



Benefits and challenges with the Royal Academy of Engineering visiting professors programme

- Dr Tom Prickett MBCS CITP SFHEA, Northumbria University
- Dr Phil Brooke CEng FBCS CITP, Green Pike Ltd / Northumbria University
- Dr Paul Johnson, PJEC Ltd / Arup / Newcastle University
- Dr Jaime Amezage, Newcastle University

Background

- Royal Academy for Engineering (RAEng) is
 - “a charity that harnesses the power of engineering to build a sustainable society and an inclusive economy that works for everyone.” (<https://www.raeng.org.uk/>)
- Amongst many activities provide several grants and prizes
- A number are focused upon
 - Academia into Industry
 - Industry into Academia

RAEng
Visiting
Professors
Scheme -
What is it?



Visiting Professor scheme in more detail



The award supports the attendance of a Visiting professor at the hosting university for at least 12 days a year



Maximum value

£10000 a year

£30000 over 3 years

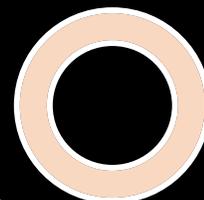
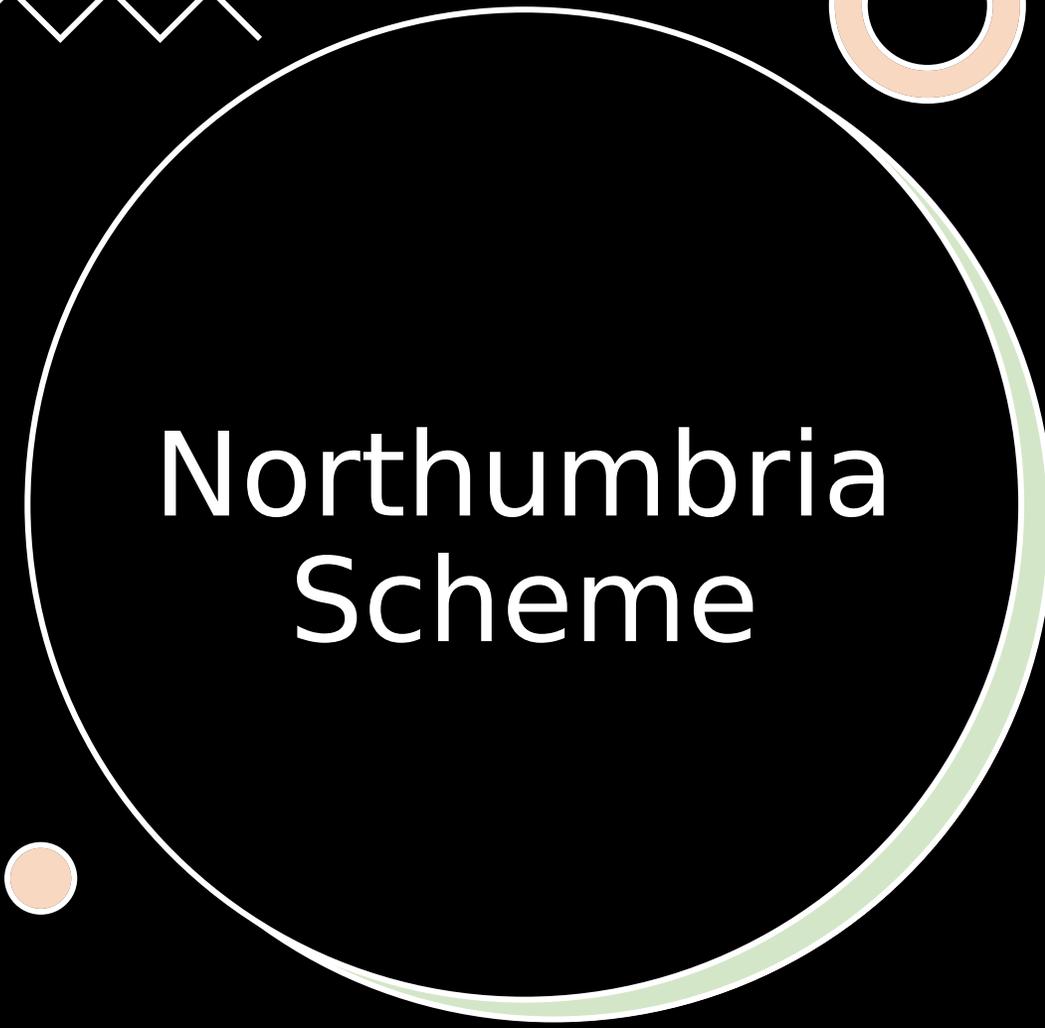


Scheme promotes diversity from under-represented groups by a range of dimensions



Covers all engineer disciplines

Vast majority of Visiting Professors demonstrate professional registration and membership with many being Engineering Fellows.



