

Science and society: A career and professional development course



School geography: Exploring a definition



OpenLearn | Free learning from
The Open University

About this free course

This free course provides a sample of Level 1 study in Science:

<http://www.open.ac.uk/courses/find/science>.

This version of the content may include video, images and interactive content that may not be optimised for your device.

You can experience this free course as it was originally designed on OpenLearn, the home of free learning from The Open University -

www.open.edu/openlearn/education/professional-development-education/science-and-society-career-and-professional-development-course/content-section-0.

There you'll also be able to track your progress via your activity record, which you can use to demonstrate your learning.

The Open University, Walton Hall, Milton Keynes, MK7 6AA

Copyright © 2016 The Open University

Intellectual property

Unless otherwise stated, this resource is released under the terms of the Creative Commons Licence v4.0 http://creativecommons.org/licenses/by-nc-sa/4.0/deed.en_GB. Within that The Open University interprets this licence in the following way:

www.open.edu/openlearn/about-openlearn/frequently-asked-questions-on-openlearn. Copyright and rights falling outside the terms of the Creative Commons Licence are retained or controlled by The Open University. Please read the full text before using any of the content.

We believe the primary barrier to accessing high-quality educational experiences is cost, which is why we aim to publish as much free content as possible under an open licence. If it proves difficult to release content under our preferred Creative Commons licence (e.g. because we can't afford or gain the clearances or find suitable alternatives), we will still release the materials for free under a personal end-user licence.

This is because the learning experience will always be the same high quality offering and that should always be seen as positive – even if at times the licensing is different to Creative Commons.

When using the content you must attribute us (The Open University) (the OU) and any identified author in accordance with the terms of the Creative Commons Licence.

The Acknowledgements section is used to list, amongst other things, third party (Proprietary), licensed content which is not subject to Creative Commons licensing. Proprietary content must be used (retained) intact and in context to the content at all times.

The Acknowledgements section is also used to bring to your attention any other Special Restrictions which may apply to the content. For example there may be times when the Creative Commons Non-Commercial Sharealike licence does not apply to any of the content even if owned by us (The Open University). In these instances, unless stated otherwise, the content may be used for personal and non-commercial use.

We have also identified as Proprietary other material included in the content which is not subject to Creative Commons Licence. These are OU logos, trading names and may extend to certain photographic and video images and sound recordings and any other material as may be brought to your attention.

Unauthorised use of any of the content may constitute a breach of the terms and conditions and/or intellectual property laws.

We reserve the right to alter, amend or bring to an end any terms and conditions provided here without notice.

All rights falling outside the terms of the Creative Commons licence are retained or controlled by The Open University.

Head of Intellectual Property, The Open University

Designed and edited by The Open University

Contents

Introduction	5
Learning Outcomes	6
1 Introduction to the course	7
2 Preparing for the course	8
3 Timetable for the residential element of the course	10
3.1 Introduction to the Timetable	10
3.2 Day 1 Timetable	10
3.3 Day 2 Timetable	12
4 References and further reading	14
5 Contributors to the course	16
Conclusion	18
Keep on learning	19
References	19
Acknowledgements	20

Introduction

Scientists throughout the world are increasingly interested in the relationship between science and society. Part of their concern is with the social responsibilities scientists have in relation to broader public interests. That raises important issues to do with the ethical and social dimension of scientists' work and how scientists explain – and perhaps justify – their work to the wider public. Indeed, no scientist today is locked within an 'ivory tower' of his or her making – scientists are looking to engage not just with fellow scientists – which has always been the case – but with new audiences, with different views and experiences of science. It's important that scientists have the opportunity to discuss these challenges about what their job entails with their colleagues and with those who teach and research issues of science communication, to share experiences and ideas. That's where we feel the materials here will help.

In February 2008, a 2-day 'Science and Society' residential course was held at the Open University campus in Milton Keynes, through the financial support of the Royal Society, and attended by 13 UK research scientists with an interest in these topics. A good deal of the material that we used to deliver this 'pilot version' of the course is here on this site and so freely available to all other interested parties – other scientists, policy-makers, science communication scholars and the like. We hope you will find it useful and perhaps an inspiration to set up comparable programmes of your own, that draw on these materials and ideas.

