2009-10 Course Selection for BScI

Major or Minor in Mathematics

Dr Yung Siu Pang

Department of Mathematics, HKU

Major in Mathematics

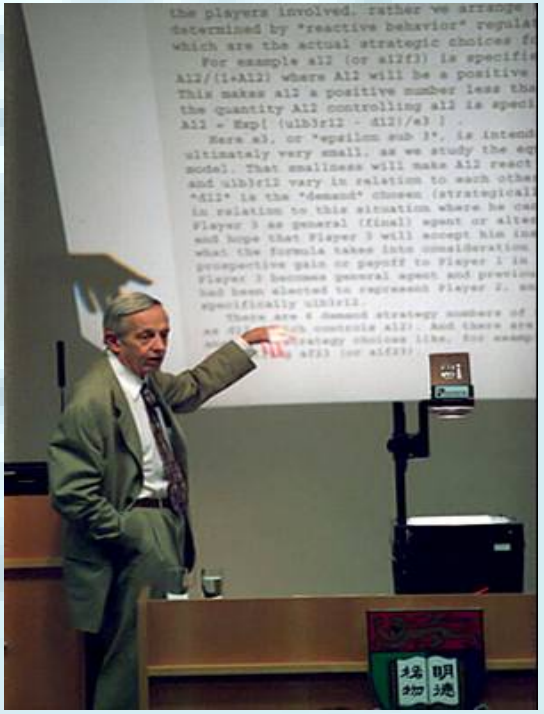
- **What is Mathematics?**
- **What could I learn from Mathematics?**
- **How should I plan my career with a Mathematics degree in mind?**

- What is Mathematics?
- In Mathematics, we try to make things as simple as possible. As a result, different unrelated things are actually related to each others in an unanticipated way. For example: stock warrants and heat tranfer, Google Pagerank and matrices, image/video compressions and matrices, ….
- Thus, you will learn how to make things as simple as possible, and also those fundamental building blocks (e.g. Algebra, Geometry, Analysis, …etc.)

- What could I learn from Mathematics?
- Knowledge that underneath a lot of subjects such as science, economics, finance, engineering … etc. in addition to mathematics itself.
- How should I plan my career with a Mathematics degree in mind?
- Stay tune!

Nobel Prize (Economics) Laureates since 90's of the last century who have a math degree:

- 2007 Eric S. Maskin (PhD in applied math)
- 2007 Roger B. Myerson (PhD in applied math)
- 2005 Robert J. Aumann (BS, MS, PhD in math)
- 2004 Edward C. Prescott (BA in math, MS in operations research)
- 2003 Clive W. J. Granger (BA in math)
- 2002 Daniel Kahneman (BA in math and psychology)
- 2001 Michael Spence (BA, MA in math)
- 2000 James J. Heckman (BA in math)
- 1998 Amartya Sen (BA minor in math)
- 1997 Robert C. Merton (BS, MS in applied math)
- 1996 James A. Mirrlees (MA in math)
- 1996 William Vickrey (BS in math)
- 1994 **John F. Nash Jr.** (PhD in math)
- 1994 Reinhard Selten (PhD in math)
- 1992 Gary S. Becker (BA in math)



John F. Nash Jr. in HKU

Major in Mathematics (requirement)

1. Introductory level courses (18 credits)
   MATH1001 Fundamental Concepts of Mathematics
   MATH1111 Linear Algebra
   MATH1211 Multi – variable Calculus

2. Advanced level courses (48 credits)
   MATH2201 Introduction to Mathematical Analysis
   MATH2301 Algebra I
   MATH2401 Analysis I

   Plus at least 18 credits from the following courses:
   MATH2304 Introduction to Number Theory
   MATH2403 Functions of a Complex Variable
   MATH2405 Differential Equations
   MATH2600 Discrete Mathematics
   MATH2601 Numerical Analysis
   MATH2603 Probability Theory
   MATH2901 Operation Research I
   MATH2904 Introduction to Optimization

   Plus at least 12 credits of advanced level Mathematics courses (MATH2XXX or MATH3XXX level), subject to prerequisite requirements.

Introductory level courses

MATH1001 Fundamental Concepts of Mathematics

MATH1111 Linear Algebra

MATH1211 Multi – variable Calculus

These courses are available in both semesters.

MATH1001 Fundamental Concepts of Mathematics

- To provide students with solid background on fundamental concepts of mathematics and methods of mathematical proofs.
- Such concepts and methods are important for subsequent studies in all higher level courses in mathematics.
- This course can be followed by (or taken concurrently with) **MATH1111** *Linear Algebra*, **MATH1211** *Multi – variable Calculus* and other more advanced courses.

MATH1001 Fundamental Concepts of Mathematics

- Logic and Set Theory :
  - Statement calculus
  - finite and infinite sets
  - relations and mappings
  - completeness of real numbers,….
- Axiomatic systems in mathematics:
  - models of the natural numbers
  - the real numbers
  - non-Euclidean geometries
  - Examples of groups

MATH1001 Fundamental Concepts of Mathematics

- Prerequisites:
  - HKCEE Additional Mathematics OR AS Mathematics and Statistics, or
  - AL Pure Mathematics, or
  - MATH1804 University Mathematics A, or equivalent.
  - Students with a good grade in MATH0201 Basic Calculus can also apply.
- Teaching:
  - Two one hour lectures plus one example class per week.
- Assessment:
  - One 2.5-hour written examination (50% weighting).
  - Continuous coursework assessment (50% weighting)

MATH1001 Fundamental Concepts of Mathematics

Teacher (both semesters):

Dr. W.K. Ching is an expert in queuing theory and mathematical biology.

