

## COMPZ1 – Computational Data Science

Created: 22 Apr 2016

Proposal Last Updated: 29 Apr 2016

## Offering Details:

## Key Details and Contacts

## Key Details

Stream Name (Official)	Computational Data Science		
Stream Name (SIMS)	Computational Data Science		
Short Name (SIMS)	C Data Sci		
Stream Career	Undergraduate		
Stream Type	Major		
Stream Code	COMPZ1		
Minimum Units of Credit	Not specified		
Program(s) this stream is offered in	<b>Program Code</b>	<b>Program Name</b>	
	3959	Data Science and Decisions	
Does this new stream replace another existing stream?	No		
First Semester and Year offered	2017 Semester 1		

## Contact Details

Proposal Proponent	<b>Name</b>	<b>Email</b>	<b>Role</b>
	Maurice Pagnucco	morri@cse.unsw.edu.au	Head of School, School of Computer Science and Engineering
Proposal Author(s)	<b>Name</b>	<b>Email</b>	<b>Role</b>
	Bruce Henry	b.henry@UNSW.EDU.AU	Head of School, School of Mathematics & Statistics
	John Shepherd	jas@cse.unsw.edu.au	Senior Lecturer, School of Computer Science and Engineering
Proposal Contact	<b>Name</b>	<b>Email</b>	<b>Role</b>
	Maurice Pagnucco	morri@cse.unsw.edu.au	Head of School, School of Computer Science and Engineering
Optional Additional Endorsers	<b>Name</b>	<b>Email</b>	<b>Role</b>
	Bruce Henry	b.henry@UNSW.EDU.AU	Head of School, School of Mathematics & Statistics
Academic Unit responsible for stream	School of Computer Science and Engineering		
Parent Academic Unit	Faculty of Engineering		

## Proposal Concept

## Summary of Proposal

Summary of Proposal	<p>This proposal is for a Computational Data Science major in a newly proposed undergraduate program - 3959 Data Science and Decisions. The proposed program is a 3-year undergraduate degree with the Faculty of Science as the program authority. The program is a collaborative effort by three schools: School of Mathematics and Statistics, Faculty of Science; School of Computer Science, Faculty of Engineering; and School of Economics, UNSW Business School. The degree would equip students with broad skills in data science including mathematical methods, statistics, computing, econometrics, economics and business modelling and decisions, and communication.</p> <p>The proposed degree includes three majors (Stream Authority in parenthesis)</p> <ul style="list-style-type: none"> <li>• Quantitative Data Science (Mathematics and Statistics)</li> <li>• Computational Data Science (Computer Science)</li> <li>• Business Data Science (Economics).</li> </ul>
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## Justification for proposal

<b>Justification for Proposal</b>	Data Science or Data Analytics or Big Data is a new exciting area of research that is affecting numerous disciplines including mathematics, statistics, computer science, economics and business disciplines. The push for this research is the general availability in businesses and other organisations of very large and continually growing data with complex structure. New statistical procedures or a refocusing of old procedures are needed to glean the best information from these complex data.
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<b>Attachments</b>	
<b>Attach documentation to this proposal</b>	None attached

## Consultation

<b>Internal Consultation</b>	<b>Consultants</b>	Bernard Kachoyan (Adjunct Associate Professor, School of Mathematics & Statistics)
	<b>Details</b>	Dr Bernard Kachoyan was the Head of the Maritime Operations division of DSTO for many years and he has been a member of the School of Mathematics and Statistics advisory board for the past four years. He has articulated the case for more graduates with skills in Data Science and Operations Research at several board meetings and he strongly supports the proposal for a new degree program in Data Science and Decisions.
	<b>Attachments</b>	None specified

