Major in Statistics
Bachelor of Science
(4-year Curriculum)

What is STATISTICS about?
Data / Observations

Statistical methods

Inference about “TRUTH” / Decision-making
whenever you want to study data...

i.e. in nearly all disciplines!
Gold Medalist
Louganis, Gregory

Gold Medalist
Mitcham, Matthew

Silver Medalist
Xiong, Ni (熊倪)

Silver Medalist
Zhou, Luxin (周呂鑫)
Results of final (10th round) dive

<table>
<thead>
<tr>
<th>Order</th>
<th>Rank</th>
<th>Ctry</th>
<th>Name</th>
<th>Type</th>
<th>Diff Coef</th>
<th>Judge / Juge</th>
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12 finalists

7 judges
## Results of final (6\textsuperscript{th} round) dive

<table>
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<tr>
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<th>Name</th>
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<th>Dive Points</th>
<th>Dive Rank</th>
<th>Total Points</th>
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<td>MITCHAM Matthew</td>
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<tr>
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<tr>
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<td>9</td>
<td>448.3</td>
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<td>United States</td>
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<td>85</td>
<td>6</td>
<td>412.65</td>
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</tbody>
</table>

- **12 finalists**
- **7 judges**

The highest score in Olympic history is 112.1 points.
How fair were the Olympic judges?

- 7 judges
- 12 finalists

Any judge biased **towards/against** any finalist?
Major in Decision Analytics
Bachelor of Science
(4-year Curriculum)

What is DECISION ANALYTICS about?
Big Data

Data Mining / Statistical Learning / Machine Learning

Decision-making
Applications

- Marketing
  - e.g. customer preference / behaviour / loyalty
- Finance
  - e.g. customer banking, stock volatility analysis, relationships between financial indicators
- Forensic Accounting
  - e.g. fraud detection in credit card transactions / insurance claims, tax evasion, insider-trading operations
- Healthcare
  - e.g. risk factors, treatment effectiveness, medical planning
- Biology
  - e.g. biological function via gene expression, protein structure identification / prediction
- plus many others…
How to predict missing ratings of customers?
... involved many statistical techniques, of which most important is SVD (Singular Value Decomposition)
Gene expression cancer data

349 patients

What genes characterise which type of cancer?

Cancer type

4,718 genes

Cancer type

4,718 genes
Using lasso-regularised multinomial classifier...
Major in Statistics
Bachelor of Science
(4-year Curriculum)

Structure of curriculum...
7 introductory level courses (42 credits)

- SCNC1111 Scientific method & reasoning
- SCNC1112 Fundamentals of modern science
- *MATH1013 University mathematics II
- *MATH2014 Multivariable calculus & linear algebra

- *STAT1600 Statistics: ideas & concepts
- *STAT2601 Probability and statistics I
- *STAT2602 Probability and statistics II

* replaced by other advanced level STAT course(s) if already taken to fulfill other majors/minors
Students must have **level 2 or above** in HKDSE Extended Module 1 or 2 of Mathematics or equivalent.

Otherwise, strongly advised to take **MATH1011 University Mathematics I** in Semester 1.
What do we need from your Mathematics?

- Set notation and theory
- Functions (*incl.* limits, continuity)
- Sequences, series
- Basic calculus (*incl.* partial differentiation, double integration)
- Vectors, matrices (basic operations)
# Suggested / Example Structure of BSc (Major in Statistics) Curriculum

<table>
<thead>
<tr>
<th>Year</th>
<th>One</th>
<th>Two</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One</td>
<td>Two</td>
</tr>
<tr>
<td></td>
<td>Two</td>
<td>One</td>
</tr>
</tbody>
</table>

## Disciplinary Core

<table>
<thead>
<tr>
<th>Semester</th>
<th>One</th>
<th>Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>MATH1013 University Mathematics II</td>
<td>MATH2014 Multivariable Calculus and Linear Algebra</td>
</tr>
<tr>
<td>Two</td>
<td>STAT1600 Statistics: Ideas and Concepts</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>STAT2601 Probability and Statistics I</td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>STAT2602 Probability and Statistics II</td>
<td></td>
</tr>
</tbody>
</table>

## Science Foundation Courses

<table>
<thead>
<tr>
<th>Semester</th>
<th>One</th>
<th>Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>SCNC1111 Scientific Method and Reasoning</td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>SCNC1112 Fundamentals of Modern Science</td>
<td></td>
</tr>
</tbody>
</table>

## Common Core

- Six common core courses within the first three years

## Language

<table>
<thead>
<tr>
<th>Semester</th>
<th>One</th>
<th>Two</th>
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<tbody>
<tr>
<td>One</td>
<td>CAES1000 Core University English (offered in both semesters)</td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>CAES9820 Academic English for Science Students (offered in both semesters)</td>
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</table>
4 Core advanced level courses (24 credits)