Dr. W. K. Ching
Deputy Head of Department

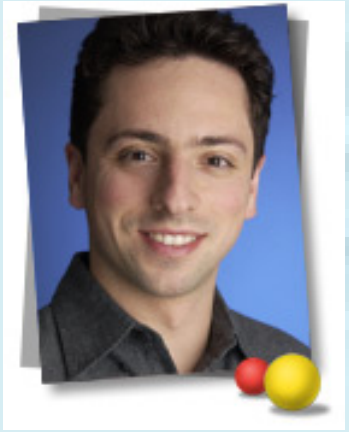
Textbook:

Mathematical Proofs: A Transition to Advanced Mathematics by Gary Chartrand, Albert D. Polimeni, Ping Zhang.

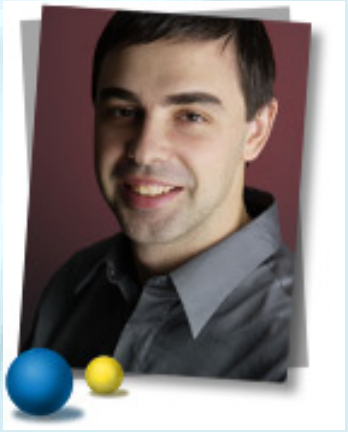
MATH1111 Linear Algebra

- Has wide applications to diverse areas in natural science, engineering, management, and social science.
- Provides students an introduction to the theory and techniques of linear algebra.
- A foundation course for all mathematics students, to be followed by other more advanced courses in mathematics such as **MATH2301** *Algebra I*, **MATH2303** *Matrix Theory* and its Applications.

MATH1111 Linear Algebra



Google™



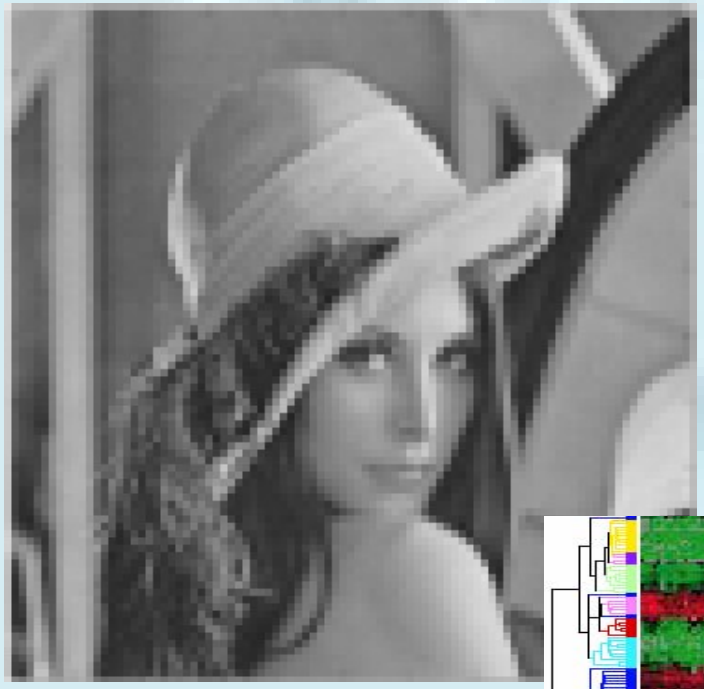
Larry Page

Sergey Brin

"The heart of our software is PageRank™, a system for ranking web pages developed by our founders Larry Page and Sergey Brin at Stanford University."

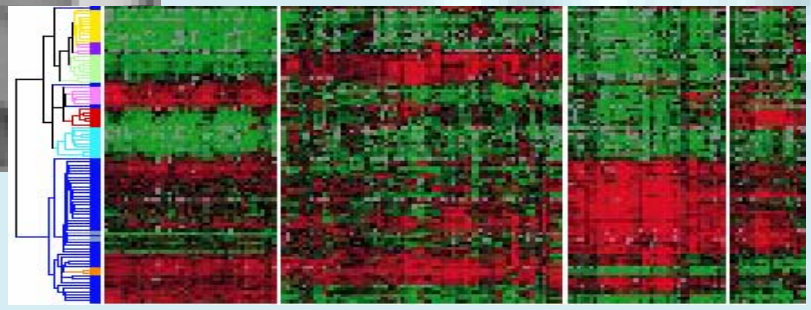
MATH1111 Linear Algebra

How to study and classify Matrices?



$$\begin{pmatrix} 2 & 0 & 4 & 6 \\ 6 & 6 & 1 & 4 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}, \begin{pmatrix} -1 & -2 \\ 1 & 2 \end{pmatrix}$$



MATH1111 Linear Algebra

System of linear equations

$$a_{11}x_1 + a_{12}x_2 + a_{13}x_3 = b_1$$
$$a_{21}x_1 + a_{22}x_2 + a_{23}x_3 = b_2$$
$$a_{31}x_1 + a_{32}x_2 + a_{33}x_3 = b_3$$

$$AX = B$$
$$(ax = b)$$

$$\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix}$$

MATH1111 Linear Algebra

Linear algebra will study in details the properties of vector spaces and the linear transformation between them.

$T : R^n \to R^m$ is a linear transformation if it satisfies

(L1) $T(X+Y) = T(X) + T(Y)$, and
(L2) $T(kX) = k\,T(X)$

for any scalar k and for any vector X, Y in R^n.