Our intention is that this site will grow and develop over time; we hope to build on the experience of jointly putting on more of these courses. Also, we're hoping that those who attend these courses – and others who express an interest in what we are doing from afar – will contribute their own ideas or resources. If you would like to learn more about this project, please contact the OpenLearn site and we will do our best to get back to you.

A good place to start looking at our materials is the Preparatory Information section, which gives the aims of the course, plus the timetable. It also contains a number of links to Session commentaries that those who delivered this course have prepared. These Commentaries – which include a range of links to other useful sources and to OU teaching material already on the OpenLearn site – offer you (and those who attended the course) the opportunity to take your interest in this area a good deal further.

This OpenLearn course provides a sample of Level 1 study in [Science](#).

Learning Outcomes

After studying this course, you should be able to:

- demonstrate an awareness of the roles and responsibilities of the modern scientist
- demonstrate an insight as a scientist into the social and ethical aspects of scientific research
- understand the rationale and role of certain contemporary tools for science governance, especially public and stakeholder engagement/consultation
- recognise opportunities to contribute to discussion and debate on the social and ethical aspects of science, either as a scientist (participating in debates about scientific work) or as a citizen (participating outside of a scientific discipline).

1 Introduction to the course

Scientists are increasingly being asked to discuss and communicate social and ethical issues that arise from their work. Understanding these issues is also part of developing science and technology responsibly. And yet the formal education system in the UK often requires scientists to focus on core science subjects at the expense of learning about the social and ethical implications of their work. How then does a modern scientist begin to engage with these important issues? One solution is to provide opportunities for practising scientists to recognise social and ethical aspects of their work, and to develop knowledge and skills to discuss them with confidence.

This introductory science and society career and professional development (CPD) course has been designed to begin to address this need. It will provide an opportunity for you to recognise and have facility in discussing the social and ethical aspects of science in general, and your scientific work in particular, and some current issues in science governance and science policy.

More specifically, the learning objectives of the course are to:

- begin to explore the roles and responsibilities of the modern scientist;
- help you to gain insights as a scientist into the social and ethical aspects of (your) scientific research;
- enable you to gain some understanding of the rationale and role of certain contemporary tools for science governance, especially public and stakeholder engagement/consultation;
- signpost opportunities for you to contribute to discussion and debate on the social and ethical aspects of science, either as a scientist (participating in debates about your scientific work) or as a citizen (participating outside of your scientific discipline).

Finally, for this introductory section at least, we think it is worth noting that there is no formative or summative assessment associated with this course. We hope that you will reflect on what you have gained by participating in this pilot, also to engage with the evaluation team as they invite you to comment on what you consider to be the strengths and weaknesses of our approach. But you will not be formally assessed and issued with a 'grade'. The real 'test' of how successful your engagement has been with the course will be whether you feel more aware of the broader implications of your scientific work. We hope that you will feel more conscious of the complex and often fascinating relationship between science and society – perhaps when you next discuss your scientific work as a 'citizen scientist' and engage with the views of non-scientists.

Of course, these are ambitious objectives for such a short course. We hope, however, to be able to introduce you to some of the key issues affecting how scientists engage with science and society issues, also to some of the core concepts and terminology used to describe this active area of research and debate. Taken together, and alongside the academic skills you have gained as practising research scientists, our hope is that the course will facilitate further exploration of these important issues through self-directed study, e.g., of some of the follow-up materials that will be on offer after the residential element of the course. (We will provide further details of how to access the follow-up materials in the final session of the residential element of the course.)

2 Preparing for the course

You are required to engage with some preparatory work before the start of the course. The first activity – ‘Preparation of research summary’ – will allow us to orient the various sessions towards your specific experiences. Please complete this activity now following the instructions provided below.

Activity 1 Preparation of research summary

Please complete a brief ‘lay’ description of your scientific research. By ‘lay’ we mean that it should be written with an audience of non-scientists in mind. Your summary should be up to 500 words long, and include some discussion of why your research is important, what it is you are trying to achieve, as well as a description of how you conduct your research, and what you have achieved. Are there social and ethical issues associated with your work? What are they?

