

COURSE TITLE	TEACHING PERIOD	CREDITS
PHILOSOPHY OF SCIENCE	2nd SEMESTER	6
<b>PROFESSOR:</b> Mauricio SUÁREZ	<b>TIMETABLE:</b>	THURS/FRIDAY 17:00-18:45

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### **COURSE OVERALL THEME: SCIENTIFIC REPRESENTATION**

Scientific representation is a booming topic in philosophy of science, at the intersection with several other philosophical disciplines such as philosophy of language, metaphysics and – I will suggest – aesthetics and the history of science. For a long time, scientific representation was a rarely treated, and barely understood topic; this was partly the consequence of the strong logical positivist stronghold on the field, which in the period between 1940 and 1980 discouraged many from thinking of the relation of theories to the world in representational terms. Yet, there were exceptions, and exceptional figures, even during those years, who emphasized models and, consequently, representation. And there is an even earlier European tradition in the sciences themselves, prominent at the turn of the century, which I shall call “the modelling attitude”.

After a brief introduction, following state of the art articles, we shall focus first on the historical material in both the sciences and philosophy. We then move to the heart of the discussions regarding the nature of scientific representation, which involves thinking about models and modelling in the sciences. Finally, there will hopefully be enough time to cover connections with aesthetics and contemporary epistemology.

### **MAIN AIMS**

- (1) To appreciate the historical origin and evolution of the contemporary debates regarding representation
- (2) To gain some appreciation for the ubiquitous role of modelling across the sciences
- (3) To appreciate the basic elements of representation within the analytical philosophy tradition
- (4) To develop an understanding of the different accounts of representation available
- (5) To gain a basic understanding of the implications for aesthetics and epistemology.

### **CONTENTS (WITH TENTATIVE SCHEDULE)**

COURSE PRESENTATION (23&24/01/2025)

INTRODUCTION (30&31/01/2025)

LECTURE 1 (06/02/2025): HISTORICAL OVERVIEW I  
Reading: Suárez (2014, 2016, 2024 Ch 1)

LECTURE 2 (07/02/2025): HISTORICAL OVERVIEW II  
Reading: Suárez (2014, 2016, 2024 Ch 1)

LECTURE 3 (13/02/2025): THE EMERGENCE OF THE MODELLING ATTITUDE I

Reading: Boltzmann (1902); Maxwell (1856); Suárez (2024, Ch. 2)

LECTURE 4 (14/02/2025): THE EMERGENCE OF THE MODELLING ATTITUDE II

Reading: Boltzmann (1902); Maxwell (1856); Suárez (2024, Ch. 2)

LECTURE 5 (20/02/2025): MODELS IN SCIENCE I

Reading: Gelfert (2017); Nersessian (2008, Ch. 3); Suárez (2016, 2024 Ch. 3)

LECTURE 6 (21/02/2025): MODELS IN SCIENCE II

Reading: Gelfert (2017); Nersessian (2008, Ch. 3); Suárez (2016, 2024 Ch. 3)

LECTURE 7 (27/02/2025): THEORIES OF REPRESENTATION (I)

Reading: Frigg & Nguyen (2016); Suárez (2010a, 2024 Ch. 4-8); Van Fraassen (2008, Part I)

LECTURE 8 (28/02/2025): THEORIES OF REPRESENTATION (II)

Reading: Frigg & Nguyen (2016); Suárez (2010a 2024 Ch. 4-8); Van Fraassen (2008, Part I)

LECTURE 9 (06/03/2025): REPRESENTATION IN ART AND SCIENCE (I)

Reading: Ambrosio (2014); Elgin (2017b); Sánchez Dorado (2018); Suárez (2024, Ch 8)

LECTURE 10 (07/03/2025): REPRESENTATION IN ART AND SCIENCE (II)

Reading: Ambrosio (2014); Elgin (2017b); Sánchez Dorado (2018); Suárez (2024, Ch 8)

LECTURE 11 (13/03/2025): THE TWO CULTURES DEBATE (I)

Reading: Snow (1959)

LECTURE 12 (14/03/2025): THE TWO CULTURES DEBATE (II)

Reading: Snow (1959)

SEMINAR 1 (20/03/2025)

SEMINAR 2 (21/03/2025)

SEMINAR 3 (27/03/2025)

SEMINAR 4 (28/03/2025)

SEMINAR 5 (03/04/2025)

SEMINAR 6 (04/04/2025)

SEMINAR 7 (10/04/2025): OFFICE HOURS

SEMINAR 8 (24/04/2025)

SEMINAR 9 (25/04/2025)

## KEY REFERENCE TEXT

Suárez, Mauricio (2024), *Inference and Representation: A Study in Modeling Science*, University of Chicago Press. (Available as pdf for students enrolled in the course)

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Bailer-Jones, Daniela (2009), *Scientific Models in Philosophy of Science*, University of Pittsburgh Press.