MATH1111 Linear Algebra

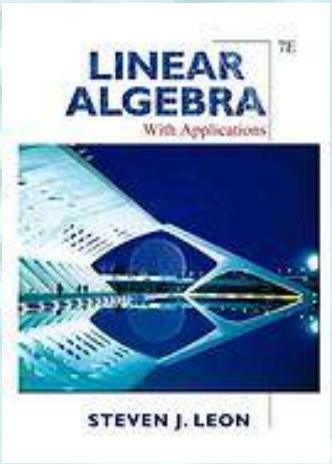
- Prerequisites:
  - HKCEE Additional Mathematics and AS Mathematics and Statistics, or
  - AL Pure Mathematics, or
  - MATH1804 University Mathematics A, or equivalent.
  - Students with a good grade in MATH0201 Basic Calculus can also apply.
- Teaching:
  - Three one hour lectures per week.
  - Tutorials.
- Assessment:
  - One 2.5-hour written examination (50% weighting).
  - Continuous coursework assessment (50% weighting)

MATH1111 Linear Algebra

Teacher (both semesters):

Dr. Y.K. Lau is an expert in number theory, modular forms and L – functions.

Dr. Y. K. Lau



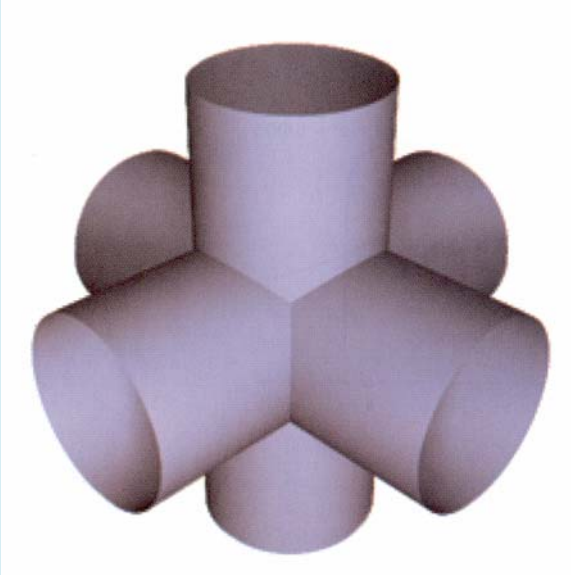
Textbook:

Linear algebra with applications by Steven J. Leon.

MATH1211 Multi – variable Calculus

- Has wide applications to diverse areas in natural science, engineering, management, and social science.
- Learn multivariable calculus in a rather rigorous manner, and learn how to apply the theory to solve practical problems.
- A foundation course for all mathematics students, to be followed by other more advanced courses in mathematics such as **MATH2201** *Introduction to Mathematics Analysis*, **MATH2401** *Analysis I.*

MATH1211 Multi – variable Calculus



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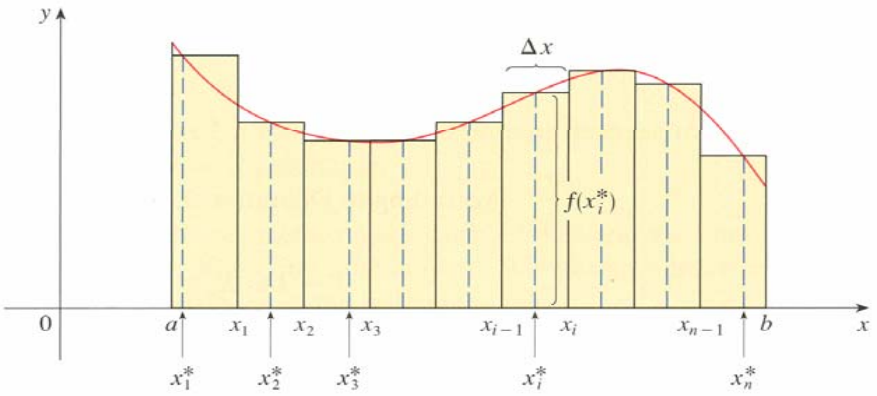
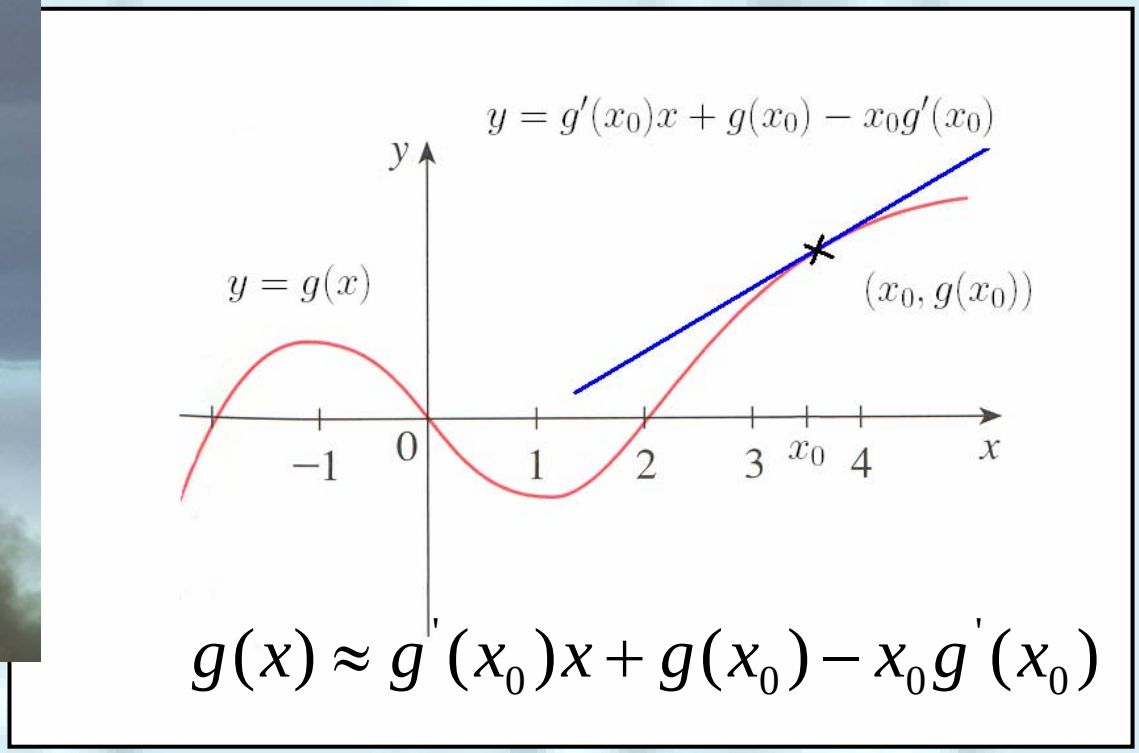
$$A = \lim_{n\to\infty} [f(x_1^*)\,\Delta x + f(x_2^*)\,\Delta x + \cdots + f(x_n^*)\,\Delta x]$$



