



UNIVERSIDAD NACIONAL AUTÓNOMA DE  
MÉXICO  
PROGRAMA DE POSGRADO EN  
FILOSOFÍA DE LA CIENCIA



<b>Actividad Académica:</b> Seminario de Temas de Selectos en Filosofía de la Ciencia (“ <b>Knowledge and History: Scientific Change and Scientific Reasoning in Historical Perspective</b> ”) dr. Vincenzo Politi (Estancia Postdoctoral, IIF)						
<b>Clave:</b>	<b>Semestre:</b> <b>2017-2</b>	<b>Campo de conocimiento:</b> Filosofía de la Ciencia; Filosofía de las Ciencias Cognitivas; Filosofía de las Matemáticas y Lógica de la Ciencia, Historia de la Ciencia				
<b>Carácter:</b> Obligatoria ( ) Optativa ( <b>X</b> ) de Elección ( )			<b>Horas por semana</b>		<b>Horas al semestre</b>	<b>No. Créditos:</b>
<b>Tipo:</b> Teórica			<b>Teóricas:</b>	<b>Prácticas:</b>	64	8
			4	0		
<b>Modalidad:</b> Presencial			<b>Duración del programa:</b> 1 semestre			

**Seriación:** Si ( ) No ( x )      **Obligatoria** ( x )      **Indicativa** ( )

**Introducción:**

Philosophers interested in the theory of knowledge cannot dispense with a thorough reflection on the nature of science. As a matter of fact, science is the most reliable form of knowledge that we possess and rely on. Yet science itself is riddled with epistemological questions, concerning the relation between hypotheses and factual evidence, the nature of scientific explanations, and so on. Furthermore, scientific knowledge also plays a dominant role in our society. Recently, such a role has been questioned by skeptics with a rather 'anti-scientific' attitude. Therefore, sooner or later, every philosopher who is interested in the nature of knowledge and in the scientific/technological society we live in will have to look at science.

But what is science? This is perhaps the most fundamental question in the philosophy of science. Answering such a question is difficult because science exhibits two different and somehow conflicting qualities: on the one hand, science grows and makes progress; on the other hand, science changes through history. If science changes through history, how can we say that science makes progress? One way to answer such questions is to try to understand how science changes through history. This advanced seminar will explore some of the major philosophical models of historical scientific change.

This course consists of **three parts**.

The **first part** will be about Thomas Kuhn's model of the development of science. Arguably, Kuhn's *The Structure of Scientific Revolutions* is one of the most influential books in the philosophy of science. Many scholars tend to reduce Kuhn's philosophy to the content of that book. Against this trend, we will discuss the philosophy of Thomas Kuhn, not just *The Structure of Scientific Revolutions*. We will discuss topics such as the nature of normal science and the division of cognitive labour in the scientific community; Kuhn's theory of scientific reasoning through models and analogies; and the more recent developments of the idea of incommensurability.

The **second part** will be about some other models of historical scientific change. We will discuss Ian Hacking's notion of 'styles of scientific reasoning'; Michael Friedman's 'post-Kuhnian historiography of science' and his view on scientific rationality; and Hasok Chang's 'active normative epistemic pluralism'. We will also examine some special features of contemporary science, such as the phenomenon of scientific specialization on the one hand and the so-called interdisciplinary research.

Finally, the **third part** will consider some of the issues connected to the historical character of science, namely the way in which it can be said that science makes progress, scientific realism and whether scientific results are contingent or inevitable. The unit concludes with some meta-philosophical considerations on the role of history for the philosophy of science.

