Dr. Vincent A. Knight

Cardiff University School of Mathematics Senghennydd Road Cardiff, CF24 4AG (+44) 29 2087 5548 www.vknight.org G+: +Vincent Knight twitter: @drvinceknight github: drvinceknight blog: Un peu de math

- Senior lecturer
- Deputy director of engagement
- Sustainable Software Institute Fellow
- Chair of OR in Schools
- Area editor for Health Systems

- Editor for the Cardiff Centre for Education Innovation Learning Hub
- Phoenix project advisory board
- Cardiff Python user group meetup organiser
- PyCon UK organising committee

AWARDS

- 2016: School of Mathematics student award for best lecturer
- 2015: Times higher education award for modelling unit
- 2014: Cardiff University Recognising Excellence rising star award
- 2005: School of Mathematics award: graduated first in my year

RESEARCH INTERESTS

- Game Theory: Strategic behaviour in queues and the Iterated Prisoner's dilemma
- Markov modelling: Queueing processes and evolutionary dynamics
- Healthcare: Applied modelling of patient flow
- Pedagogy: Active learning approaches

Cardiff University

APPOINTMENTS

Senior Lecturer
Cardiff University

Lecturer
Cardiff University

2016 - present
2011 - 2016
Cardiff University

2017 - 2016
2017 - 2016
2009 - 2011

ACADEMIC QUALIFICATIONS

Postgraduate Certificate in University Teaching and Learning,

Obtained with distinction

Cardiff University 2013

Ph.D. in Enumerative Combinatorics,

Alternating Sign Matrix Polytopes

Cardiff University 2009

B.Sc. (Hons) Mathematics,

Graduated top of my class

Cardiff University 2005

Baccalaureat Scientifique,

Fluent in French

Lycee du Pre Saint Sauver, St Claude, Jura, France

2002

PUBLICATIONS

31. 2016: Ambulance Allocations for Maximising Survival within a Heterogeneous Population using a Heterogeneous Fleet.

Leanne Smith, Paul Harper, Vincent Knight

Submitted to the journal of the operational research society

30. 2016: Measuring the Price of Anarchy in Critical Care Unit Interactions.

Knight VA., Komenda I, Griffiths J.

The journal of the operational research society

http://www.readcube.com/articles/10.1057/s41274-016-0100-8?author_access_token=JAsSHKTcTl3NH3k5swULIi-5FaAMov8cp-zDTP1PJoVIArpmmPDcS9szSXf4MFhLgmkgDfNf-Es-tfeeFIWjcAd9ghBNqM6Ekw%3D%3D

29. 2016: Editorial: Operations Research for Health Care ESI XXXI OR applied to Health in a Modern World.

Aringhieri, R., Knight, V., Smith, H.

Health Systems

28. 2016: Virtual Machine Warmup Blows Hot and Cold

Barrett, E., Bolz, C. F., Killick, R., Knight, V., Mount, S., Tratt, L.

http://arxiv.org/abs/1602.00602

27. 2016: Editorial: Operations Research for Health Care ESI XXXI OR applied to Health in a Modern World.

Aringhieri, R., Knight, V., Smith, H.

Operations Research for Health Care, 8, 2223.

http://doi.org/10.1016/j.orhc.2016.01.002

26. 2016: An Open Framework for the Reproducible Study of the Iterated Prisoners Dilemma.

Vincent Knight, Owen Campbell, Marc Harper, Karol Langner, James Campbell, Thomas Campbell, Alex Carney, Martin Chorley, Cameron Davidson-Pilon, Kristian Glass, Nikoleta Glynatsi, Tom Ehrlich, Martin Jones, Georgios Koutsovoulos, Holly Tibble, Jochen Mller, Geraint Palmer, Piotr Petunov, Paul Slavin, Timothy Standen, Luis Visintini, Karl Molden.

Journal of open research software.

25. 2016: Time-dependent stochastic methods for managing and scheduling Emergency Medical Services

J.L. Vile, J.W. Gillard, P.R. Harper, V.A. Knight.

Operations Research for Health Care.

http://www.sciencedirect.com/science/article/pii/S2211692314200518

24. 2015: Containment of socially optimal policies in multiple-facility Markovian queueing systems.

