in business practices, products, and industry competition. They must keep abreast of new regulations or policies that may affect the industry, as well as monitor the economy to determine its effect on earnings.

Investment Analyst

Investment analysts provide analysis and guidance to businesses and individuals to help them with their investment decisions. Both types of specialists gather financial information, analyze it, and make recommendations to their clients. They assess the economic performance of companies and industries for firms and institutions with money to invest.

Applications Programmer

Applications programmers write and test programs to handle a specific job, such as a program to track inventory within an organization. They may also revise existing packaged software or customize generic applications called middleware.

Computational Scientist

A computational scientist is an applied mathematician who interprets problems arising from the physical sciences and engineering in mathematical form and develops mathematical solutions to these problems. Computation scientist use large and sophisticated computers are intensively. Potential employers include government laboratories, the chemical industry, and the biotech industry.

Computer Applications Software Engineer

Computer applications engineers analyze users' needs and design, construct, and maintain general computer applications software of specialized utility programs. Some develop both packaged systems and systems software or create customized applications.

Computer Programmer

Compuer programmers write, test, and maintain programs or software that tells the computer what to do. They convert project specifications and statements of problems and procedures to detailed logical flow charts for coding into computer language. They develop and write computer programs to store, locate, and retrieve specific documents, data, and information.

Computer Systems Analyst

Computer systems analysts solve computer problems and apply computer technology to meet the individual needs of an organization. They help an organization to realize the maximum benefit from its investment in equipment, personnel, and business processes. Most systems analysts work with specific types of systems - for example, business, accounting, or financial systems, or scientific and engineering systems - that vary with the kind of organization.

Cryptanalyst

Cryptanalysts analyze and decipher secret coding systems and decode messages for military, political, or law enforcement agencies or organizations. They help provide privacy for people and corporations, and keep hackers out of important data systems. Cryptanalysts seek to secure many of the following information systems including the Internet, e-mail, and home banking.

Database Administrator

Database managers work with database management systems software and determine ways to organize and store data. They identify user requirements, set up computer databases, and test and coordinate modifications to the computer database systems. A database manager ensures the performance of the system and may also design and implement system security.

College or University Professor

College and university professors make up the majority of postsecondary teachers. They teach and advise college students and perform a significant part of our nation's research. They also keep up with new developments in their field and may consult with government, business, nonprofit, and community organizations. They may also conduct research to expand knowledge in their field. Professors must have a doctorate degree in their field of study.

Community College Instructor

Community College instructors teach one or more classes within specific academic or occupational areas in community colleges. Most of them prepare their students to transfer to four-year degree programs by teaching courses that are equivalent to the lower division level of four-year institutions. Others teach classes for occupational fields in technology, industry, and trade. Instructors must at least have a Master's degree.

Teacher

Teachers teach students either single subject or multi-subject classes. Teachers play a vital role in the development of children. Math and science teachers are in high demand in the United States. Teachers must complete a credential program and be licensed in their respective state.

Operations Research Analyst

Operations research analysts work with an organization's management team to define a performance or inventory problem. The analyst then breaks the problem down into its basic parts and analyzes each part to determine how best to increase efficiency and lower costs. Some of the larger employers of operations research analysts include telecommunications firms, air carriers, computer and data processing firms, financial institutions and the federal government.

Systems Analyst

Systems analysts interact with others in a variety of disciplines, depending on their particular industry, and strive to ensure that the individual parts can work together to perform a desired function. These analysts are the middleman between the end-user and the computer system. They assess the needs of the end-user and translate them into programming.

Biometrician

Biometricians, or biostatistician, are specialized statisticians in public health and medicine. They prepare analysis plans and write detailed specifications for analysis files, consistency checks, table, and figures. The biometrician interprets analyses and writes statistical sections of study reports.

Demographer

Demographers study human population dynamics. They study the size structure, and distribution of populations, and how populations change over time due to births, deaths, migration, and aging. They analyze the relationships between economic, social, cultural, and biological processes influencing the population.

Econometrician

An econometrician uses economic theories, statistical methods, and forecasting techniques to develop models. They feed data on possible future economic situations into models to see the likely results and wider implications of particular actions and advise industry or government on possible costs resulting from their policy decisions.

Psychometrician

Psychometricians develop, administer, and score tests and exams. They use mathematical techniques to evaluate the large sets of data from tests. They use techniques such as factor analysis, multidimensional scaling, and data clustering. School districts and test publishers often employ psychometricians.

Quality Control Analyst

Quality control analysts conduct tests and inspections of products, services, or processes to evaluate their quality and performance. They develop systems to ensure products or services are designed and produced to meet or exceed customer requirements. Keeping the probability of an unexpected failure to a minimum is the main responsibility of the quality control analyst.