- **STAT3600** Linear statistical analysis
- **STAT4601** Time-series analysis
- **STAT3603** Probability modelling
- **STAT4602** Multivariate data analysis

Also core to Risk Management Major

Also core to Decision Analytics Major
Other advanced level courses (24 credits = 4 courses)

- At least one course from List A:
  - STAT3602 Statistical inference
  - STAT3604 Design and analysis of experiments
  - STAT3620 Modern nonparametric statistics
  - STAT3621 Statistical data analysis

**mainstream statistics courses**
- core knowledge in statistics
- applications to general problems in all areas
- foundation for graduate studies in statistics or related subjects
Other advanced level courses
(24 credits = 4 courses)

Other courses from List B:

- STAT3617 Sample survey methods
- STAT3613 Marketing engineering
- STAT3606 Business logistics
- STAT3605 Quality control & management
- STAT3955 Survival analysis
- STAT3607 Statistics in clinical medicine & bio-medical research
- STAT3608 Statistical genetics
- STAT3612 Data mining
- STAT3616 Advanced SAS programming

- government, social science marketing
- business, management
- industry
- medicine, biostatistics
- bioinformatics, forensic science

software skills
(with applications to diverse subject areas)
Other advanced level courses (24 credits = 4 courses)

Other courses from List B:

- STAT3617 Sample survey methods
- STAT3613 Marketing engineering
- STAT3606 Business logistics
- STAT3605 Quality control & management

- STAT3955 Survival analysis
- STAT3607 Statistics in clinical medicine & bio-medical research
- STAT3608 Statistical genetics
- STAT3612 Data mining
- STAT3616 Advanced SAS programming

*conceptually less demanding*

*conceptually more demanding*
Other advanced level courses (24 credits = 4 courses)

Other courses from List B:

- STAT3617 Sample survey methods
- STAT3613 Marketing engineering
- STAT3606 Business logistics
- STAT3605 Quality control & management
- STAT3955 Survival analysis
- STAT3607 Statistics in clinical medicine & bio-medical research
- STAT3608 Statistical genetics
- STAT3612 Data mining
- STAT3616 Advanced SAS programming

Theme of data science

Preparatory course: STAT2603 Data Management with SAS
Capstone requirement (6 credits)

At least 6 credits from:

- STAT3799 Directed studies in statistics (6 credits)
- STAT4799 Statistics project (12 credits)
- STAT4710 Capstone experience for statistics undergraduates (6 credits)
- STAT4766 Statistics internship (6 credits)
Major in Risk Management vs Major in Statistics

- All 7 introductory level courses **SAME**
- Advanced level core courses:
  - **2 SAME, 2 DIFFERENT**
- **Risk Management** –
  courses focus primarily on business-related topics: e.g. investment, insurance, finance, banking, etc.
- **Statistics** –
  courses cover wide range of topics with emphasis on “METHODS”, their applications, and underlying theory.
- Students **CANNOT** double major or major/minor in Statistics & Risk Management
Major in Decision Analytics
Bachelor of Science
(4-year Curriculum)

Structure of curriculum...
8 introductory level courses (48 credits)

- SCNC1111 Scientific method & reasoning
- SCNC1112 Fundamentals of modern science
- *MATH1013 University mathematics II
- *MATH2014 Multivariable calculus & linear algebra
- *COMP1117 Computer programming
- *COMP2119 Introduction to data structures and algorithms
- *STAT2601 Probability and statistics I
- *STAT2602 Probability and statistics II

* replaced by other advanced level STAT course(s) if already taken to fulfill other majors/minors
Remarks:

- Students must have level 2 or above in **HKDSE Extended Module 1 or 2 of Mathematics** or equivalent; otherwise, strongly advised to take **MATH1011 University Mathematics I** in Semester 1.
- To enrol in COMP2119, students must also take **COMP2123 Programming Technologies and Tools**.
## Suggested / Example Structure of BSc (Major in Decision Analytics) Curriculum

<table>
<thead>
<tr>
<th>Year</th>
<th>One</th>
<th>Two</th>
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<tbody>
<tr>
<td>Semester</td>
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<td>Disciplinary Core</td>
<td>COMP1117 Computer Programming</td>
<td>MATH2014 Multivariable Calculus and Linear Algebra</td>
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<td>MATH1013 University Mathematics II</td>
<td>STAT2601 Probability and Statistics I</td>
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<tr>
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<td></td>
<td>STAT2602 Probability and Statistics II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>COMP2119 Introduction to Data Structures and Algorithms</td>
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<tr>
<td>Other</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>COMP2123 Programming Technologies and Tools (Pre-requisite of COMP2119)</td>
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<tr>
<td>Science Foundation Courses</td>
<td>SCNC1111 Scientific Method and Reasoning</td>
<td>SCNC1112 Fundamentals of Modern Science</td>
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<td>Common Core</td>
<td>Six common core courses within the first three years</td>
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<tr>
<td>Language</td>
<td>CAES1000 Core University English (offered in both semesters)</td>
<td>CAES9820 Academic English for Science Students (offered in both semesters)</td>
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</table>
5 Core advanced level courses (30 credits)