Readings 1 and 2 have a slightly different purpose to the activity you have just completed. They provide an introduction to some key thinking on the contemporary relationship between science and society, issues that will be revisited during the residential element of the course.

In completing these readings, and answering the questions posed, you are being asked to engage critically with these ideas and to reflect on your perspective and practice as a working scientist. But this is not a test; nor does it require that you prepare detailed, fully worked answers to these questions. Rather, we are asking you to use these readings and the associated questions as preparation for the types of issues and questions that will be addressed during the face-to-face sessions.

Please make notes on the questions asked below and bring these with you to the residential element of the course. (You are not required to submit your answers to these questions prior to the start of the course.)

Reading 1

You should now read Chapter 1 – ‘The scientific state we’re in’ and Chapter 4 – ‘Citizen scientists’ of the following pamphlet: Wilsdon, J., Wynne, B. and Stilgoe, J. (2005). *The Public Value of Science*, DEMOS, London. (A copy of this pamphlet is available online at: <http://www.demos.co.uk/publications/publicvalueofscience>.)

As you read these two chapters, please make notes on the following questions:

- What are your impressions of the House of Lords report discussed in Chapter 1 on page 16? Do you agree that there is indeed a ‘crisis of confidence’ in science–society relations?
- With the examples of Mark Welland and Alexis Vlandis in mind (Chapter 4, pp. 45–6), think about the experiences you have had of talking about your work to different types of ‘publics’ (parties, family, public lectures, policy makers, media, etc.). What did you learn from such experiences?
- What occasions and opportunities have you had to reflect on the social and ethical implications of your work? For example, have you participated in science

outreach or public engagement activities, informal discussions, grant applications, courses, etc.? What, if anything, did you learn from these experiences?

The DEMOS pamphlet makes references to discussion of ‘... the codes, values and norms that govern scientific practice...’ (Chapter 1, page 19) and Merton’s ‘CUDOS norms of *Communalism, Universality, Disinterestedness, Originality* and *Scepticism*’ (Chapter 4, p. 48). These ‘norms’ – by which we mean the types of informal social rules that are learnt and enacted, as people practice science professionally – are examined in more detail in Reading 2.

Reading 2

Ziman, J. (1996) ‘Is science losing its objectivity?’ *Nature* 382, pp. 751–4.

In this article the late John Ziman revisits the ‘CUDOS’ norms that were initially outlined by the American sociologist Robert Merton. As you read this short article, please make notes on the following questions:

- To what extent do the ‘social norms’ of Robert Merton – encapsulated in the acronym CUDOS – apply to science as you have experienced it?
- Ziman (writing in 1996) argues that ‘post-academic science’ is now more prevalent, sharing some of the hallmarks of what was traditionally called ‘applied science’ – and that this move is changing the practice (and perception) of science. Do you agree? Please consider a couple of examples when formulating your answer.
- Ziman warns us of a ‘loss of objectivity’ – science becoming increasingly ‘shot though with social interest’. In your experience, are scientists and scientific expertise now less ‘trusted’ as a result?

Click to view [‘Is science losing its objectivity?’](#) (PDF, 4 pages, 1MB)

The final three sections of this preparatory booklet detail the timetable for the residential element of the course, provide a list of further background reading, and short biographies of contributors.

3 Timetable for the residential element of the course

3.1 Introduction to the Timetable

The residential element of the course will comprise a mixture of discussion, practical exercises and presentations from tutors and leading figures in the science and society field. As far as possible the course will explore and discuss your research, use readily accessible case studies, and use key questions and policy issues as anchors for discussion.

The timetable shown below shows the timings and contributors to the course as it was first run at the Open University, UK on February 18 – 20th, 2008. We hope you find this plan for the course useful, though of course you are free to adapt what's here, depending on what would be of most interest to you. Please share your own experiences by posting your own ideas back onto this site for others to see.

Day 0 – Monday 18th February 2008

Early evening talk by Professor Richard Jones, FRS, Sheffield University.