Integration

Originated from evaluation of area and volume by the ancient Greeks around 200 B.C.

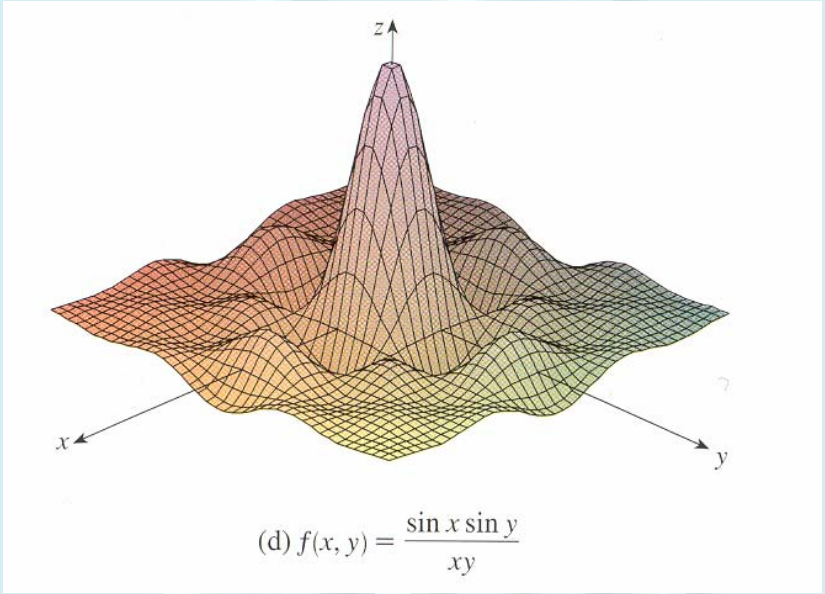
MATH1211 Multi – variable Calculus



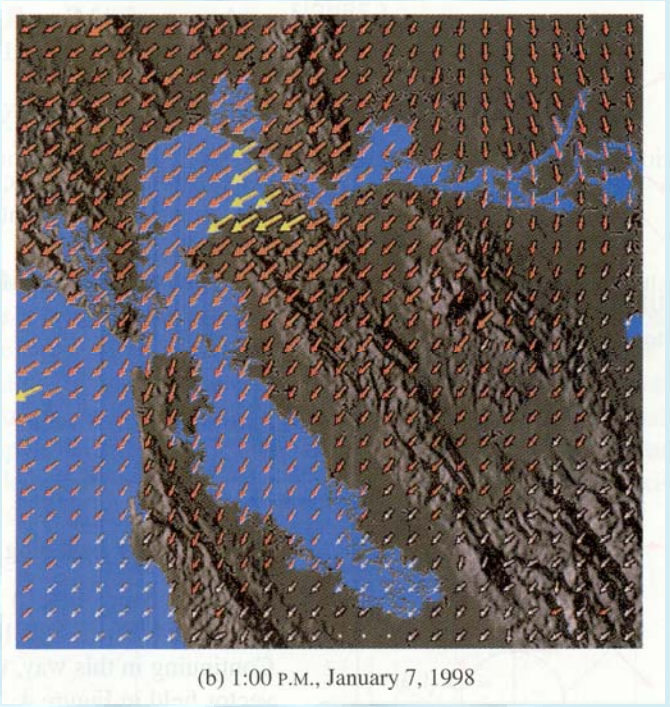
Differentiation

Originated from the study of rigid body motion by Newton in the 17th century.

MATH1211 Multi – variable Calculus



(d) $f(x, y) = \dfrac{\sin x \sin y}{xy}$



(b) 1:00 P.M., January 7, 1998

Study differentiation and integration of functions of several variables.

MATH1211 Multi – variable Calculus

The one – variable fundamental theorem of calculus:

$$\int_a^b f'(x)dx = f(b) - f(a)$$

and its multi – variable counterparts:

- Stokes' theorem

$$\oint_{\partial S} \mathbf{F} \cdot \mathbf{T}\, ds = \iint_S (\nabla \times \mathbf{F}) \cdot \mathbf{n}\, dS$$

- Divergence theorem

$$\iint_{\partial V} \mathbf{F} \cdot \mathbf{n}\, dS = \iiint_V \nabla \cdot \mathbf{F}\, dV$$

MATH1211 Multi – variable Calculus

Optimization Problem

- Critical Points, local maxima and minima.
- First and Second derivative tests.
- Method of Lagrange Multipliers for *constraint optimization problem.*

MATH1211 Multi – variable Calculus

- Prerequisites:
  - HKCEE Additional Mathematics and AS Mathematics and Statistics, or
  - AL Pure Mathematics, or
  - MATH1804 University Mathematics A, or equivalent.
  - Students with a good grade in MATH0201 Basic Calculus can also apply.
- Teaching:
  - Three one hour lectures per week.
  - Tutorials.
- Assessment:
  - One 2.5-hour written examination (50% weighting).
  - Continuous coursework assessment (50% weighting).

