

## Dr. Vincent A. Knight

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github: drvinceknight  
blog: Un peu de math

- Senior lecturer
- Deputy director of engagement
- Fellow of the Sustainable Software Institute
- Chair of the OR in Schools taskforce
- Area editor for Health Systems
- Member of the Phoenix project advisory board
- Organiser of the Cardiff Python user group meetup
- Member of the PyCon UK organising committee

### APPOINTMENTS

Senior Lecturer Cardiff University	2016 - present
Lecturer Cardiff University	2011 - 2016
Post Doctoral Researcher Cardiff University	2009 - 2011

### ACADEMIC QUALIFICATIONS

Postgraduate Certificate in University Teaching and Learning, <b>Obtained with distinction</b> Cardiff University	2013
Ph.D. in Enumerative Combinatorics, <b>Alternating Sign Matrix Polytopes</b> Cardiff University	2009
B.Sc. (Hons) Mathematics, <b>Graduated top of my class</b> Cardiff University	2005
Baccalaureat Scientifique, <b>Fluent in French</b> Lycee du Pre Saint Sauver, St Claude, Jura, France	2002

### PUBLICATIONS

26. 2016: **Measuring the Price of Anarchy in Critical Care Unit Interactions.**  
Knight VA., Komenda I, Griffiths J.  
**Accepted in the journal of the operational research society.**
25. 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/>

24. 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>

23. 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>

22. 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>

21. 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>

20. 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.**

19. 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)**

18. 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)**

17. 2014: **Operational research ambassadors in schools**

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

**Proceedings of the HEA STEM, Edinburgh 2014**

16. 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**

15. 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)**
14. 2013: **Selfish routing in public services.**  
Knight VA, Harper PR.  
**European Journal of Operational Research. 230 (1) 122-132**
13. 2013: **Using Singular Spectrum Analysis to Obtain Staffing Level Requirements in Health-care.**  
Knight VA, Gillard J  
**Journal of the Operational Research Society**
12. 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**
11. 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**
10. 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.**
9. 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**
8. 2012: **Modelling Emergency Medical Services with Phase Type Distributions.**  
Knight VA, Harper PR.  
**Health Systems. 1 53-68**
7. 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.**
6. 2011: **Forecasting Welsh Ambulance Demand using Singular Spectrum Analysis.**  
Williams J, Gillard J, Harper PR, Knight VA  
**Journal of the Operational Research Society.**
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**
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**  
Behrend RE, Knight VA  
**Electronic Journal of Combinatorics. 14(1): R83, 38pp.**

#### RESEARCH STUDENTS

- |                                                                                                                     |                |
|---------------------------------------------------------------------------------------------------------------------|----------------|
| 26. Nikoleta Glynatsi (PhD)                                                                                         | 2016 - present |
| <b>Machine learning and the Prisoner's Dilemma</b>                                                                  |                |
| 25. James Campbell (BSc)                                                                                            | 2016 - present |
| <b>Fingerprinter prisoner's Dilemma strategies</b>                                                                  |                |
| 24. Rhys Ward (Summer)                                                                                              | 2015 - 2015    |
| <b>Building Game Theoretical Software in a Research Environment</b>                                                 |                |
| 23. James Campbell (Summer)                                                                                         | 2015 - 2015    |
| <b>Building Game Theoretical Software in a Research Environment</b>                                                 |                |
| 22. Tobenna Peter Igwe (Google Summer of Code)                                                                      | 2015 - 2015    |
| <b>Extending Game Theory in Sage</b>                                                                                |                |
| 21. Ffinian Sullivan (Nuffield Research Placement)                                                                  | 2015 - 2015    |
| <b>Understanding mixed behaviour in queue balking threshold policies</b>                                            |                |
| 20. Hannah Lorrimore (Summer)                                                                                       | 2015 - 2015    |
| <b>Building Game Theoretical Software in a Research Environment</b>                                                 |                |
| 19. Geraint Palmer (PhD)                                                                                            | 2014 - present |
| <b>Jackson networks and healthcare</b>                                                                              |                |
| 18. Imogen Dunne (BSc.)                                                                                             | 2014 - 2015    |
| <b>The Effect of Personality Traits on Academic Achievement in Flipped versus Traditional Learning Environments</b> |                |

17. James Campbell (Summer) 2014 - 2014  
**Building Game Theoretical Software in a Research Environment**
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. Rob Shone (PhD) 2011 - 2014  
**Individually and Socially Optimal Policies in Queueing Systems with Multiple Heterogeneous Facilities**
11. Angelico Fetta (PhD) 2011 - 2014  
**Agent Based Simulation for Complex Health Systems Interventions**
10. Chappman Sin (BSc.) 2011 - 2012  
**Mathematical modelling of Risk (the board game)**
9. Iain Reynolds (Summer) 2011 - 2011  
**Modelling patient choice in healthcare systems development and application of a discrete event simulation with agent-based functionality**
8. Izabela Komenda (PhD) 2010 - 2013  
**Bed management in a critical care unit**
7. Tatjana Timofejeva (BSc.) 2010 - 2011  
**Impact of unscheduled care Modelling time varying activities at a Hospital**
6. 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**
5. Catherine Fortune (BSc.) 2010 - 2011  
**Game Theory and the Lemke-Howson algorithm**
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 |
| <b>Troops to Task Tool and Refugee Estimation</b>   |             |
| 1. Leanne Smith (PhD)                               | 2008 - 2013 |
| <b>Modelling emergency medical vehicle services</b> |             |

## GRANT FUNDING

- |                                                                                                                                                            |             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Cardiff and Vale University Health Board                                                                                                                   |             |
| Operational Research Modelling to Support Cardiff and Vale UHB                                                                                             |             |
| £371,427                                                                                                                                                   | 2013 - 2018 |
| EPSRC                                                                                                                                                      |             |
| Identifying and modelling victim, business regulatory and malware behaviours in a changing cyberthreat landscape                                           |             |
| £101,659                                                                                                                                                   | 2013 - 2016 |
| Aneurin Bevan Health Board                                                                                                                                 |             |
| Creation of a Mathematical/OR Modelling Unit to Support the Aneurin Bevan Health Board                                                                     |             |
| £319,944                                                                                                                                                   | 2013 - 2015 |
| 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 |
| LANCS (EPSRC)                                                                                                                                              |             |
| Post-Doctoral Training Scheme Grant: Investigating the Effects of Individual Behaviour on Hierarchical queueing Systems                                    |             |
| £5,000                                                                                                                                                     | 2012 - 2012 |
| 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 |
| Cardiff University CUROP Award                                                                                                                             |             |
| 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 fundamental aspects of object oriented programming.*
1. *OR2 - 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**

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**

- *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.*
- *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*
- *Ciw: A Python library for simulation queueing networks*

## **SOFTWARE COMMUNITY**

- *PyDiff: I help organise the Cardiff Python user group meetup.*
- *DjangoCon Europe 2015: I was on the organising committee for this year's DjangoCon Europe.*
- *Python Namibia: I help run the Pycon Namibia conference.*
- *PyCon UK: I am on the organising committee for PyCon UK.*