**Objetivo general:**

- learn about the historical, social and practical dimension of science

**Objetivos específicos:**

1. acquire knowledge of some recent debates in the history and philosophy of science
2. improve the ability to critically assess arguments about science
3. acquire a deep understanding of Thomas Kuhn's model of the development of science
4. acquire a deep understanding of some recent post-Kuhnian models of scientific development
5. learn about theories on scientific reasoning and views on scientific rationality

Contenido Temático			
Unidad	Temas	Horas	
		Teóricas	Prácticas
1	<b>1. NORMAL SCIENCE and SCIENTIFIC REVOLUTIONS</b>		
	1.1 General Introduction to the Unit: Kuhn's <i>Structure of Scientific Revolutions</i>	4	

	1.2 Normal Science and the Essential Tension	4	
	1.3 Exemplars	4	
	1.4 Taxonomic Revolutions	4	
	1.5 Semantic Incommensurability	4	
	1.6 Methodological Incommensurability	4	
2	<b>2. OTHER MODELS OF SCIENTIFIC CHANGE</b>		
	2.1 Styles of Reasoning	4	
	2.2 The Dynamics of Reason	4	
	2.3 Active Normative Epistemic Pluralism	4	
	2.4 Scientific Specialisation and Interdisciplinary Research	4	
3	<b>3. WHAT DOES THE HISTORY OF SCIENCE TELL US ABOUT SCIENCE?</b>		
	3.1 What is scientific progress?	4	
	3.2 The problema of 'Unconceived Alternatives'	4	
	3.3 Is science contingent?	4	
	3.4 Can the history of science tell us anything about science?	4	
	REVISION	4	
	CONCLUSION	4	
<b>Total de horas:</b>		64	
<b>Suma total de horas:</b>		64	

## Bibliografía y actividades:

### Bibliografía Obligatoria:

- Barker, P., Chen, X. and Andersen, H. (2003), 'Chapter 8: Kuhn on Concepts and Categorisations', in Nickles, T. (Ed.), *Thomas Kuhn*, Cambridge University Press, pp. 212-245
- Bird, A., (2002) 'Kuhn's Wrong Turning', *Studies in History and Philosophy of Science*, 33, pp. 443-463
- Bird, A. (2005), 'Naturalizing Kuhn', *Proceedings of the Aristotelian Society*, 105, pp. 99-117
- Bird, A. (2007), 'What is scientific progress?', *Noûs*, 41, pp. 64-89
- Bird (2010) - 'What can cognitive science tell us about scientific revolutions?', *THEORIA. An International Journal for Theory, History and Foundations of Science*, 27 (3). pp. 293-321
- Bradley, S. (2016), 'Constraints on Rational Choice Theory', *British Journal for the Philosophy of Science*, forthcoming, available on-line at <https://doi.org/10.1093/bjps/axv063>
- Bueno, O. (2012), 'Styles of Reasoning: a pluralist view', *Studies in History and Philosophy of Science*, 43, pp. 657-665
- Carter, A. and Gordon, E. (2013), 'A new maneuver against the epistemic relativist', *Synthese*, 191, pp. 1683-1695
- Cevolani, G. and Tambolo, L. (2013), 'Progress as approximation to the truth: a defense of the verosimilitudinal approach', *Synthese*, 78, pp. 921-935
- Chang, H. (2012), 'Pluralism in Science: a call to action', in *Is Water H<sub>2</sub>O? Evidence, Realism and Pluralism*, ch. 5, pp. 253-301
- Chang, H. (2013) 'Incommensurability: Revisiting the Chemical Revolution', in Kindi, V. And Arabatzis, T. (Eds.), *Kuhn's The Structure of Scientific Revolutions Revisited*, London: Routledge, pp. 153
- Chen, X. (2010) - 'A Different Kind of Revolutionary Change: Transformation from Object to Process Concepts', *Studies in History and Philosophy of Science*, 41, pp. 182-191