MATH1211 Multi – variable Calculus

Teacher (1st semester):

Dr. N.K. Tsing is an expert in matrix theory, control theory and operator theory.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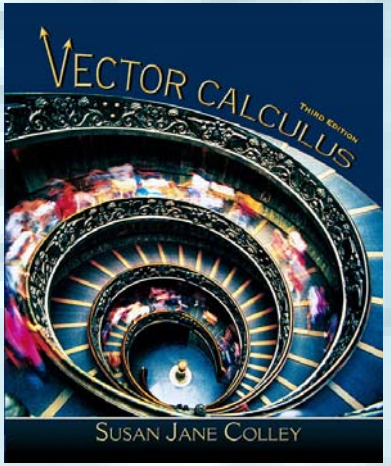


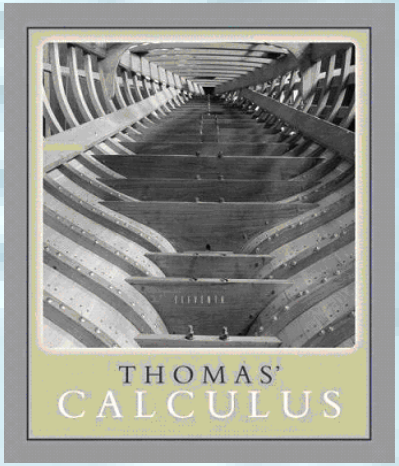
Textbook:

Vector Calculus by Susan J. Colley.

MATH1211 Multi – variable Calculus

Teacher (2nd semester):

Dr. J.T. Chan



Textbook:

Thomas' Calculus by Maurice D. Weir, Joel Hass and Frank R. Giodano.

Major in Mathematics (requirement)

3. **Experiential Learning Requirement** (6 credits)

   Students must take at least one of the following forms of extraordinary – learning experience to fulfill the capstone requirement:

   MATH2002 Mathematics seminar (6 credits)

   MATH2999 Directed studies in mathematics (6 credits)

   MATH3988 Mathematics Internship (6 credits)

   MATH3999 Mathematics project (12 credits)

   Exchange programme via HKU World Wide Exchange Programme (1 semester or 1 year) (non – credit bearinig)#

4. Students also need to take two Science Faculty electives: One course from Block B (The Physical World) and one course from Block C (Life & Living)

Students must take an additional 6-credit advanced level mathematics course.

MATH2002 Mathematics Seminar

- This course is offered in the 2nd semester.
- This is a seminar style course intended for those year one students who have very strong interests and good ability in mathematics.
- Study some book chapters and elementary research articles and make presentations in front of the whole class.
- Active participation in all the discussions is expected. The aim of the course is to let students learn how to initiate self/independent study in mathematics.

MATH2002 Mathematics Seminar

- Prerequisites: MATH1001, MATH1111 and MATH1211 (one of MATH1111 and MATH1211 can be co-requisite).
- Enrollment needs instructors' approval.
- Quota:12.
- It will be run by Prof. K.M. Tsang, Dr. N.K. Tsing and Dr. S.P. Yung this year.

MATH2002 Mathematics Seminar

- Teaching: Meeting of the whole class for two hours each teaching week, plus individual meetings with the instructors.
- Assessment:
  - Coursework assessment (70%), based on class presentations, participation in discussions and a written report.
  - Final written examination of 2 hours (30%).

MATH2002 Mathematics Seminar

The following topics were covered last year.

- Convex geometry (Helly's theorem)
- Euler's characteristics
- Hyperbolic geometry (Basic notions)
- Isoperimetric problem
- Markov chain
- Marriage's lemma
- Mathematics in voting (Arrow' Impossibility Theorem)
- Pagerank algorithm
- Sperner's lemma
- SIR model
- Zorn's Lemma

MATH2999 Directed Studies in Mathematics

This course is designed for a student who would like to take an early experience on independent study. It provides the student with the opportunity to do a small mathematics project close to research in nature independently.

Selected topics in the past years:

- Exploration of the technical analysis of finance data
- Fibonacci sequence, the golden ratio, and patterns in plants: Phyllotaxis
- The Plateau problem
- Microarray data and diagnosis of cancer
- Positive rational solutions to some diophantine equations
- Coxeter Groups
- Riemann surfaces and / or complex manifolds
- Linear geometry in Euclidean 4-space
- Open problems in affine algebraic geometry and commutative/noncommutative algebra

MATH3988 Mathematics Internship

This course aims to offer students the opportunities to gain work experience in the industry related to their major of study. Students have to take on at least 120 hours of internship work either within the University or outside the University arranged by the School/Departments.

Available in 1st, 2nd, and the summer semester.

Assessment: Required to submit a written report and to give a presentation on their internship experience. This course will be assessed on Pass or Fail basis.

MATH3988 Mathematics Internship

In the past years, our students interned at various organizations: for example

- AECOM: A Fortune 500 company, serves clients in more than 100 countries and provides professional technical and management support services to a broad range of markets, including transportation, facilities, environmental and energy.
- Hong Kong Observatory
- St. Peter's Secondary school

Teachers in the Math Department also offered internship in the summer.

MATH3999 Mathematics Projects

The object is to provide a student with an opportunity to formulate and investigate, in depth, a problem of practical interest and/or have a foretaste of mathematical research.