Rob Shone, Vincent Knight, Paul Harper, Janet Williams, John Minty

Journal of the Operational Research Society.

http://link.springer.com/article/10.1057/jors.2015.98

23. 2015: Playing games: a case study in active learning applied to Game Theory.

Vince Knight

Connections

https://journals.gre.ac.uk/index.php/msor/article/view/254

22. 2015: Compliance with National Guidelines for Stroke in Radiology.

Izabella Komenda, Hannah Williams, Vincent Knight

Operations Research for Health Care.

http://www.sciencedirect.com/science/article/pii/S2211692314200191

21. 2015: Modelling of psoriasis patient flows for the reconfiguration of secondary care services and treatments

Kayne Putman, Alex Anstey, Paul R Harper, Vince A Knight

Health Systems.

20. 2015: Rostering staff at a mathematics support service using a finite-source queueing model

Gillard J., Knight V., Vile J., Wilson R.

IMA Journal of Management Mathematics. 27 (2)

19. 2014: Mathematical modelling of patient flows to predict critical care capacity required following the merger of two district general hospitals into one

J. Williams, S. Dumont, J. Parry-Jones, I. Komenda, J. Griffiths, V. Knight Anaesthesia. 70 (1)

18. 2014: Operational research ambassadors in schools

Bradshaw N.A., Harper P, Knight V., Orpin L.

Proceedings of the HEA STEM, Edinburgh 2014

17. 2014: Tweeting the Terror: Modelling the Social Media Reaction to the Woolwich Terrorist Attack

Burnap P, Williams ML, Sloan L, Rana O, Housley W, Edwards A, Knight V, Procter R., Voss A. (Social Network Analysis and Mining

16. 2014: Mathematical modelling of patient flows to predict critical care capacity required following the merger of two district general hospitals into one.

J. Williams, S. Dumont, J. Parry-Jones, I. Komenda, J. Griffiths, V. Knight.

Anaesthesia. 70 (1)

15. 2013: Selfish routing in public services.

Knight VA, Harper PR.

European Journal of Operational Research. 230 (1) 122-132

14. 2013: Using Singular Spectrum Analysis to Obtain Staffing Level Requirements in Healthcare.

Knight VA, Gillard J

Journal of the Operational Research Society

13. 2013: Comparisons between observable and unobservable M/M/1 queues with respect to optimal customer behavior

Shone R, Knight VA, Williams JE

European Journal of Operational Research

12. 2012: Ambulance Allocation for Maximal Survival with Heterogeneous Outcome Measures.

Knight VA, Harper PR, Smith L

OMEGA - The International Journal of Management Science. 40 (6) 918–926

11. 2012: How Efficient can an Emergency Unit be? A Perfect World Model.

Baboolal K, Griffiths J, Knight VA, Nelson AV, Voake C, Williams JE.

Emergency Medicine Journal.

10. 2012: Discrete Conditional Phase-Type Models Utilising Classification Trees: Application to Modelling Health Service Capacities.

Harper PR, Knight VA, Marshall A.

European Journal of Operational Research. 219 (3) 522-530

9. 2012: Modelling Emergency Medical Services with Phase Type Distributions.

Knight VA, Harper PR.

Health Systems. 1 53-68

8. 2011: On the Peter Principle: An Agent Based Investigation into the Consequential Effects of Social Networks and Behavioural Factors.

Fetta A, Harper PR, Knight VA, Williams JW, Vieira I

Physica A: Statistical Mechanics and its Applications.

7. 2011: Forecasting Welsh Ambulance Demand using Singular Spectrum Analysis.

Williams J, Gillard J, Harper PR, Knight VA

Journal of the Operational Research Society.

6. 2011: Operational Research Informing National Health Policy

Harper PR, Knight VA, Vieira I, Williams JW

Cardiff University. ISBN: 978-0-9569158-0-1

5. 2011: Bed Management in a Critical Care Unit.

Griffiths J, Knight VA, Komenda I.

IMA Journal of Management Mathematics.

4. 2011: Modelling Patient Choice in Healthcare Systems: Development and Application of a Discrete Event Simulation with Agent-Based Functionality.