- Collins, H., Evans, R. and Gorman, M. (2007), 'Trading Zones and Interactional Expertise', *Studies in History and Philosophy of Science*, 38, pp. 657-666
- D'Agostino, F. (2008), 'Naturalising the Essential Tension', *Synthese*, 162, pp. 275-308
- Dellsén, F. (2016), 'Scientific Progress: knowledge versus understanding', *Studies in History and Philosophy of Science*, 56, pp. 73-83
- Egg, M. (2016), 'Expanding our Grasp: causal knowledge and the problem of unconceived alternatives', *British Journal for the Philosophy of Science*, 67, pp. 115-141
- Friedman, M. (2002), 'Kant, Kuhn and the Rationality of Science', *Philosophy of Science*, 69, pp. 171-190
- Hacking, I. (1992), 'Language, Truth and Reason', in Hollis, M. and Lukes, S. (eds.), *Rationality and Relativism*, MIT Press, pp. 48-66
- Hacking, I. (2000), 'How inevitable are the results of successful science?', *Philosophy of Science*, 67, pp. 71
- Hendry, R. (2016), 'Immanent Philosophy of X', *Studies in History and Philosophy of Science*, 55, pp. 36-42
- Holbrook, B.J. (2013), 'What is interdisciplinary communication? Reflections on the very idea of disciplinary integration', *Synthese*, 190, pp. 1865-1879
- Kindi, V. (2013), 'Kuhn's Paradigms', in Kindi, V. And Arabatzis, T. (Eds.), *Kuhn's The Structure of Scientific Revolutions Revisited*, London: Routledge, pp. 91-111
- Kinzel, K. (2015), 'Narrative and Evidence: how can case studies from the history of science support claims in the philosophy of science?', *Studies in History and Philosophy of Science*, 49, pp. 48-57
- Klein, U. (2015), 'A Revolution that never happened', *Studies in History and Philosophy of Science*, 49, pp. 80-90
- Kuhn, T. (1970), *The Structure of Scientific Revolutions*, second edition (with the *Postscript*), University of Chicago Press

- Kuhn, T. (1979) *The Essential Tension: Selected Studies in Scientific Tradition and Change*, University of Chicago Press
- Kuhn, T. (2000) *The Road since Structure*, University of Chicago Press
- Kusch, M. (2015), 'Scientific Pluralism and the Chemical Revolution', *Studies in History and Philosophy of Science*, 49, pp. 69-79
- Kuukkanen, JM (2016), 'Historicism and the Failure of HPS', *Studies in History and Philosophy of Science*, 55, pp. 3-11
- MacLeod, M. (forthcoming), 'What makes interdisciplinarity difficult? Some consequences of domain specificity in interdisciplinary practices', *Synthese*, doi: 10.1007/s1129-016-1236-4
- Magnus, P.D. (2010), 'Inductions, red herrings and the best explanation for the mixed record of science', *British Journal for the Philosophy of Science*, 61, pp. 803-819
- McDonough (2003), 'A Rosa Multiflora by any other name', *Synthese*, 136, pp. 337-358
- Mormann, T. (2012), 'A place for pragmatism in the dynamics of reason?', *Studies in History and Philosophy of Science*, 43, pp. 27-37
- Nickles, T. (2003), 'Normal Science: from Logic to Case-Based and Model-Based Reasoning', in Nickles, T. (Ed.), *Thomas Kuhn*, Cambridge University Press, pp. 142-177
- Niiniluoto, I. (2014), 'Scientific Progress as increasing verosimilitude', *Studies in History and Philosophy of Science*, 46, pp. 73-77
- Okasha, S. (2011), 'Theory Choice and Social Choice: Kuhn versus Arrow', *Mind*, 120 (477): pp. 83-115
- Popper, K. (1970), 'Normal Science and Its Dangers' in Lakatos, I. And Musgrave, A. (Eds.), *Criticism and the Growth of Knowledge*, Cambridge University Press, pp. 51-59
- Richardson, A. (2002), 'Narrating the History of Reason Itself: Friedman, Kuhn and a Constitutive A Priori for the Twenty-First Century', *Perspectives on Science*, 10, pp. 253-274

