Dr. Vincent A. Knight

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www.vknight.org
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twitter: @drvinceknight
github: drvinceknight
blog: Un peu de math

- *Phoenix project advisory board*
- *Deputy director of engagement*
- *Cardiff Python User Group Meetup Organiser*
- *Member of the PyCon UK organising committee*
- *Sustainable Software Institute Fellow*
- *Mathematical modelling area editor for Health Systems*
- *Editor for the Cardiff Centre for Education Innovation Learning Hub*
- *Chair of OR in Schools*

AWARDS

- *2014: Cardiff University Recognising Excellence Rising Star Award*
- *2015: Times higher education award for modelling unit*
- *2016: School of Mathematics student award for best lecturer*
- *2005: Cardiff School of Mathematics - graduated top of my year*

RESEARCH INTERESTS

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

APPOINTMENTS

Senior Lecturer — *2016 - present*
Cardiff University

Lecturer — *2011 - 2016*
Cardiff University

Post Doctoral Researcher — *2009 - 2011*
Cardiff University

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

32. *2017:* ***Predicting Adolescent Social Networks to Stop Smoking in Secondary Schools***
Angelico Fetta, Vincent Knight, Paul Harper, Janet Williams
European Journal of Operational Research
`http://www.sciencedirect.com/science/article/pii/S0377221717306665?via%3Dihub`

31. *2017:* ***Reinforcement Learning Produces Dominant Strategies for the Iterated Prisoner's Dilemma***
Marc Harper, Vincent Knight, Martin Jones, Georgios Koutsovoulos, Nikoleta Glynatsi, Owen Campbell
Arxiv pre print
`https://arxiv.org/abs/1707.06307`

30. *2017:* ***Evolution Reinforces Cooperation with the Emergence of Self-Recognition Mechanisms: an empirical study of the Moran process for the iterated Prisoner's dilemma***
Vincent Knight, Marc Harper, Nikoleta Glynatsi, Owen Campbell
Arxiv pre print
`https://arxiv.org/abs/1707.06920`

29. *2016:* ***Time-dependent stochastic methods for managing and scheduling Emergency Medical Services***
Julie Vile, Jon Gillard, Paul Harper, Vincent Knight
Operations Research for Health Care.
`http://www.sciencedirect.com/science/article/pii/S2211692314200518`

28. *2016:* ***Editorial: Health Systems ESI XXXI OR applied to Health in a Modern World.***
Roberto Aringhieri, Vincent Knight, Honora Smith
Operations Research for Health Care, 5, 3.
`https://link.springer.com/article/10.1057/s41306-016-0012-5`

27. *2016:* ***Measuring the Price of Anarchy in Critical Care Unit Interactions.***
Vincent Knight, Izabela Komenda, Jeff Griffiths
The journal of the operational research society
`http://www.readcube.com/articles/10.1057/s41274-016-0100-8?author_access_token=JAsSHKTcTl3NH3k5s`

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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.
http://openresearchsoftware.metajnl.com/article/10.5334/jors.125/

25. 2016: ***Editorial: Operations Research for Health Care ESI XXXI OR applied to Health in a Modern World.***
Roberto Aringhieri, Vincent Knight, Honora Smith
Operations Research for Health Care, 8, 2223.
http://doi.org/10.1016/j.orhc.2016.01.002

24. 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

23. 2015: ***Compliance with National Guidelines for Stroke in Radiology.***
Izabela Komenda, Hannah Williams, Vincent Knight
Operations Research for Health Care.
http://www.sciencedirect.com/science/article/pii/S2211692314200191

22. 2015: ***Rostering staff at a mathematics support service using a finite-source queueing model***
Jon Gillard, Vincent Knight, Julie Vile, Rob Wilson
IMA Journal of Management Mathematics. 27 (2)

21. 2015: ***Modelling of psoriasis patient flows for the reconfiguration of secondary care services and treatments***
Kayne Putman, Alex Anstey, Paul Harper, Vincent Knight
Health Systems.

20. 2015: ***Playing games: a case study in active learning applied to Game Theory.***
Vincent Knight
Connections
https://journals.gre.ac.uk/index.php/msor/article/view/254

19. 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

18. 2014: ***Tweeting the Terror: Modelling the Social Media Reaction to the Woolwich Terrorist Attack***
Peter Burnap, Matthew Williams, Luke Sloan, Omer Rana, Will Housley, Adam Edwards, Vincent

Knight, Rob Procter, Alex Voss
Social Network Analysis and Mining

17. *2014:* ***Operational research ambassadors in schools***
Noel-Ann Bradshaw, Paul Harper, Vincent Knight, Louise Orpin
Proceedings of the HEA STEM, Edinburgh 2014

16. *2014:* ***Mathematical modelling of patient flows to predict critical care capacity required following the merger of two district general hospitals into one.***
James Williams, Steve Dumont, Jack Parry-Jones, Izabela Komenda, Jeff Griffiths, Vincent Knight
Anaesthesia. 70 (1)