Knight VA, Williams JE, Reynolds I.

Journal of Simulation.

3. 2011: Cost-Effective Workforce Planning: Optimising the Dental Team Skill-Mix for England.

 $Harper\ PR,\ Kleinman\ ER,\ Gallagher\ JE,\ Knight\ VA$

Journal of Enterprise Information Management

 ${\it 2.\ 2010: Forecasting\ Welsh\ Ambulance\ Demand\ using\ Singular\ Spectrum\ Analysis.}$

Williams J, Gillard J, Harper PR, Knight VA

In Proceedings of the XXXVI International ORAHS Conference

1. 2008: Higher Spin Alternating Sign Matrices

Jackson networks and healthcare

Behrend RE, Knight VA

Electronic Journal of Combinatorics. 14(1): R83, 38pp.

RESEARCH STUDENTS

27. Nikoleta Glynatsi (PhD) Machine learning and the Prisoner's Dilemma	2016 - present
26. James Campbell (BSc) Fingerprinter prisoner's Dilemma strategies	2016 - present
25. Cindy Huang (Nuffield Research Placement) Investigating deadlock in queues with vacation and baulking	2016 - 2016
24. Rhys Ward (Summer) Building Game Theoretical Software in a Research Environment	2015 - 2015
23. James Campbell (Summer) Building Game Theoretical Software in a Research Environment	2015 - 2015
22. Tobenna Peter Igwe (Google Summer of Code) Extending Game Theory in Sage	2015 - 2015
21. Ffinian Sullivan (Nuffield Research Placement) Understanding mixed behaviour in queue balking threshold policies	2015 - 2015
20. Hannah Lorrimore (Summer) Building Game Theoretical Software in a Research Environment	2015 - 2015
19. Geraint Palmer (PhD)	2014 - present

18.	Imogen Dunne (BSc.) The Effect of Personality Traits on Academic Achievement in Flipped versus Learning Environments	2014 - 2015 Traditional
17.	James Campbell (Summer) Building Game Theoretical Software in a Research Environment	2014 - 2014
16.	Rhys Jones (BSc.) Modelling Rugby Lineout Strategies Using Game Theory	2013 - 2014
15.	Jason Young (MMath) Markov Decision Processes for the study a system of two queues in series.	2013 - 2014
14.	Ceri Morse (BSc.) Modelling Lineout Strategies using Game Theory	2012 - 2013
13.	Jason Young (Summer) Understanding the effect of selfish behaviour in a series of 2 queues	2012 - 2012
12.	Rob Shone (PhD) Individually and Socially Optimal Policies in Queueing Systems with Multiple neous Facilities	2011 - 2014 Heteroge-
11.	Angelico Fetta (PhD) Agent Based Simulation for Complex Health Systems Interventions	2011 - 2014
10.	Chappman Sin (BSc.) Mathematical modelling of Risk (the board game)	2011 - 2012
9.	Iain Reynolds (Summer) Modelling patient choice in healthcare systems development and application of event simulation with agent-based functionality	2011 - 2011 f a discrete
8.	Izabela Komenda (PhD) Bed management in a critical care unit	2010 - 2013
7.	Tatjana Timofejeva (BSc.) Impact of unscheduled care Modelling time varying activities at a Hospital	2010 - 2011
6.	Stuart MacGregor (BSc.) A study into two player hide and seek games verifying results from game the monte carlo simulation, with a particular application to anti-submarine warfat	
5.	Catherine Fortune (BSc.) Game Theory and the Lemke-Howson algorithm	2010 - 2011
4.	${\it Julie~Vile~(PhD)}$ Time-dependent stochastic modelling for predicting demand and scheduling of	2009 - 2012 emergency

