Mathematics

DIFFERENCES WITH OTHER PROGRAMMES

1. **What is the difference between the NUS Mathematics, Statistics and the Quantitative Finance programmes?**

   Mathematics deals with numbers, discrete and continuous quantities, geometric figures and images, etc. in all their generalities. It ranges from the most abstract and fundamental theories in pure mathematics to the most concrete methods and practical algorithms in applied mathematics. An undergraduate mathematics major paves the way for a variety of quantitative disciplines at the postgraduate level, including statistics, economics and management science.

   On the other hand, statistics deals with the collection and analysis of data and information in surveys, experiments, databases, etc. in order to reach conclusions or decide on a suitable course of action.

   The Quantitative Finance programme is specifically designed for students who want to pursue a career in the finance industry and the core courses focus on various areas of quantitative finance.

PROGRAMME INFORMATION

2. **What courses are offered in the mathematics programme?**

   The undergraduate mathematics degree programme offers a wide range of courses and a broad spectrum of mathematical research activities, some multidisciplinary in nature. The curriculum consists of fundamental mathematical concepts in areas including algebra; differential equations; geometry and topology; logic; number theory and combinatorics; and real and complex analysis. It also includes the study of mathematical methods and problem-solving techniques that are applied in science, engineering and computer science.

   You will have the option to pursue the following specialisations:

   - Operations Research and Data Analytics, which covers the application of analytical methods and mathematical models to solve problems in areas like industrial engineering, operations management and finance; and
   - Pure Mathematics, which covers advanced mathematics topics in algebra, analysis, mathematical logic and geometry

3. **Will I be learning mathematics that is very different from what is taught in Junior Colleges?**

   The topics are mostly new and are naturally at a higher level than what is required in Junior Colleges. You should also expect some changes in the emphasis of, and the way you deal with materials. You would need to develop analytical skills and learn more on fundamental ideas, proving techniques as well as the application of mathematical theories.

4. **Are the mathematics courses taught in the programme relevant to the real world?**

   Many mathematics courses in the programme prepare you with relevant skills to work in specific areas. Mathematics training in general will also equip you with analytical skills that are essential in many jobs in professional and executive careers. Here are some examples:

Real world application	Areas in mathematics
Internet: Search engines, compression	Graph theory, linear algebra, wavelets
Confidentiality	Number theory, cryptology / combinatorics
Global reconnaissance	Signal / image processing, data mining
Options valuation	Black-Scholes model and Monte Carlo simulation
Analysis of the human genome	Data mining, pattern recognition, algorithms
Rational drug design	Data mining, combinatorics, statistics
Magnetic Resonance Imaging (MRI) and computed tomography (CAT) imaging	Integral geometry, Fourier analysis, wavelet
Aerodynamic design	Differential equations
Visual effect	Computer graphics, differential equations
Modelling of oceans and atmosphere	Wavelets, statistics, numerical analysis
Earthquake analysis and prediction	Statistics, dynamical systems / turbulence

APPLICATION/ADMISSION

5. **How do I apply to read mathematics with the College of Humanities and Sciences?**

   To read Mathematics as the Primary Major, candidates should apply for admissions to the College of Humanities and Sciences (CHS). The Mathematics Major requires a good H2 pass (or equivalent) in Mathematics/Further Mathematics (or equivalent). Candidates without these prerequisites are required to read the corresponding bridging course in Mathematics in the first year of studies.

CAREER PROSPECTS

6. **What are the career prospects for mathematics graduates?**

   Mathematics, statistics and data science graduates are much in demand wherever quantitative analysis is needed and/or rigorous, objective, critical analysis is valued. They are widely employed in commerce, industry and government sectors. Our mathematics graduates can venture into careers in administration, education, financial analysis, info communications technology, information processing, operations management, research and risk management, amongst many others.