The work, to be done on an individual basis, is considered a highly desirable part of the training of a mathematician.

MATH3999 Mathematics Projects

Topics:

- Nonnegative matrices and their Perron roots (Dr. J.T. Chan)
- Numerical Simulation in Fluid Dynamics (Dr. K.H. Chan)
- Calculus of Variations (Professor W.S. Cheung)
- Genetic Regulatory Networks and Probabilistic Boolean Networks (Dr. W.K. Ching)
- Project Scheduling via Network Models: independent study & computer implementation (Professor S.C.K. Chu)
- Mathematical Problems in Network Coding (Dr. G.Y. Han)
- Arithmetical Functions and Dirichlet Series (Dr. Y.K. Lau)
- Introduction to Algebraic Geometry (Professor J. Lu)
- Solving Non-Linear Differential Equations (Dr. T. W. Ng)
- Dirichlet's Divisor Problem (Professor K.M. Tsang)
- Higher Rank Numerical Ranges (Dr. N.K. Tsing)
- Supersymmetric Quantum Mechanics and the Witten Index (Dr. S. Wu)

Major in Mathematics

Most math majors will follow one of the following three main themes:

- **(Pure) Mathematics (Math)**
- **Computational Mathematics, Logistics/ Operations Research (CMOR)**
- **Mathematics, Economics and Finance (MAEF)**

Major in Mathematics - Math

Recommended Courses:

MATH2303 Matrix Theory and its Applications
MATH2304 Introduction to Number Theory
MATH2402 Analysis II
MATH2403 Functions of a Complex Variable
MATH3302 Algebra II
MATH3404 Functional Analysis
MATH3501 Geometry
MATH3502 Geometric Topology

MATH2001 Development of Mathematical Ideas
MATH3406 Introduction to Partial Differential Equations

Major in Mathematics - Math

Secondary School Teachers

Major in Mathematics - Math

Further Studies

Columbia University

MIT

New York University

Major in Mathematics – CMOR

Recommended courses:

MATH2303 Matrix Theory and Its Applications
MATH2601 Numerical Analysis
MATH2603 Probability Theory
MATH2901 Operations Research I
MATh2904 Introduction to Optimization
MATH2905 Queuing Theory and Simulation
MATH3602 Scientific Computing
MATH3902 Operations Research II
MATH3903 Network Models in Operations Research

MATH3610 Topics in Applied Discrete Mathematics
MATH3910 Topics in mathematical Programming and optimization
BUSI1003 Introduction to Management Information System
CSIS1119 Introduction to Data Structures and Algorithms
ECON0701 Introductory Econometrics
STAT3301 Time-series Analysis

Major in Mathematics – CMOR

- Courses in Computational Mathematics and Operations Research are taught by experts in these two areas.
- For operations research:

  Prof. S.C.K. Chu (*Columbia*)

  Dr. W.K. Ching (*CUHK*)

  Prof. W. Zang (*Rutgers*)
- For computational mathematics:

  Dr. K.H. Chan (*CUHK*)

  Dr. G.Y. Han (*Notre Dame*)

The operations research courses mainly study different types of the constraint optimization problems.

Major in Mathematics – CMOR

Operations Research Group

Prof. S.C.K. Chu, Prof. W. Zang, Dr. W.K. Ching

(Prof. K.P. Ng)

HSBC

Major in Mathematics – CMOR

Constraint Optimization Problem:

- Max/Min $f(x_1,\ldots,x_n)$ under the constraints $g_i(x_1,\ldots,x_n)=0$, $i=1,..,m$.
- **MATH2901** *Operational Research I* and **MATH3902** *Operational Research II* study this optimization problem when all these functions are linear.
- **MATH2904** *Introduction to Optimization* studies the same optimization problem when some of these functions are non-linear by using multi-variable calculus.
- Numerical methods may be employed.

Major in Mathematics – CMOR

Constraint Optimization Problem (an example):

Customers redistribute themselves based on the perceived service performance (queuing time and traveling time) and customer loyalty.

Goal: Try to predict the final customer redistribution.

Major in Mathematics – CMOR

Job Opportunities:

- Logistics companies
- Airport Authority Hong Kong
- Banks (data mining)
- Software companies

Major in Mathematics – MAEF

Recommended courses:

- **MATH2906 Financial Calculus**
- **MATH2907 Numerical Methods for Financial Calculus**
- **BUSI1002 Introduction to Accounting**
- **ECON2101 Microeconomics Theory**
- **ECON2102 Macroeconomics Theory**
- **FINA1001 Introduction to Finance**
- **FINA2802 Investments**

Major in Mathematics

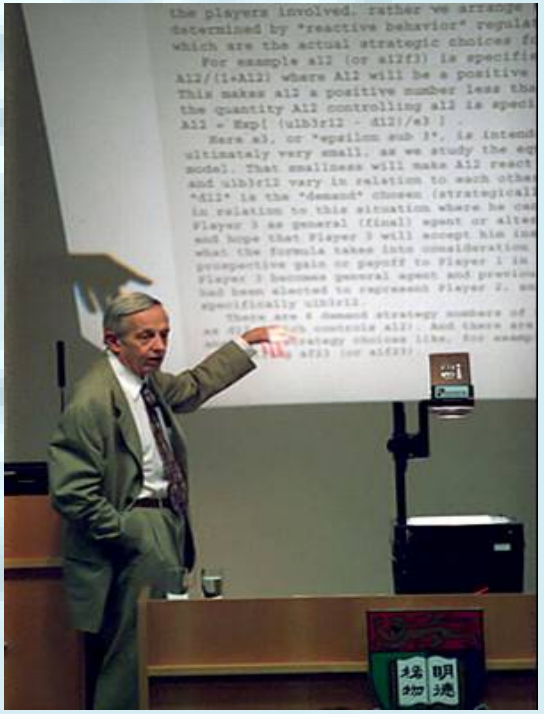
Minor in Economics or Finance or Risk Management!