The lecture will be begin at 17.30 and last for approximately 1 hour.

There will be an opportunity to put questions to Professor Jones at the end of his talk entitled:
Making space for reflection on the social and ethical implications of science

Welcome reception and buffet

Professor Jones' talk will be followed by a welcome reception and buffet where delegates will have an opportunity to meet the speaker, fellow delegates, guest lecturers, staff from the Royal Society Science in Society Unit, and the Open University organisers.

3.2 Day 1 Timetable

Day 1 – Monday 19th February 2008

Session 1

The modern scientist

Richard Holliman and Jeff Thomas

9.00 to 11.00

An introduction to the course, its aims, teaching questions and learning objectives.

An introduction to the team, timetabling and housekeeping issues.

The rest of this session will be devoted to reflecting on Reading 1 from the preparatory activities.

Break

Session 2

Science – Governance – Innovation

Alan Irwin

How did we arrive at the current context for science–society relations?

What are the current aims of public engagement?

Copenhagen Business School 11.20 to 13.00	<p>What are the strengths and limitations of public engagement for policy formation, decision-making, etc.?</p> <p>Are these aims challenged by the 'innovation agenda'?</p>
Lunch	
Session 3 Science, policy and people Giskin Day Science Communication Group, Imperial College 14.00 to 15.30	<p>If something is technically feasible, should it be allowed?</p> <p>Who has the right to speak about scientific issues?</p> <p>Should non-scientists contribute to science-based issues?</p> <p>What constitutes the evidence base on which decisions about science should be made?</p>
Break	
Session 4 Science and society now Stephen Webster Science Communication Group, Imperial College 15.50 to 17.00	<p>If something is technically feasible, should it be allowed?</p> <p>Who has the right to speak about scientific issues?</p> <p>Should non-scientists contribute to science-based issues?</p> <p>What constitutes the evidence base on which decisions about science should be made?</p>
90 minute break before a social evening involving a meal at a local restaurant.	

Click to view [Session 3: Science, policy and people](#) (PDF, 7 pages, 58KB)

Click to view [Session 4: Science and society now](#) (PDF, 6 pages, 44KB)

3.3 Day 2 Timetable

Day 2 – Wednesday 20th February 2008

Session 5 Science in its social landscape Matthew Harvey Royal Society Science and Society Unit 09.00 to 10.30	Investigating the social landscape for science; further exploration of science and its social and ethical implications. What influences (enabling and limiting) are there on the science that you do? What impacts does your science have?
Break	
Session 6a Science in the public eye (1) Richard Holliman and Jeff Thomas 11.00 to 12.15	How does science become subject to public discussion and debate? Why are some scientific issues subject to extended public discussion when others are largely overlooked? What sources of information are valid, credible and reliable?
Lunch	
Session 6b Science in the public eye (2) Jeff Thomas and Richard Holliman 13.15 to 14.15	How have high-profile public discussions and debates influenced the relationship between science and society? What can be learned from these cases?
Session 7 Finding the science voice Bob Ward 14.30 to 16.00	Investigating the changing roles for science institutions and finding the science voice in public debate. Who has (had) a role in developing/restricting the climate change and society agenda?
Break	
Session 8 Engaging as citizen scientists Jeff Thomas and Richard Holliman 16.00 to 17.15	How can delegates contribute effectively to discussing and debating current and future science issues? What are the skills required to engage with the current science and society agenda?
End of residential element of the course	

Click to view [Session 5: Science in its social landscape](#) (PDF, 6 pages, 58KB)

Click to view [Session 6a: Science in the public eye \(1\)](#) (PDF, 7 pages, 50KB)

Click to view [Session 6b: Science in the public eye \(2\)](#) (PDF, 6 pages, 62KB)

Click to view [Session 7: Finding the science voice](#) (PDF, 10 pages, 79KB)

4 References and further reading

There are a wide range of perspectives on science–society relations. In part, this is reflected in the different readings listed below. They have been chosen to address issues that we feel are relevant to current debates about science–society relations.

Durodié, B. (2002, April 12). 'Why I think a dialogue with the public will undermine science', *The Times Higher Education Supplement*, p. 16.