- Riesch, H. (2014), 'Philosophy, History and Sociology of Science: interdisciplinary relations and complex social identities', *Studies in History and Philosophy of Science*, 48, pp. 30-37
- Rouse, J. (2003), 'Kuhn's Philosophy of Scientific Practice', in Nickles, T. (Ed.), *Thomas Kuhn*, Cambridge University Press, pp. 101-121
- Ruhmkorff, S. (2015), 'Unconceived alternatives and the cathedral problem', *Synthese*, forthcoming, available on-line at <http://link.springer.com/article/10.1007/s11229-015-0947-2>
- Soler, L. (2008), 'Revealing the analytical structure and some intrinsic major difficulties of the contingentist/inevitalist debate', *Studies in History and Philosophy of Science*, 39, pp. 230-241
- Stanford, K. (2006), 'Ch. 2: Chasing Duhem and the Problem of Unconceived Alternatives', in Stanford, K., *Exceeding our grasp: science, history and the problem of unconceived alternatives*, Oxford University Press, pp. 27-50
- Tambolo, L. (2010), Counterfactual Histories of Science and the Contingency Thesis, in Magnani, L. and Casadio, C. (Eds.) *Model Based Reasoning in Science and Technology. Studies in applied philosophy, epistemology and rational ethics*, Springer
- Trizio, E. (2008), 'How many sciences for one world? Contingency and the Success of Science', *Studies in History and Philosophy of Science*, 39, pp. 253-258
- Van Dyck, M. (2009), 'Dynamics of reason and the Kantian project', *Philosophy of Science*, 76, pp. 689-700
- Vihalemm, R. (2016), 'Chemistry and the problem of pluralism in science: an analysis concerning philosophical and scientific disagreements', *Foundations of Chemistry*, 18, pp. 91-102
- Wray, K. (2011), 'Chapter 7: Scientific Specialization', in *Kuhn's Evolutionary Social Epistemology*, Cambridge: Cambridge University Press

### Bibliografía Complementaria:

- Andersen, H. (2013), 'The Second Essential Tension: on Tradition and Innovation in Interdisciplinary Research', *Topoi*, 31, pp. 3-8

- Andersen, H., Barker, P. and Chen, X. (1996), 'Kuhn's mature philosophy of science and cognitive psychology', *Philosophical Psychology*, 9, pp. 347-363
- Bod, R. (2006), 'Towards a general model of applying science', *International Studies in the Philosophy of Science*, 20, pp. 5-25
- Chang, H. (2012), *Is Water H<sub>2</sub>O? Evidence, Realism and Pluralism*, Springer.
- Chang, H. (2015), 'The Chemical Revolution Revisited', *Studies in History and Philosophy of Science*, 49, pp. 91-98
- Chen, X., Andersen, H. And Barker, P. (1998), 'Kuhn's theory of scientific revolutions and cognitive psychology', *Philosophical Psychology*, 11, p. 5-28
- DeLanghe, R. (2014) - 'A Unified Model of the Division of Cognitive Labour', *Philosophy of Science*, 81, pp. 444-459
- Dunbar, K. (2002), 'Understanding the role of cognition in science: the *Science as Category* framework', in Carruthers, P. and Stephen, S. (Eds.), *The Cognitive Basis of Science*, Cambridge University Press, pp. 154-170
- Elwick, J. (2012), 'Layered History: Styles of Reasoning as stratified conditions of possibilities', *Studies in History and Philosophy of Science*, 43, pp. 619-627
- Franklin, A. (2008), 'Is Failure an Option? Contingency and refutation', *Studies in History and Philosophy of Science*, 39, pp. 242-252
- Friedman, M. (2001) *Dynamics of Reason*, University of Chicago Press
- Friedman, M. (2011) 'Extending the Dynamics of Reason', *Erkenntnis*, 75, pp. 431-444
- Hacking, I. (2012), 'Language, Truth and Reason 30 years later', *Studies in History and Philosophy of Science*, 43, pp. 599-609
- Hoyningen-Huene, P. and Sankey, H. (2001), *Incommensurability and Related Matters*, Kluwer Academic
- Kidd, I.J. (2016), 'Inevitability, Contingency and Epistemic Humility', *Studies in History and Philosophy of Science*, 55, pp. 12-19.