Students can prepare the level I examination of *Chartered Financial Analyst* by taking suitable courses in this category.

Major in Mathematics – MAEF

Nobel Prize (Economics) Laureates since 90's of the last century who have a math degree:

- 2007 Eric S. Maskin (PhD in applied math)
- 2007 Roger B. Myerson (PhD in applied math)
- 2005 Robert J. Aumann (BS, MS, PhD in math)
- 2004 Edward C. Prescott (BA in math, MS in operations research)
- 2003 Clive W. J. Granger (BA in math)
- 2002 Daniel Kahneman (BA in math and psychology)
- 2001 Michael Spence (BA, MA in math)
- 2000 James J. Heckman (BA in math)
- 1998 Amartya Sen (BA minor in math)
- 1997 Robert C. Merton (BS, MS in applied math)
- 1996 James A. Mirrlees (MA in math)
- 1996 William Vickrey (BS in math)
- 1994 **John F. Nash Jr.** (PhD in math)
- 1994 Reinhard Selten (PhD in math)
- 1992 Gary S. Becker (BA in math)



John F. Nash Jr. in HKU

Major in Mathematics – MAEF

Mathematics is the common language in these areas and it is easier to learn math when you are young.

Major in Mathematics – MAEF

Luo Guannan (a math major) is now doing a PhD in Economics at Northwestern University.

If you plan to do a master or PhD in economics or finance, the following courses are recommended:

MATH2401 Analysis I

MATH2901/3902 OR I and II

MATH2904 Introduction to Optimization

MATH2911 Game Theory and Strategy

MATH2906 Financial Calculus

MATH2907 Numerical Methods for Financial Calculus

STAT3301 Time-series Analysis

STAT3316 Advanced Probability

Computational Finance

Many investment banks employ mathematicians for risk management or computational finance.

Dr. Lau Chi Fong (PhD in number theory)

Former Head of Market Risk Management

HSBC Global Markets

Computational Finance

- Usually need a PhD in Mathematics/Physics/Computer Sciences/Statistics to do quantitative finance in investment banks.
- Develop and analyze new financial products.
- Write programs to evaluate the price of financial derivatives.
- Mathematical modeling skills.
- Computing skills, e.g., Visual Basic.

Computational Finance

Recommended courses:

- **MATH2906 Financial Calculus**
- **MATH2907 Numerical Methods for Financial Calculus**
- MATH2603 Probability Theory
- MATH2601 Numerical Analysis
- MATH3602 Scientific Computing
- MATH3406 Introduction to PDE
- STAT3301 Time-series Analysis
- STAT3316 Advanced Probability

Computational Finance

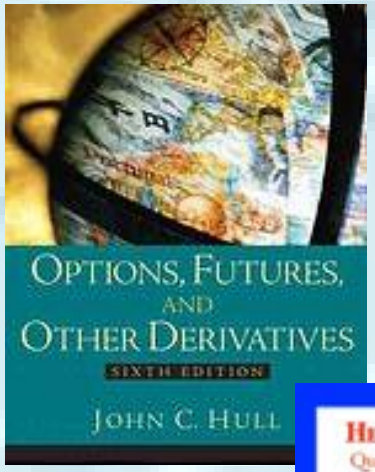
MATH2906 Financial Calculus

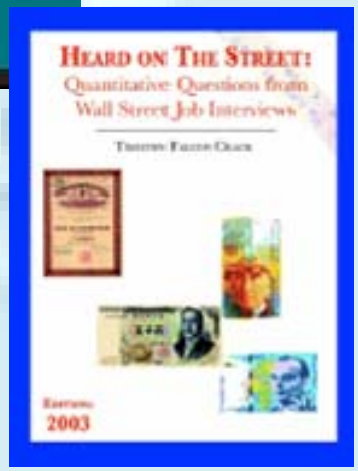
- Modeling of financial derivatives, asset pricing and market risks
- Introduction to stochastic calculus
- Provide a solid background for future study in quantitative finance.
- Prerequiste:MATH2603 Probability Theory
- Good knowledge of partial differential equations and probability theory is needed for further studies.

Computational Finance

Suggested Readings:

- *Options, futures, and other derivatives* by John C. Hull
- *An elementary introduction to mathematical finance* by Sheldon M
- *Heard on the street : quantitative questions from Wall Street job interviews* by Timothy Falcon Crack.





Single Major in Mathematics (without any minor)

- Recommended to take **MATH1001** *Fundamental Concepts of Mathematics* in the first semester.
- Recommended to take **MATH1211** *Multi – variable Calculus* and **MATH1111** *Linear Algebra* in separate semesters, for example, MATH1211 in the first semester and MATH1111 in the second semester.
- Those who are strongly interested in mathematics and perform well in the mathematics courses in the first semester are recommended to take the **MATH2002** *Mathematics Seminar* and **MATH2201** *Introduction to Mathematical Analysis* in year one.

MATH2201
Introduction to Mathematical Analysis

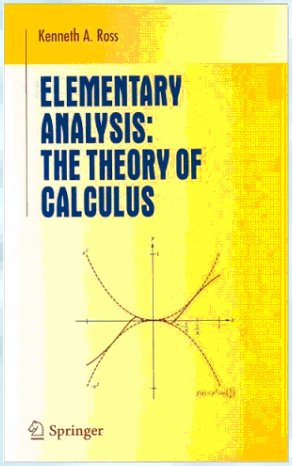
To introduce students to the basic ideas and techniques of mathematical analysis.