Gibbons, M. (1999). Science's new social contract with society, *Nature*, 402 (Supp.), pp. C81-84.

Holliman, R. (2005). 'An introduction to communicating science'. STM895 *Postgraduate skills in science, technology, maths and computing*, The Open University, Milton Keynes, available online through the Open University's OpenLearn project.

House of Lords Select Committee on Science and Technology (2000). *Science and society* (Third Report), London, HMSO, available online at:

<http://www.publications.parliament.uk/pa/ld199900/ldselect/ldsctech/38/3801.htm>.

Lloyd, I. (2000, February) 'The tyranny of the L-shaped curve', *Science and Public Affairs*, pp. 14-15.

Jones, R. (2007). 'What have we learned from public engagement?' *Nature Nanotechnology*, 2 (5), pp. 262-263.

Miller, S. (2001). 'Public understanding of science at the crossroads', *Public Understanding of Science*, 10, pp. 115-120.

Parliamentary Office of Science and Technology (POST) (2006). *Debating science*, Postnote Number 260, available online at:

<http://www.parliament.uk/documents/upload/postpn260.pdf>.

Research Councils UK (RCUK) (2002). *Dialogue with the public: Practical Guidelines*, London, People Science and Policy Ltd., available online at:

<http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/scisoc/dialogue.pdf>.

Stilgoe, J., Irwin, A. and Jones, K. (2006). *The received wisdom: opening up expert advice*, London, DEMOS, available online at:

<http://www.demos.co.uk/publications/receivedwisdom>.

Turney, J. (ed.) (2006). *Engaging science: Thoughts, deeds, action*, London, The Wellcome Trust. Available online at:

http://www.wellcome.ac.uk/doc_wtx032706.html.

The Phillips Report (2000). *The BSE Inquiry*, London, HMSO, available online at:

<http://www.bse inquiry.gov.uk/>.

The Royal Society (2006). *Factors affecting science communication: a survey of scientists and engineers*, London, The Royal Society, available online at:

<http://www.royalsoc.ac.uk/downloadaddoc.asp?id=3052>.

Willis, R. and Wilsdon, J. (2004). *See through science: why public engagement needs to move upstream*, London, DEMOS, available online at:

<http://www.demos.co.uk/catalogue/paddlingupstream/>.

Wilsdon, J., Wynne, B. and Stilgoe, J. (2005) *The Public Value of Science*, DEMOS, London. Available online at:

<http://www.demos.co.uk/catalogue/publicvalueofscience/>.

Wolpert, L. (1998) 'In praise of science', in Levinson, R. and Thomas, J. *Science Today: Problem or crisis?* Routledge, London.

Ziman, J. (1996) 'Is science losing its objectivity?' *Nature* 382, pp. 751-754.

5 Contributors to the course

Giskin Day lectures on the Humanities undergraduate programme on the course 'Communicating Science: the media and the public' at Imperial College London. She also co-ordinates and lectures on the Medical Humanities taught option for fourth-year medical students. She originally trained as a botanist in South Africa and worked at Blackwell Science as a copy editor on medical journals before joining the Science Museum where she was publications officer. She has an MSc in Science Communication from Imperial College London. She also teaches on the Birkbeck Diploma in Science Communication and has contributed to the Open University's postgraduate science courses, *Science and the public* and *Communication science in the information age*.

Richard Holliman is Senior Lecturer in Science Communication at the Open University (OU), UK and production course team chair of *Communicating science in the information age*. After completing a PhD investigating the representation of contemporary scientific research in television and newspapers in the Department of Sociology at the OU, in 2000 he moved across the campus to the Faculty of Science. Since that time he has worked on a number of undergraduate and postgraduate course teams, producing mixed media materials that address the interface between science and society. He edited (with Eileen Scanlon) *Mediating science learning through ICT* (2004, Routledge) and, more recently (with Jeff Thomas) a special issue of the *Curriculum Journal* (17: 3) on science learning and citizenship. He is a member of the OU's Centre for Research in Education and Educational Technology and is leading (with colleagues) the Informing Science Outreach and Public Engagement (<http://isotope.open.ac.uk/>) and (In)visible Witnesses (<http://www.open.ac.uk/invisible-witnesses/>) research project teams.