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Bokulich, Alisa and Naomi Oreskes, “Models in Geosciences”, in L. Magnani et al., eds., *Handbook in Model-Based Science*, Springer. <https://www.springer.com/gp/book/9783319305257>

Boltzmann, Ludwig (1902), “Models”, *Encyclopedia Britannica*. Reprinted in McGuinness, ed., *Ludwig Boltzmann: Theoretical Physics and Philosophical Problems. Selected Writings*, Dordrecht: Reidel. [http://www.muellerscience.com/MODELL/Definitionen/Encyclopaedia\\_Britannica.htm](http://www.muellerscience.com/MODELL/Definitionen/Encyclopaedia_Britannica.htm)

Elgin, Catherine (1997), *Between the Absolute and the Arbitrary*, Cornell University Press. <http://elgin.harvard.edu/Books.html>

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\_\_\_\_ (2017b), “Nature’s Handmaid, Art”, in Bueno et al., eds., *Thinking about Science, Reflecting on Art*, Routledge. <https://www.taylorfrancis.com/books/e/9781315114927/chapters/10.4324/9781315114927-2>

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Gelfert, Axel (2016), *How to Do Science with Models*, Springer. <https://www.springer.com/gp/book/9783319279527>

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Maxwell, James Clerk (1856), “Are There Real Analogies in Nature?”, in P. M. Harman, ed., *The Scientific Letters and Papers of J. C. Maxwell*, Cambridge University Press, pp. 376-383 <https://sites.uci.edu/mathematics/files/2016/11/Maxwell-Analogies-in-Nature.pdf>

Nersessian, Nancy (2008), *Creating Scientific Concepts*, The MIT Press. <https://mitpress.mit.edu/books/creating-scientific-concepts>

Ruyant, Quentin (2021), “True Griceanism: Filling the Gaps in Callender and Cohen’s Account of Scientific Representation”, *Philosophy of Science* 88 (3), pp. 533-553. DOI: <https://doi.org/10.1086/712882>

Sánchez Dorado, Julia (2018), “Methodological Lessons for the Integration of Philosophy of Science and Aesthetics: The Case of Representation”, in Bueno et al., eds., *Thinking about Science, Reflecting on Art*, Routledge. <https://www.taylorfrancis.com/books/e/9781315114927/chapters/10.4324/9781315114927-2>

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## PEDAGOGY AND METHODOLOGY

The methodology is that of the leading European universities in humanities and social sciences, according to rankings such as: (<https://www.shanghairanking.com/rankings/gras/2021/RS0504>). The basic pedagogical concept is that philosophy is essentially a practical skill, a capacity to reason and argue clearly about any topic. Therefore, there will an emphasis on the state-of-the-art research on every topic. There will also be a mixed format of lectures and seminars; the former involves careful attention to the teacher’s disquisition of a topic and require previous reading as per syllabus. The latter involve active participation in discussions led by the teacher, where students try out their own ideas about the topic, and possibly an oral presentation. Students may compile their own small biography on the topic, by means of the excellent resources available in the UCM philosophy library and with guidance from the outstanding library staff.

## COURSE REQUIREMENTS

None – other than the acceptance of the methodology described above.

## ASSESSMENT

The course will be assessed by means of a single exam that will take place on **a date in May to be determined**. Students will be offered two main topics extracted from the syllabus and will have to choose one on which to write a brief essay. The mark in this exam will contribute 66% of the overall final mark; the remaining 33% of the overall mark will be contributed by participation in the seminars, including regular attendance, contributions to the debates, and the presentation of some relevant reading or topic.

Alternatively, students may replace the examination with a home-written essay **not more than 3,000 words** in length on the issues covered in the course, to be submitted by email by the **strict deadline of the scheduled date of the exam**.