<b>External Consultation</b>	<b>Consultants</b>	None specified
	<b>Details</b>	<p>Mark Lawrence is Managing Director of Mark Lawrence Group. mark@marklawrencegroup.com</p> <p>Mark Lawrence Group operates as a global risk consultancy that offers market, credit, liquidity, counterparty, and operational risk measurement and management; risk disclosure and transparency; and risk culture, compensation and governance. The company was founded in 2008 and is based in Melbourne, Australia.</p> <p>Mark Lawrence recently prepared a report for the Australian Mathematical Sciences Institute on key observations and recommendations arising from engagement of AMSI IAC members with selected senior industry representatives July – November 2015. The report identified Data Analytics as an area of short supply and it noted that the supply problem is expected to become more problematic in future years. Many of the companies that he consulted identified the deficit in Data Science skills among their workforce as an urgent competitive and strategic issue.</p> <p>Mark has been advised on our plans for a new degree program in Data Science and Decisions and he strongly supports this initiative.</p>
	<b>Attachments</b>	None specified

<b>Interested Parties</b>	Not specified
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## Related Proposals

<b>Related Proposals</b>	<b>Code</b>	<b>Proposal Name</b>	<b>Type</b>	<b>Date</b>	<b>Status</b>
	3959	Data Science and Decisions	New Program (UG)	Apr 2016	Submitted

## Endorsements and Comments

<b>Endorsement history</b>	No endorsements have been recorded for this proposal (yet).
<b>Comments</b>	No comments posted

## Administration:

### Key Stream Details

#### Key Admin Details

Stream Name (Official)	Computational Data Science
Field of Education	020100 – Computer Science
Next stream review date	December 01, 2021
Details of any particular factors that need to be considered at that review	Not specified

#### Delivery and Attendance

Campus administering the stream	Sydney
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### Articulation

#### Articulated streams

Related streams in the articulated sequence	Not specified
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### Staff

#### Staff associated with stream

##### Stream Convenor

Name	Email	Role
Maurice Pagnucco	morri@cse.unsw.edu.au	Head of School, School of Computer Science and Engineering

##### Administrative Contact

Name	Email	Role
Ray Eaton	r.eaton@unsw.edu.au	Associate Dean (Education), Faculty of Engineering

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## Academic Structure:

### Academic Structure

#### Stream Rules

No academic rules have been defined yet

### Curriculum Mapping

#### Stream Learning Outcomes

Learning outcomes that students should achieve upon successful completion of this Stream.

- 1 Demonstrate a broad understanding of a body of knowledge and theoretical concepts in data science and analytics.

#### Mapping to UNSW Graduate Capabilities

Stream Learning Outcomes mapped to the University's Graduate Capabilities

Demonstrate a broad understanding of a body of knowledge and theoretical concepts in data science and analytics.

- **Scholars** capable of independent and collaborative enquiry, rigorous in their analysis, critique and reflection, and able to innovate by applying their knowledge and skills to the solution of novel as well as routine problems

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Publications and Marketing:

**Publications**

**Stream Description**

## STREAM OUTLINE

Computational Data Science is the study of methods for organising, modelling and analysing large and complex data relevant for businesses, governments or other organisations. The information gleaned from the data analysis is intended to improve business decisions and inform policies.

The program provides a strong technical background in mathematics, statistics, computer science and economics. The Computational Data Science major enables a student to specialise further in computational data methods.

The program and this major open a pathway to exciting careers in data science and data analytics.

## STREAM STRUCTURE

A major in Computational Data Science consists of 8 courses (48 UOC). Four of these courses are required while the other four are free elective courses. to be chosen from the list below.

### COMPULSORY COURSES

#### Level 1

MATH1131 Mathematics 1A (6 UOC)

MATH1231 Mathematics 1B (6 UOC)

COMP1917 Computing 1 (6 UOC)

COMP1927 Computing 2 (6 UOC)

DATA1001 Introduction to Data Science and Decisions (6 UOC)

ECON1101 Microeconomics (6 UOC)

#### Level 2

**COMP2911 Engineering Design and Computing**

**COMP2041 Software Construction**

ECON2112 Game Theory and Business Strategy (6 UOC)

MATH2501 Linear Algebra (6 UOC)

MATH2801 Theory of Statistics (6 UOC)

#### Level 3

**COMP3121 Algorithms and Computing Techniques**

**COMP9313 Big Data Management**

**COMP9417 Machine Learning and Data Mining**

COMP3311 or COMP3911 Data Based Systems (6 UOC)