Matthew Harvey manages the Science in Society programme at the Royal Society. Part of the Society's Policy Section, the programme explores social and ethical dimensions of science, and works with policy-makers, scientists, industry, stakeholders and members of the public in taking account of these dimensions in science decision-making. Matthew came to the Royal Society following a two-year stint as a Research Fellow at the ESRC Genomics Research and Policy Forum, University of Edinburgh, leading a work package on social and ethical aspects of animal genomics. Before that, he completed a PhD at Cardiff University investigating the nature and role of expertise in public debate and policy on genetically modified crops.

Alan Irwin is Dean of Research at Copenhagen Business School. His PhD is from the University of Manchester and he has held previous appointments at Manchester, Liverpool and at Brunel University. Alan currently chairs the UK BBSRC (Biotechnology and Biological Sciences Research Council) Strategy Panel on 'Bioscience for Society'. Alan Irwin has published widely on issues of science and technology policy, risk, and science-public relations. His books include *Risk and the Control of Technology* (Manchester University Press, 1985), *Citizen Science* (Routledge, 1995), *Sociology and the Environment* (Polity, 2001), and (with Mike Michael) *Science, Social Theory and Public Knowledge* (Open University Press, 2003). He was also co-editor (with Brian Wynne) of *Misunderstanding Science?* (Cambridge University Press, 1996), and co-author of *The Received Wisdom* (Demos, 2006). His most recent research has been on the governance of science – including work with the UK Department of Environment, Food and Rural Affairs on 'lay' advice in the policy process.

Richard Jones, FRS, is Professor of Physics at the University of Sheffield. He is an experimental polymer physicist concentrating on the properties of polymers at surfaces

and interfaces. His interests in nanotechnology include its potential impact on society, which has involved collaboration with social scientists, and involvement in 'upstream public engagement' activities.

Jeff Thomas is a senior lecturer within the Department of Life Sciences at the Open University. He has worked at the OU all his professional life, contributing to a wide range of teaching initiatives in biology and in health sciences, and more recently to a range of projects concerned with contemporary science issues and on the relationships between science and different publics, at both undergraduate and Masters level. He co-edited *Science Today; problem or crisis* (with Ralph Levinson) and *The Science Good Study Guide*, and (with Richard Holliman) co-edited a special issue of the *Curriculum Journal* (17: 3). His research interests are concerned with the influence of contemporary science controversies on public attitude, on conceptual problems of learning biological science, and in public involvement in science-based policy-making. He also teaches part-time for Birkbeck College, University of London on its Diploma in Science Communication.

Bob Ward is Director of Global Science Networks at Risk Management Solutions Ltd. He previously worked for the Royal Society where he led the media relations team. He has published a number of articles examining news media reporting of climate change, including: 'The Royal Society and the debate on climate change', in Bauer, M. and Bucchi, M. (eds) (2007), *Journalism, science and society*, Routledge.

Stephen Webster studied zoology at Bristol University before taking an MPhil in the philosophy of science at Cambridge. He trained as a science teacher and worked for many years in London schools. During that time he also freelanced as a science writer, concentrating especially on writing for children, and on radio drama. Three of his plays were broadcast by BBC radio, and he won a Glaxo/ABSW science writing prize in 1993. In 1995 he became co-director of the Birkbeck College Diploma in Science Communication. He currently lectures in science communication at Imperial College as a member of the Science Communication Group.

Conclusion

This free course provided an introduction to studying Science. It took you through a series of exercises designed to develop your approach to study and learning at a distance and helped to improve your confidence as an independent learner.

Keep on learning



Study another free course

There are more than **800 courses on OpenLearn** for you to choose from on a range of subjects.

Find out more about all our [free courses](#).

Take your studies further

Find out more about studying with The Open University by [visiting our online prospectus](#).

If you are new to university study, you may be interested in our [Access Courses](#) or [Certificates](#).

What's new from OpenLearn?

[Sign up to our newsletter](#) or view a sample.