Northumbria Scheme

- Academic Champion
 - Tom Prickett
- Visiting Professor
 - Phil Brooke



Northumbri

Students received letters t
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Newcastle University cyber attack 'to take weeks to fix'

🕒 6 September 2020



Most new students at Newcastle University will begin term on 28 September.

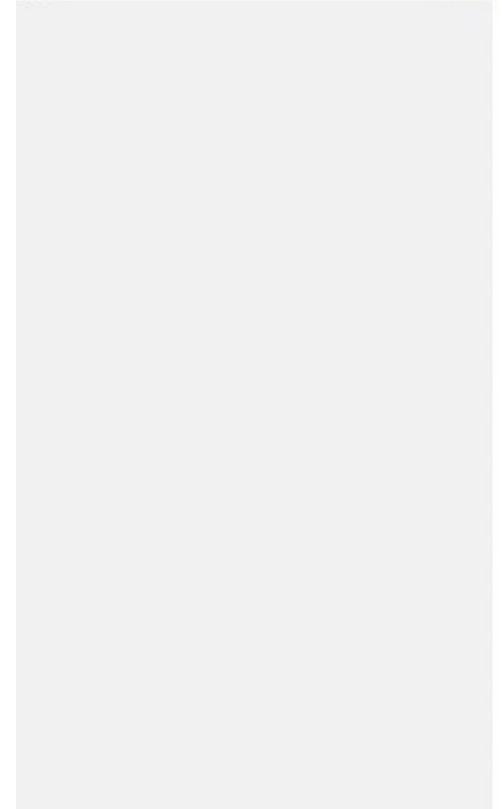
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Northumbria Visiting Professor



Dr Phil Brooke

Visiting Professor in Practical Cybersecurity insights

Northumbria University (Green Pike Ltd.)

Phil is a computer scientist and software engineer specialising in information security. He is currently a consultant running Green Pike Ltd and also works as an information security manager in a public sector organisation. He has over twenty years' of experience including several academic posts, the Civil Service and work related to law enforcement.

Phil is also a Chartered Engineer, a Fellow of the British Computer Society and a Chartered IT Professional. He is also a Chartered Mathematician and Member of the IMA. He holds degrees from the University of Cambridge and the University of York.

In his role as a Visiting Professor, Phil intends to provide students with examples and case studies drawn from real-life practice. These are to illustrate the difficulties, challenges, and inevitable compromises that can be hard to explain within academia. Phil aims to mentor students and support them in developing a good standard of professionalism and ethics in the field of cybersecurity.

Teaching Innovations – including security in general CS – Embedding across Curricula – Lead by visiting

Subject / Module	Year Taught		How Assessed
Web Technologies	1	Confidentiality, integrity and availability. Threats and Attacks, how they materialise and how those attacks exploit website vulnerabilities.	Web page providing user training related to cybersecurity.
Systems Analysis	1	Personal, organisation and legal/regulatory framework in which a system can be used, including risks and constraints.	Self selected team Design Project
Databases	1	Threats and Attacks, how they materialise and how those attacks exploit database vulnerabilities.	Examination questions
Web Programming	2	Threats and Attacks, how they materialise, how those attacks exploit web vulnerabilities and approaches to mitigate.	A web application, secured against OWASP top ten vulnerabilities
Programming Design and Development	2	Design, defensive programming and testing	Programming project and related report
Networks, Operating Systems and Cybersecurity	2	Cybersecurity architecture and operations: physical and process controls that can be implemented across an organisation to reduce information and systems risk, identify, and mitigate the vulnerability, and ensure organisational compliance	Practical work and related report
Team Project and Professionalism	3	Personal, organisation and legal/regulatory framework in which a system can be used, including risks and constraints.	Design and construction of a software component as part of a self selected team project and the evaluation of the project and its potential future exploitation. The projects are 'live' addressing the needs of a real client or problem.