- Kinzel, K. (2015), 'State of the Field: are the results of science contingent or inevitable?', *Studies in History and Philosophy of Science*, 52, pp. 55-66
- MacLeod, M. and Nersessian, N. (2016), 'Interdisciplinary problem-solving: emerging modes in integrative systems biology', *European Journal for Philosophy of Science*, 6, pp. 401-418
- Mizrahi, M. (2013), 'What is scientific progress? Lesson from scientific practice', *Journal for General Philosophy of Science*, 44, pp. 375-390
- Morreau, M. (2015), 'Theory Choice and Social Choice: Kuhn Vindicated', *Mind*, 123 (493), pp. 239-262
- Okasha, S. (2015), 'On Arrow's theorem and scientific rationality: a reply to Morreau and Stegenga', *Mind*, 124 (493), pp. 279-294
- Rowbottom, D. (2010), 'What scientific progress is not: against Bird's epistemic view', *International Studies in the Philosophy of Science*, 24, pp. 241-255
- Rowbottom, D. (2016), 'Extending the argument from unconceived alternatives: observations, models, predictions, explanations, methods, instruments, experiments and values', *Synthese*, forthcoming, available on-line at: <http://link.springer.com/article/10.1007/s11229-016-1132-y>
- Sciortino, L. (2016), 'Styles of Reasoning, Human Forms of Life and Relativism', *International Studies in the Philosophy of Science*, 30, pp. 165-184
- Stanford, K. (2015), 'Unconceived alternatives and conservatism in science: the impact of professionalization, peer-review and Big Science', *Synthese*, forthcoming, available on-line at <http://link.springer.com/article/10.1007%2Fs11229-015-0856-4>
- Stegenga, J. (2015), 'Theory Choice and Social Choice: Okasha versus Sen', *Mind*, 124 (493), pp. 263-277
- Weisberg, M. and Muldoon, R. (2009), 'Epistemic Landscapes and the Division of Cognitive Labour', *Philosophy of Science*, 76, pp. 225-252
- Worral, J. (2003), 'Normal Science and Dogmatism, Paradigms and Progress: Thomas Kuhn 'versus' Popper and Lakatos', in Nickles, T. (Ed.), *Thomas Kuhn*, Cambridge University Press, pp. 65-100

Medios didácticas:	Métodos de evaluación:
Exposición profesor(a) ( X )	Exámenes o trabajos parciales ( X )
Exposición alumnos ( X )	Examen o trabajo final escrito ( X )
Ejercicios dentro de clase ( )	Trabajos y tareas fuera del aula ( )
Ejercicios fuera del aula ( )	Exposición de alumnos ( X )
Lecturas obligatorias ( X )	Participación en clase ( )
Trabajo de investigación ( X )	Asistencia ( )
Prácticas de campo ( )	Prácticas ( )
Otros: _____ ( )	Otros: _____ ( )

**Nota:** (en caso que exista alguna)

- A full syllabus - with the background, compulsory and further readings for each week - will be made available at the beginning of the course
- The first week is an introduction to the whole unit as well as a critical summary of Kuhn's *The Structure of Scientific Revolutions* and of its impact in philosophy
- Every week, at the end of each seminar, I will do a 40 minutes presentation about the content of the seminar of the following week
- The teaching language of this unit is English. This is the language I will use to explain things and to interact with the students. Students are free to talk to me in Spanish, although I will probably be able to answer their questions only in English. **Students are free to write their essays either in Spanish or in English.**

### Evaluación y forma de trabajo

- Seminars attendance and participation: 10%

- Class presentation: 20%
- Mid-term essay: 30%
- Final essay: 40%

**Imparte:** dr. Vincenzo POLITI (Estancia Postdoctoral, IIF)

**Mail:** vin.politi@googlemail.com

**Día y hora del curso o seminario (dos propuestas):** Wednesday or Thursday, 15 a 19hrs