15. *2013:* ***Selfish routing in public services.***
Vincent Knight, Paul Harper
European Journal of Operational Research. 230 (1) 122-132

14. *2013:* ***Comparisons between observable and unobservable M/M/1 queues with respect to optimal customer behavior***
Rob Shone, Vincent Knight, Janet Williams
European Journal of Operational Research

13. *2013:* ***Using Singular Spectrum Analysis to Obtain Staffing Level Requirements in Healthcare.***
Vincent Knight, Jon Gillard
Journal of the Operational Research Society

12. *2012:* ***Ambulance Allocation for Maximal Survival with Heterogeneous Outcome Measures.***
Vincent Knight, Paul Harper, Leanne Smith
OMEGA - The International Journal of Management Science. 40 (6) 918–926

11. *2012:* ***Discrete Conditional Phase-Type Models Utilising Classification Trees: Application to Modelling Health Service Capacities.***
Paul Harper, Vincent Knight, Adele Marshall
European Journal of Operational Research. 219 (3) 522–530

10. *2012:* ***Modelling Emergency Medical Services with Phase Type Distributions.***
Vincent Knight, Paul Harper
Health Systems. 1 53-68

9. *2012:* ***How Efficient can an Emergency Unit be? A Perfect World Model.***
Kesh Baboolal, Jeff Griffiths, Vincent Knight, Andrew Nelson, Cheryl Voake, Janet Williams
Emergency Medicine Journal.

8. *2011:* ***Cost-Effective Workforce Planning: Optimising the Dental Team Skill-Mix for England.***
Paul Harper, E Kleinman, Jenny Gallagher, Vincent Knight
Journal of Enterprise Information Management

7. *2011:* ***Bed Management in a Critical Care Unit.***
Jeff Griffiths, Vincent Knight, Izabela Komenda
IMA Journal of Management Mathematics.

6. *2011:* ***On the Peter Principle: An Agent Based Investigation into the Consequential Effects of Social Networks and Behavioural Factors.***
Angelico Fetta, Paul Harper, Vincent Knight, Janet Williams, Israel Vieira
Physica A: Statistical Mechanics and its Applications.

5. *2011:* ***Modelling Patient Choice in Healthcare Systems: Development and Application of a Discrete Event Simulation with Agent-Based Functionality.***
Vincent Knight, Janet Williams, Iain Reynolds
Journal of Simulation.

4. *2011:* ***Operational Research Informing National Health Policy***
Paul Harper, Vincent Knight, Israel Vieira, Janet Williams
Cardiff University. ISBN: 978-0-9569158-0-1

3. *2011:* ***Forecasting Welsh Ambulance Demand using Singular Spectrum Analysis.***
Janet Williams, Jon Gillard, Paul Harper, Vincent Knight
In Journal of the Operational Research Society

2. *2010:* ***Forecasting Welsh Ambulance Demand using Singular Spectrum Analysis.***
Janet Williams, Jon Gillard, Paul Harper, Vincent Knight
In Proceedings of the XXXVI International ORAHS Conference

1. *2008:* ***Higher Spin Alternating Sign Matrices***
Roger Behrend, Vincent Knight
Electronic Journal of Combinatorics. 14(1): R83, 38pp.

RESEARCH STUDENTS

33. *Henry Wilde (PhD)* *2017 - present*
Costs in healthcare

32. *Mansour Hakem (Nuffield Research Placement)* *2017 - 2017*
Investigating Axelrod's second tournament

31. *Toby Devlin (BSc)* *2017 - 2017*
Machine learning for optimisation of move sequence

30. *Will Guo (Nuffield Research Placement)* *2017 - 2017*
Investigating Axelrod's second tournament

29. *Thomas Rodwell (PhD)* *2017 - present*
Diary planner for healthcare ward

28. *Lewis Parsons (Summer)* *2017 - 2017*
Building a framework for research excellence framework submission coordination

27. *James Campbell (BSc)* — *2016 - 2016*
Fingerprinting prisoner's Dilemma strategies

26. *Cindy Huang (Nuffield Research Placement)* — *2016 - 2016*
Investigating deadlock in queues with vacation and baulking

25. *Nikoleta Glynatsi (PhD)* — *2016 - present*
Machine learning and the Prisoner's Dilemma

24. *Rhys Ward (Summer)* — *2015 - 2015*
Building Game Theoretical Software in a Research Environment

23. *Tobenna Peter Igwe (Google Summer of Code)* — *2015 - 2015*
Extending Game Theory in Sage

22. *Ffinian Sullivan (Nuffield Research Placement)* — *2015 - 2015*
Understanding mixed behaviour in queue balking threshold policies

21. *James Campbell (Summer)* — *2015 - 2015*
Building Game Theoretical Software in a Research Environment

20. *Hannah Lorrimore (Summer)* — *2015 - 2015*
Building Game Theoretical Software in a Research Environment

19. *James Campbell (Summer)* — *2014 - 2014*
Building Game Theoretical Software in a Research Environment

18. *Geraint Palmer (PhD)* — *2014 - present*
Jackson networks and healthcare

17. *Imogen Dunne (BSc.)* — *2014 - 2015*
The Effect of Personality Traits on Academic Achievement in Flipped versus Traditional Learning Environments

16. *Rhys Jones (BSc.)* — *2013 - 2014*
Modelling Rugby Lineout Strategies Using Game Theory

15. *Jason Young (MMath)* — *2013 - 2014*
Markov Decision Processes for the study a system of two queues in series.