Statistician

Statisticians work with the theoretical and applied statistics in the private and public sectors. The core of their work is to measure, interpret, and describe the world. It is common to combine statistical knowledge with expertise in other subjects. Statisticians apply their knowledge to production, research, finances, medicine, insurance, and government. They often are employed to support managerial decisions. Typical work might involve developing a model and sampling plans, analyzing survey results, or contributing to agricultural or econometric forecasts.

Applied Mathematician

Applied mathematicians use theories and techniques, such as mathematical modeling and computational methods, to formulate and solve practical problems in business, government, and engineering and in the physical, life, and social sciences. Applied mathematicians start with a practical problem, envision the separate elements of the process under consideration, and then reduce the elements to mathematical variables. They often use computers to analyze relationships among the variables and solve complex problems by developing models.

Business Analyst

Business analysts analyze and propose ways to improve an organization's structure, efficiency, and/or profits. They determine what resources will be required and what problems may be encountered in a certain project. They analyze relevant data then develop solutions to the problem. They build and solve mathematical models to gain insight into the problem.

Communications Engineer

Communications engineers plan and manage projects, ensuring that they are delivered on time, within budget, and to the agreed standards of quality. They test theoretical designs and provide technical guidance to others within the organization. Communications engineers work in a number of sectors, including Internet and computing technologies, networking and telecommunications, and radio.

Economic Analyst

Economic analysts conduct research, collect and analyze data, monitor economic trends, and develop forecasts. They devise methods and procedures for obtaining the data they need. They must present economic and statistical concepts in a clear and meaningful way.

Investment Manager

Investment managers mostly work for large financial institutions such as a bank, life insurance, or trust company. They oversee the daily activities for the company's investment operations and manage investment portfolios of clients.

Market Researcher

Market researchers are concerned with the potential sales of a product or service. They gather statistical data of competitors and examine prices, sales, and methods of marketing and distribution. They analyze data on past sales in order to predict future sales.

Product Developer

A product developer plans and develops new products. They research what consumers' wants and needs and create a timeline for the project. They are responsible for taking a product from the drawing board to actually being produced and put onto the market to sell.

Biomathematician

The biomathematics field is the intersection of biology, mathematics, statistics, and computer science. They use mathematical tools to help understand complex, nonlinear mechanisms in biology. They also use analytical tools to understand data-rich information sets.

Biomedical Engineer

Biomedical engineers design, develop, and provide safety testing, repair, and maintenance of biomedical equipment. They ensure that the biomedical equipment is in compliance with applicable regulatory requirements and quality control standards.

Ecologist

Ecologists study the relationships among organisms and between organism and their environments, examining the effects of population size, pollutants, rainfall, temperature, and altitude. Ecologists may study and report data on the quality of air, food, soil, and water.

Emerging Fields

Computational Biology and Genomics

By now, we've all heard of terms like "genetic sequencing" and "human genome". The mapping of the human genome depended on the use of sophisticated mathematical and computational tools. Now that sequencing is complete, the next challenge is to understand how genes interact, how they are switched on or off, and how they differ from individual to individual. The need for newer and better mathematical and computational tools will create new career opportunities in technology, medicine, and drug development and design.

Computer Animation and Digital Imaging

To get an idea of what this field entails, consider the following description from the Fields Institute in Toronto. "Computer Animation is an eclectic science that uniquely combines mathematics, computer science, fine art, classical animation, physics, biomechanics, and anatomy, to name but a few fields. Algorithms for computer animation rely heavily on techniques from scientific computation, statistics, signal processing, linear algebra, control theory, and computational geometry." With a diverse and exciting set of applications to such areas as entertainment (movies, video games), medical diagnostics, and fine arts (dancing, sculpture, painting), there are many avenues to explore.

Data Mining

If you're looking for a broad mathematical area with lots of applications, look no further—data mining is the answer. Data mining involves the discovery of patterns and previously unknown information in large data sets. Emerging career opportunities will be found in applications of data mining in, for example, security, forensics, e-commerce, and sciences, such as genomics, astrophysics, and chemical engineering.

Neuroscience

As described by organizers at the Mathematical Biosciences Institute (MBI), beginning with "the discovery of the fundamental Hodgkin-Huxley equations, which model electrical impulses and oscillations in neurons, mathematicians have been involved in developing models and computational schemes for systems of neurons." This mathematical and computational research provides tools for the study of the brain, the progression of neurological diseases, and the emerging treatments for such diseases.

Materials Science

Materials science is the study of the properties, processing and production of a broad range of existing and new materials, including metallic alloys, composites, liquid crystals, biological materials, and thin films. The rational design and analysis of materials depends on mathematical models and computational tools. Career opportunities abound in science, manufacturing, and materials design for applications in fields such as aerospace, engineering, electronics and biology.