- Prerequisites:
  - MATH1111, or
  - MATH1211
- Teaching:
  - 36 hours of lectures and student-centered learning.
- Assessment:
  - One 2.5-hour written examination (50% weighting).
  - Continuous coursework assessment (50% weighting)

MATH2201
Introduction to Mathematical Analysis

Teacher (both semesters):

Dr. J.T. Chan



Textbook:

Elementary Analysis: The Theory of Calculus by Kenneth A. Ross.

Single Major in Mathematics (without any minor)

Those who would like to take more mathematics course in the first year can also take some of the following courses:

MATH2304 Introduction to Number Theory (2)

or the common core

YSCN0034 Hidden Order in Daily Life: A Mathematical Perspective (2)

MATH2304 Introduction to Number Theory

Dr. YK Lau
(*HKU*)

Expert in
modular forms
and L-functions

Prof. KM Tsang
(*Princeton*)

Expert in
Riemann's zeta
function and
analytic number
theory.

Student of Prof.
Atle Selberg (1950
Fields-Medallist)

Prerequisites: MATH1111 and
MATH1211
Co-requisite: MATH2301.
Enrollment needs instructors' approval.

YSCN0034 Hidden Order in Daily Life: A Mathematical Perspective

Through exploring non-technically some mathematically rich daily life topics, this course aims to help students gain essential mathematical literacy for living in the 21st century.

Students will learn the mathematical concepts and principles of things that they encounter in the modern society, and learn how to handle and interpret numerical and other forms of mathematical data that affect their daily life.

YSCN0034 Hidden Order in Daily Life: A Mathematical Perspective

Some selected topics are:

- Game Theory and Auction
- Mathematics of Voting
- Some Mathematical Principles of the Stock Markets
- Mathematics in the Courtroom
- Benford's Law and Detecting Fraud in Accounting Data

Major in Mathematics
Minor in Economics/Finance
Statistics/Actuarial Studies/Risk Management

- Recommended to take **MATH1001** *Fundamental Concepts of Mathematics* in the first semester.

- Recommended to take **MATH1211** *Multi – variable Calculus* and **MATH1111** *Linear Algebra* in separate semesters, for example, **MATH1211** in the first semester and **MATH1111** in the second semester.
- Recommended to take **STAT1301** *Probability and Statistics I* in the 2nd semester.

- Those who are strongly interested in mathematics and perform well in the mathematics courses in the first semester are recommended to take the **MATH2002** *Mathematics Seminar* and **MATH2201** *Introduction to Mathematical Analysis* in year one.

What should I do if I want to be a minor in mathematics ?

Minor in Mathematics (requirement)

1. Introductory level courses (12 credits)

   MATH1111 Linear Algebra

Plus one of the following courses

MATH1211 Multi – variable Calculus

MATH1805 University Mathematics B

MATH1813 Mathematical Methods for Actuarial Science

2. Advanced level courses (24 credits)

   Any 24 credits of advanced level Mathematics courses (MATH2XXX or MATH3XXX level), subject to prerequisite requirements.

Minor in Mathematics

If you are interested in mathematics and would like to be a minor in mathematics, the following courses are recommended

MATH2001 - Development of Mathematical Ideas
MATH2201 - Introduction to Mathematical Analysis
MATH2301 - Algebra I
MATH2405 - Differential Equations
MATH2600 - Discrete Mathematics
MATH2601 - Numerical Analysis
MATH2603 - Probability Theory
MATH2901 - Operations Research I

Minor in Mathematics

If you would like to be a minor in math and plan to pursue a master/PhD in economics/finance, the following courses are recommended

MATH2401 Analysis I

MATH2901/3902 Operations Research I/II

MATH2904 Introduction to Optimization

MATH2906 Financial Calculus

MATH2907 Numerical Methods for Financial Calculus

STAT3301 Time-series Analysis

STAT3316 Advanced Probability

Minor in Mathematics

If you would like to be a minor in math and plan to pursue a master/PhD in computational/mathematical finance in the future, the following courses are recommended

MATH2906 Financial Calculus
MATH2907 Numerical Methods for Financial Calculus
MATH2603 Probability Theory
MATH2601 Numerical Analysis
MATH3602 Scientific Computing
MATH3406 Introduction to PDE
STAT3301 Time-series Analysis
STAT3316 Advanced Probability

Minor in Mathematics

If you would like to be a minor in math and plan to pursue a master/PhD in computational/mathematical finance in the future, the following courses are recommended

MATH2906 Financial Calculus

MATH2907 Numerical Methods for Financial Calculus

MATH2603 Probability Theory

MATH2601 Numerical Analysis

MATH3602 Scientific Computing

MATH3406 Introduction to PDE

STAT3301 Time-series Analysis

STAT3316 Advanced Probability

Bridging Courses in Mathematics

Students with different mathematics background can major or minor in mathematics by taking suitable bridging courses and follow different paths.

For more information, please visit the following link

http://hkumath.hku.hk/~wkc/advisor_major.htm

Differentiate yourself from the competitions

Major in math is a good indicator:

Good in Math = Intelligent

Good in Math = Flexible

Further Enquiries: Course Selection Advisors

Year One:

Dr. Y.K. Lau (yklau@maths.hku.hk)

Dr. C.W. Wong (cwwongab@hkusua.hku.hk)

Year Two and Three:

Dr. G. Han (ghan@maths.hku.hk)

Dr. S.P. Yung (spyung@hkucc.hku.hk) (2nd sem)

Prof. W. Zang (wzang@maths.hku.hk) (1st sem)

http://hkumath.hku.hk/web/info/math_student.html

End