Information Security

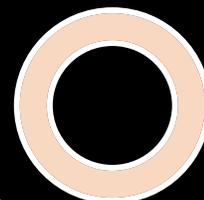
<https://unsplash.com/photos/wJ7atxTNeQE>

Successes

- Linking real-world examples and their lessons to underpinning academic information security concepts. Demonstrating the applicability of content delivered in modules
- Encouraging and mentoring individuals and small groups, particularly in small-group teaching where wider conversations are feasible
- Adding industrial/public-sector stories, guidance, ... into group project work. Particularly valuable around the realities of group work, limited resources and interpersonal relationships
- Not just about information security – wider applicability of industrial fellows where a different background reinforces the academic delivery

Challenges

- (as for so many others...) COVID and the need for remote delivery
- This has significantly reduced interactions, and we assert that much value is to be found in "side" conversations that occur less often in remote delivery. Particularly hits lab / small group teaching
- Delivering pre-prepared lectures – time-consuming to prepare and although useful to watch at a student's convenience removes all interactivity
- Coordination 1: The industrial fellow can normally schedule time to suit Northumbria's timetables... but not always
- Coordination 2: For the best impact to the students, need to schedule at a "good" place in existing academic content to properly reinforce and support it



Newcastle Scheme

- Academic Champion
 - Jaime Amezage
- Visiting Professor
 - Paul Johnson



Newcastle Visiting Professor



Dr Paul Johnson

Visiting Professor in Total Engineering of Major Infrastructure Projects

University of Newcastle (PJEC Ltd/Arup)

Dr Paul Johnson is an environmental consultant and has some 45 years' experience in the provision of environmental and planning advice to public and private sector clients on the impact of major projects. He is an Arup Fellow and was previously Director of Arup's global environmental consulting practice for 30 years.

Paul has wide experience of environmental engineering, planning, design and assessment of major aviation, energy, rail and road projects, sustainable urban development, green infrastructure, and water and waste management. Paul has led and contributed to the environmental impact assessment, design and engineering / environmental mitigation, sustainability appraisal and health impact assessment of many projects of national / international significance.

Paul's aim as a Visiting Professor at the University of Newcastle is to focus on undergraduate / masters teaching in the 'Design of Sustainable Engineering Systems' course. He will deliver lectures introducing the concept of 'total engineering' as part of the inclusive and multi-disciplinary design and implementation of major infrastructure projects. Paul will also help to develop a new curriculum, supervise student dissertations and inspire a new generation to deliver sustainable development while addressing climate change, health and well-being and enhancing biodiversity.

Successes

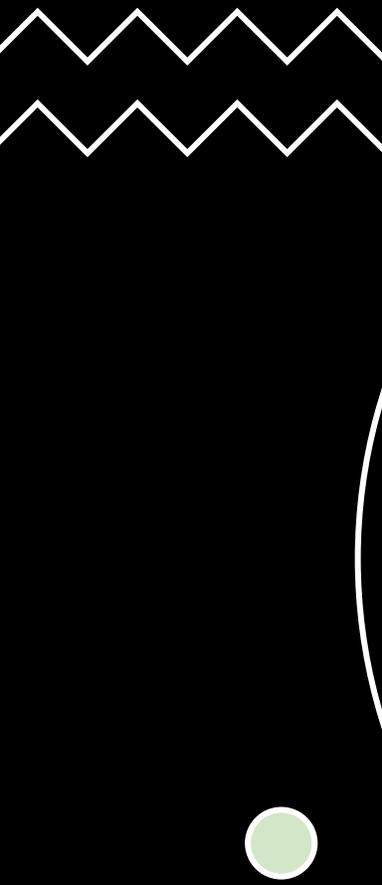
- Introducing concept of 'total design' / 'total engineering' with regard to major infrastructure and development projects into undergraduate and MEng teaching resources
- Using 40+ years of industry experience to introduce real life project challenges and opportunities into academic process
- Enthusiating students through teaching, mentoring and course work to incorporate holistic multi-disciplinary inputs (involving environment, biodiversity, water, climate, heritage, social, economic etc) into concept development, optioneering, detailed design and construction
- Undergrad coursework has a foundation in real world – eg 15 teams of 12 students working on a project to define the route and design of new 40km high speed railway in the north-east of England

Challenges

- Covid-19 has removed the valuable face to face element but the new challenge of using packages such as Zoom, Teams and Flipgrid has allowed considerable innovative interaction, albeit remotely
- Newcastle School of Engineering curriculum is changing to a common year 1 for all engineering students. Not easy to find time for 'non-core' topics such as sustainability, climate and environment other than at a very high and brief level of introduction
- Refocusing the introduction of holistic integrated design to 2nd and 3rd year student courses, practical projects and MEng dissertation mentoring

What next

- Northumbria Scheme is in 2nd year of operation. Next year will be last year
- In addition to planned contributions to curricula and assessment design, teaching and mentoring of learners
 - Produced reusable video-based resources
 - Discussions / training of academic colleagues
 - Related publications (<https://doi.ieeecomputersociety.org/10.1109/FIE44824.2020.9274033> , <https://www.ease.ws/>)
- Need to plan for sustainability and evaluation of impact



Any
Questions?