For reference, full URLs to pages listed above:

OpenLearn – www.open.edu/openlearn/free-courses

Visiting our online prospectus – www.open.ac.uk/courses

Access Courses – www.open.ac.uk/courses/do-it/access

Certificates – www.open.ac.uk/courses/certificates-he

Newsletter –

www.open.edu/openlearn/about-openlearn/subscribe-the-openlearn-newsletter

References

Durodié, B. (2002, April 12). 'Why I think a dialogue with the public will undermine science', *The Times Higher Education Supplement*, p. 16.

- Gibbons, M. (1999). Science's new social contract with society, *Nature*, 402 (Supp.), pp. C81-84.
- Holliman, R. (2005). 'An introduction to communicating science'. STM895 *Postgraduate skills in science, technology, maths and computing*, The Open University, Milton Keynes, available online through the Open University's OpenLearn project.
- House of Lords Select Committee on Science and Technology (2000). *Science and society* (Third Report), London, HMSO, available online at: <http://www.publications.parliament.uk/pa/ld199900/ldselect/ldscitech/38/3801.htm>
- Lloyd, I. (2000, February) 'The tyranny of the L-shaped curve', *Science and Public Affairs*, pp. 14-15.
- Jones, R. (2007). 'What have we learned from public engagement?' *Nature Nanotechnology*, 2 (5), pp. 262-263.
- Miller, S. (2001). 'Public understanding of science at the crossroads', *Public Understanding of Science*, 10, pp. 115-120.
- Parliamentary Office of Science and Technology (POST) (2006). *Debating science*, Postnote Number 260, available online at: <http://www.parliament.uk/documents/upload/postpn260.pdf>
- Research Councils UK (RCUK) (2002). *Dialogue with the public: Practical Guidelines*, London, People Science and Policy Ltd., available online at: <http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/scisoc/dialogue.pdf>
- Stilgoe, J., Irwin, A. and Jones, K. (2006). *The received wisdom: opening up expert advice*, London, DEMOS, available online at: <http://www.demos.co.uk/publications/receivedwisdom>
- Turney, J. (ed.) (2006). *Engaging science: Thoughts, deeds, action*, London, The Wellcome Trust. Available online at: http://www.wellcome.ac.uk/doc_wtx032706.html
- The Phillips Report (2000). *The BSE Inquiry*, London, HMSO, available online at: <http://www.bse inquiry.gov.uk>
- The Royal Society (2006). *Factors affecting science communication: a survey of scientists and engineers*, London, The Royal Society, available online at: <http://www.royalsoc.ac.uk/downloaddoc.asp?id=3052>
- Willis, R. and Wilsdon, J. (2004). *See through science: why public engagement needs to move upstream*, London, DEMOS, available online at: <http://www.demos.co.uk/catalogue/paddlingupstream/>
- Wilsdon, J., Wynne, B. and Stilgoe, J. (2005) *The Public Value of Science*, DEMOS, London. Available online at: <http://www.demos.co.uk/catalogue/publicvalueofscience>
- Wolpert, L. (1998) 'In praise of science', in Levinson, R. and Thomas, J. *Science Today: Problem or crisis?* Routledge, London.
- Ziman, J. (1996) 'Is science losing its objectivity?' *Nature* 382, pp. 751-754.

Acknowledgements

The organisers of this course are grateful for the financial support provided by the Royal Society, whose generous backing covered all aspects of the course's production and presentation.

The material acknowledged below is Proprietary and used under licence (not subject to Creative Commons licence). See [terms and conditions](#). This content is made available under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 Licence](#)

Grateful acknowledgement is made to the following for permission:

Couse image: [Nils Geylen](#) in Flickr made available under [Creative Commons Attribution-NonCommercial-ShareAlike 2.0 Licence](#).

Ziman, J. (1996) 'Is science losing its objectivity?' *Nature* 382, pp. 751–754. Reprinted by permission from Macmillan Publishers Ltd.

Don't miss out:

If reading this text has inspired you to learn more, you may be interested in joining the millions of people who discover our free learning resources and qualifications by visiting The Open University - www.open.edu/openlearn/free-courses