DATA3001 Data Science and Decisions in Practice (6 UOC)

ECON3203 Econometric Theory and Methods (6 UOC)

**Students must take four electives and two general studies courses**

### RECOMMENDED ELECTIVE COURSES

#### Level 1

ECON1102 Macroeconomics 1

MATH1081 Discrete Mathematics

#### Level 2

COMP2911 Engineering Design in Computing

COMP6771 Advanced C++ Programming

ECON2101 Microeconomics 2

ECON2206 Introductory Econometrics

ECON2209 Business Forecasting

ECON2104 Applied Macroeconomics

ECON2111 Introduction to Economic Development

MATH2011 Several Variable Calculus

MATH2831 Linear Models (6 UOC)

MATH2871 Data Management for Statistical Analysis (6 UOC)

COMP9315 Data Base Systems Implementation

INFS1602 Information Systems in Business

MARK1012 Marketing Fundamentals

MNGTxxxx Human Resource Analytics

#### Level 3

ACTL3141 Actuarial Models and Statistics

ACTL3142 Actuarial Data and Analysis

COMP3411 Artificial Intelligence

COMP3441 Security Engineering

COMP4418 Knowledge Representation and Reasoning

COMP9319 Data Warehousing and Data Mining

COMP4121 Advanced and Parallel Algorithms

COMP9418 Advanced Topics in Machine Learning

ECON3208 Applied Econometrics Models

ECON3107 Economics of Finance

ECON3123 Organizational Economics

ECON3130 Real Estate Economics and Public Policy

ECON3206 Financial Econometrics

INFS3603 Business Intelligence  
 MARK3054 Marketing Analytics and Big Data  
 MARK3085 Digital Marketing and Web Analytics  
 MATH3871 Bayesian Inference and Computation  
 MATH3041 Mathematical Modelling for Real World Systems  
 MATH3161 Optimization  
 MATH3411 Information Codes and Ciphers  
 MATH5836 Data Mining and its Business Applications  
 MATH3821 Statistical Modelling and Computing (6 UOC)  
 MATH3871 Bayesian Inference and Computation (6 UOC)  
 Level 2  
**COMP2911 Engineering Design and Computing**  
**COMP2041 Software Construction**  
 ECON2112 Game Theory and Business Strategy (6 UOC)  
 MATH2501 Linear Algebra (6 UOC)  
 MATH2801 Theory of Statistics (6 UOC)  
 Level 3  
**COMP3121 Algorithms and Computing Techniques**  
**COMP9313 Big Data Management**  
**COMP9417 Machine Learning and Data Mining**  
 COMP3311 or COMP3911 Data Based Systems (6 UOC)  
 DATA3001 Data Science and Decisions in Practice (6 UOC)  
 ECON3203 Econometric Theory and Methods (6 UOC)

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### FURTHER INFORMATION

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Please note that these requirements may be subject to change.  
 Students are advised to follow requirements according to the year they commenced. Please refer to previous editions of the [Online Handbook](#) for your program requirements.

#### Key Search Terms

<b>Key search terms that might be used to search for this stream</b>	Not specified
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## Supplementary Information:

### Student Commitments

#### Resource requirements

Are there any resources that students are required to purchase if they are enrolled in this stream, and what expenses will they incur?	Not specified
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### Accreditation

#### Accreditation with professional institutes

Professional institutes that offer accreditation on completion of this stream, including professional institutes where an application has been made for accreditation	Not specified
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### Related streams

#### Related streams within the same career level

Other UNSW streams within the same career level that are similar in nature to this stream and could be seen as an alternative study option	MATHE1 - Quantitative Data Science (UG) ECONL1 - Business Data Science (UG)
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Other UNSW streams at a postgraduate career level that are similar in nature to this stream and may be an alternative study option for prospective students who have already completed a Bachelor degree stream	Not specified
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### Future Pathways

Postgraduate streams or programs (research and coursework) available to students who wish to further their study in the same discipline area	Not specified
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#### Future career opportunities

Possible careers/occupations available to students who graduate from this stream	Not specified
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