medical services

3. Fern Gould (BSc.) Game Theory and the Iterated Prisoner's Dilemma	2009 - 2010		
2. Tamsin Griffiths (BSc.) Troops to Task Tool and Refugee Estimation	2009 - 2010		
1. Leanne Smith (PhD) Modelling emergency medical vehicle services	2008 - 2013		
GRANT FUNDING			
Sustainable software institute			
Fellowship $\pounds 3,000$	013 - ongoing		
Cardiff and Vale University Health Board			
Operational Research Modelling to Support Cardiff and Vale UHB $\pounds 371,427$	2013 - 2018		
EPSRC			
Identifying and modelling victim, business regulatory and malware behaviours in a changing cyberth landscape			
£ $101,659$	2013 - 2016		
Aneurin Bevan Health Board Creation of a Mathematical/OR Modelling Unit to Support the Aneurin Bevan Health Board $\pounds 319{,}944$	2013 - 2015		
ESRC			
Hate speech? Understanding the modelling of social media identity formation and behaviour through			
Cardiff Online Social Media Observatory (COSMOS) $\pounds 7,015$	2013 - 2016		
Health Foundation and Cardiff and Vale University Health Board			
Estimating quality improvement and cost reduction for the patient and local health economy of tr			
ENT/audiology services into a community setting $\pounds 61,237$	2013 - 2014		
LANCS (EPSRC)			
Post-Doctoral Training Scheme Grant: Investigating the Effects of Individual Behaviour on	Hierarchical		
queueing Systems $\pounds 5,000$	2012 - 2012		
Cardiff University CUROP Award Developing and Evaluating Mathematical Teaching Resources through Open Source Software $\pounds 2,200$	2012 - 2012		
LANCS (EPSRC)			
Post-Doctoral Training Scheme Grant: Choice and Healthcare Investigation Project $\pounds 2,500$	2010 - 2011		

Patient Choice: A Discrete Event Simulation

£2,500 2010 - 2012

TEACHING

Courses I am currently teaching:

- 3. Computing for Mathematics: A course introducing programming to mathematics students.
- 2. Introduction to Object Oriented Programming: A hackathon introduces students to fundemental aspects of object oriented prgramming.
- 1. Game Theory: A final year mathematics course covering introductory game theory.

Courses I have taught in the past:

- 4. MSc. Week 0: An overview of fundamental mathematics concepts for new MSc students.
- 3. OR Methods: A course covering: queueing theory, game theory and Markov processes.
- 2. Introduction to LaTeX: A brief introduction to LaTeX.
- 1. Advanced Statistical Packages: A course teaching the SAS and R software packages.

MEDIA

- 10. 2017-03-23: Talk Python to Me Podcast Game Theory and the Axelrod library
- 9. 2017-03-17: Cardiff University YouTube Channel PyCon Namibia and the Phoenix project
- 8. 2017-01-09: Pythagoras' trousers Mathematics in animation
- 7. 2017-01-02: Pythagoras' trousers Alpha Go
- 6. 2016-09-26: Pythagoras' trousers Election polling
- 5. 2016-01-27: Namibia broadcasting company Discussing PyCon Namibia
- 4. 2015-06-16: BBC Radio Wales Game Theory and Nash Equilibrium
- 3. 2015-04-16: Sci screen screening The Imitation Game
- 2. 2014-05-05: 2014 Pythagoras Lecture Mathematics and Healthcare Management
- 1. 2014-03-19: BBC Parliament Voice of the Future 2014

OUTREACH

I participate in a variety of mathematics outreach activities.

- Monmouth Science initiative.
- Regular workshops at the School of Mathematics.
- STEM live: a university wide event.
- Speaking at the British Science festival 2015.

SOFTWARE PROJECTS

- Axelrod: A Python library/github project that replicates Axelrod's tournament.
- Nashpy: A Python library to find equilibria in 2 player normal form games
- Ciw: A Python library for simulation queueing networks
- Game Theory in Sage: A collection of code to continue the integration of Game Theoretic capabilities in to Sage.
- Virtual Microscope: A web application to display and annotate scanned slides.
- ghtalks: Organise and share talks with gh-pages
- sklDj: A Django web app interface to machine learning algorithms

SOFTWARE COMMUNITY

- PyDiff: I help organise the Cardiff Pyton user group meetup.
- DjangoCon Europe 2015: I was on the organising committee for DjangoCon Europe 2015.
- Python Namibia: I help run the Pycon Namibia conference.
- PyCon UK: I am on the orgnising committee for PyCon UK.
- School of mathematics code club: I help run a code club open to mathematics students.