STAT3600 Linear statistical analysis
also core to Statistics / Risk Management Major

STAT3612 Data mining
STAT4609 Big data analytics
COMP3278 Introduction to database management systems
MATH3904 Introduction to optimization
Elective advanced level courses
(12 credits = 2 courses)

- COMP3250 Design & analysis of algorithms
- COMP3270 Artificial intelligence
- COMP3323 Advanced database systems
- COMP3407 Scientific computing
- MATH3408 Computational methods & differential equations with applications
- MATH3600 Discrete mathematics
- MATH3601 Numerical analysis
- MATH3901 Operations research
Elective advanced level courses (12 credits = 2 courses)

- STAT3616 Advanced SAS programming
- STAT3620 Modern nonparametric statistics
- STAT3621 Statistical data analysis
- STAT3622 Data visualization
- STAT4601 Time-series analysis
- STAT4602 Multivariate data analysis
Capstone requirement (6 credits)

At least 6 credits from:

- STAT3799 Directed studies in statistics (6 credits)
- STAT4799 Statistics project (12 credits)
- STAT4710 Capstone experience for statistics undergraduates (6 credits)
- STAT4766 Statistics internship (6 credits)
Major in Decision Analytics vs Major in Statistics / Risk Management

- 8 introductory level courses (1 more than STAT/RM):
  - COMP1117 Computer programming
  - COMP2119 Introduction to data structures & algorithms *(instead of STAT1600 Statistics: ideas and concepts)*

- 5 Advanced level core courses (1 more than STAT/RM):
  - one common to all 3 majors: STAT3600 Linear statistical analysis
  - Heavier emphasis on *COMPUTER SCIENCE + MATHEMATICS*

- Students *CANNOT* double major in Decision Analytics and Statistics, Risk Management, Computing & Data Analytics, Computer Science

- Students *CANNOT* major in Decision Analytics and minor in Statistics, Computer Science
Reminder

- plan ahead
- watch out for pre-requisites of individual courses
- courses **CANNOT** be double-counted to fulfill different majors/minors

*exception for double major in Science:*

**SCNC1111 & SCNC1112 & up to 12 credits** of compulsory courses

**REQUIRED by both Science majors can be double-counted**

- consult course selection advisors if necessary
Contact Persons

- Course Selection Advisors
  - C W Kwan
  - Stephen M S Lee
  - K Zhu
- Tel: 3917 2466
- Email: ug_enquiry@saas.hku.hk

13-Aug-18
Support from University and Department

- **Department**: Computing facilities
  - two statistical computer laboratories
  - up-to-date software for teaching, learning, research
Support from University and Department

- **HKU**: Career Development and Resources for Students
  - NETmatch, NETjobs, JIJIS (Joint Institution Job Info. System)
- **Department**: Internship / Job Online Application System

Contact person: Dr C W KWAN  
<cwkwan@hku.hk>
Career Development Training

- **Summer IT course:**
  - Essential IT skills for statistical and risk analysts

- **Career Advising Programme (CAP) to prepare students for:**
  - Internships and job opportunities
  - Advancing resume and interview skills
Exchange study

Faculty of Science
Course Equivalence Database
(for credit transfer reference):

http://webapp.science.hku.hk/student/servlet/course_equiv

Contact person:
Dr ZHU Ke
<mazhuke@hku.hk>
Available to students majoring in Decision Analytics / Statistics / Risk Management based on academic performance and/or other qualities
Student Peer Advisers in 2018-19

• General roles
  – to offer advice in relation to academic studies to freshmen; and
  – to facilitate freshmen’s smooth transition from secondary to university education

• You are highly encouraged to contact the following Student Peer Advisers (SPAs) if you have any questions about your study (their contacts can be found at the Faculty’s website)

  **Decision Analytics**
  – Mr FAN Kwok Lung (BSc Year 4)
  – Mr LAO Annan (BSc Year 3)
  – Miss LUO Tianling (BSc Year 2)
  – Miss ZHENG Shumeng (BSc Year 4)

  **Statistics**
  – Miss LI Ruohan (BSc Year 4)
  – Miss ZHU Zhengyi (BSc Year 2)
Q & A