14. *Ceri Morse (BSc.)* — *2012 - 2013*
Modelling Lineout Strategies using Game Theory

13. *Jason Young (Summer)* — *2012 - 2012*
Understanding the effect of selfish behaviour in a series of 2 queues

12. *Chappman Sin (BSc.)* — *2011 - 2012*
Mathematical modelling of Risk (the board game)

11. *Iain Reynolds (Summer)* *2011 - 2011*
Modelling patient choice in healthcare systems development and application of a discrete event simulation with agent-based functionality

10. *Rob Shone (PhD)* *2011 - 2014*
Individually and Socially Optimal Policies in Queueing Systems with Multiple Heterogeneous Facilities

9. *Angelico Fetta (PhD)* *2011 - 2014*
Agent Based Simulation for Complex Health Systems Interventions

8. *Izabela Komenda (PhD)* *2010 - 2013*
Bed management in a critical care unit

7. *Stuart MacGregor (BSc.)* *2010 - 2011*
A study into two player hide and seek games verifying results from game theory using monte carlo simulation, with a particular application to anti-submarine warfare

6. *Catherine Fortune (BSc.)* *2010 - 2011*
Game Theory and the Lemke-Howson algorithm

5. *Tatjana Timofejeva (BSc.)* *2010 - 2011*
Impact of unscheduled care Modelling time varying activities at a Hospital

4. *Julie Vile (PhD)* *2009 - 2012*
Time-dependent stochastic modelling for predicting demand and scheduling of emergency medical services

3. *Fern Gould (BSc.)* *2009 - 2010*
Game Theory and the Iterated Prisoner's Dilemma

2. *Tamsin Griffiths (BSc.)* *2009 - 2010*
Troops to Task Tool and Refugee Estimation

1. *Leanne Smith (PhD)* *2008 - 2013*
Modelling emergency medical vehicle services

GRANT FUNDING

EPSRC
Identifying and modelling victim, business regulatory and malware behaviours in a changing cyberthreat landscape
£101,659 *2013 - 2016*

Cardiff University CUROP Award
Developing and Evaluating Mathematical Teaching Resources through Open Source Software
£2,200 *2012 - 2012*

LANCS (EPSRC)
Post-Doctoral Training Scheme Grant: Choice and Healthcare Investigation Project
£2,500 *2010 - 2011*

Aneurin Bevan Health Board
Creation of a Mathematical/OR Modelling Unit to Support the Aneurin Bevan Health Board
£319,944 *2013 - 2015*

Sustainable software institute
Fellowship
£3,000 *2013 - ongoing*

LANCS (EPSRC)
Post-Doctoral Training Scheme Grant: Investigating the Effects of Individual Behaviour on Hierarchical queueing Systems
£5,000 *2012 - 2012*

Cardiff and Vale University Health Board
Operational Research Modelling to Support Cardiff and Vale UHB
£371,427 *2013 - 2018*

ESRC
Hate speech? Understanding the modelling of social media identity formation and behaviour through the Cardiff Online Social Media Observatory (COSMOS)
£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 transferring ENT/audiology services into a community setting
£61,237 *2013 - 2014*

Cardiff University CUROP Award
Patient Choice: A Discrete Event Simulation
£2,500 *2010 - 2012*

TEACHING

Courses I am currently teaching:

4. *Introduction to Object Oriented Programming: A hackathon introduces students to fundamental aspects of object oriented programming*
3. *Game Theory: A final year mathematics course covering introductory game theory*
2. *Computing for Mathematics: A course introducing programming to mathematics students*
1. *Research Software Development: A course introducing best practice for software development*

Courses I have taught in the past:

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

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

SOFTWARE PROJECTS

- *Axelrod: A Python library/github project that replicates Axelrod's tournament.*
- *Ciw: A Python library for simulation queueing networks*
- *Conference Scheduler: A Python library to schedule conferences using integer linear programming*
- *Game Theory in Sage: A collection of code to continue the integration of Game Theoretic capabilities in to Sage.*
- *Nashpy: A Python library to find equilibria in 2 player normal form games*
- *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

- *DjangoCon Europe 2015: I was on the organising committee for DjangoCon Europe 2015.*
- *PyCon UK: I am on the orgnising committee for PyCon UK.*
- *PyDiff: I help organise the Cardiff Pyton user group meetup.*
- *Python Namibia: I help run the Pycon Namibia conference.*
- *School of mathematics code club: I help run a code club open to mathematics students.*
- *sklDj: A Django web app interface to machine learning algorithms*