Rationale

The origins of this course lay in a discussion I had with students in my course, “Humans, Machines, and Aesthetics.” I was struck by (yet very pleased with) their insistence that the contextualization of scientific and technological knowledge rendered the content of such knowledge infinitely more comprehensible. That is to say: by learning the processes by which scientific and technological knowledge is constructed, the content of such knowledge is clearer than if it is presented as a collection of disembodied, ahistorical ideas and formulae. Such a pedagogical technique also forces students to query the rather fundamental relationship between science and culture.

The term “culture” needs some unpacking. In one sense, I mean the practices, beliefs, and identities of certain communities and the milieu that reinforces them.¹ I also use culture in the sense of high culture of the haute bourgeoisie. This is particularly true when discussing music and art in fin-de-siècle Europe. In each case, culture is inherently political, whether referring to the role of seventeenth-century natural philosophy in the formation of the State, or to the political use of science and technology by scientists, artists, and musicians in the subversion of an aesthetic, or to the creation of a capitalist, military-industrial complex.

Likewise, the term “science” needs explanation. Contra much popular belief, science is not one coherent, transtemporal, transcultural body of knowledge. Historically, there have been various (and indeed antithetical) epistemological approaches to study nature. At times in this course “science” denotes experimental natural philosophy. Other times it means thermodynamics and physiology. And it refers to particle physics and molecular biology. What intrigues me most: occasionally the boundaries between science and culture tend to be so blurred that questions about what constitutes “science” and what constitutes “culture” become meaningless.²

¹ Here, my approach owes much to the works of Norbert Elias, Max Weber, and Marcel Mauss, Pierre Bourdieu, Benedict Anderson, and Ludwig Fleck.
² I know this might sound absurd; however, consider the following examples. Debates among seventeenth-century natural philosophers about the existence of a vacuum were simultaneously debates about nature, the State, and religion. Solutions to questions of the natural order were simultaneously solutions to questions of the theological and political orders. To ask which is the ‘science part’ and which is the ‘cultural part’ would be to miss a critical historical point and its moral. Similarly, if one were to ask the nineteenth-century physicist Wilhelm Weber whether his compensated reed pipe was a musical or scientific instrument, he would respond by claiming it was both. Finally, genes in the late twentieth century were simultaneously building blocks of life and commodities critical to
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Course Description

This course, which spans from the Scientific Revolution to the present, examines various examples of how the conduct and context of science are framed by culture, and conversely, how science shapes culture. Which models proffered by various historians, philosophers, cultural anthropologists, and sociologists can begin to explain this relationship?

The first portion of this course addresses how scientific knowledge was intricately intertwined with religious and political knowledge during the Scientific Revolution and the Enlightenment. The next section illustrates how important developments in thermodynamics (or the physics of work and waste) led to improvements in nineteenth-century musical instrument design and a change in musical aesthetics. Similarly, we shall discuss how twentieth-century technological and scientific developments in fin-de-siècle Europe and the U.S. directly led to new artistic expressions and aesthetics. The final third of the course looks at how the content of scientific and technological knowledge associated with “Big Science” from World War II to the present owes much to the development of national defense in the case of physics and to venture-corporate capitalism in the case of molecular biology.

Rather than simply stay at the level of case studies, we shall continually test the various models, which attempt to explain the complex and historically contingent relationship between science and culture, including Marx’s theory of base-superstructure, Kuhn’s paradigm, Shapin and Schaffer’s historical social constructivism, and Galison’s bricolage model and trading zones. Finally, the course will force students to think about related issues, such as the history of objectivity and the differences and similarities between science on the one hand, and the social sciences and humanities on the other. Readings include: Shapin and Schaffer, Galison, Jackson, Marx, and Kuhn. This interdisciplinary seminar may be used to fulfill the science requirement.

Syllabus [N.B.: I tinker obsessively with syllabi; however, I think (well, I hope!) this version is close to the final one!]

the intellectual-property portfolio of many biotech start-up companies. This development has critically altered both the content and conduct of molecular genetics.
Week One

Wednesday: Introduction to course, course requirements, and expectations

Week Two: Social and Natural Knowledge


Week Three: Science, Religion, and Political Representation, I

Wednesday: Movie: Newton’s Dark Secrets

Week Four: Science, Religion, and Political Representation, II

Monday: No Class. Finishing reading from last week.
Wednesday: Newton and Leibniz. Reading: The Clarke-Leibniz Correspondence (T), pp. 5-125.

Week Five: Science, Religion, and Political Representation, III

Monday: Student Presentations One. Finish last Wednesday’s reading.

Week Six: Music and Science, I

Monday: Columbus Day, No Class
Wednesday: Music and Science: Thermodynamics and Organs. Reading: Jackson, Harmonious Triads (T), chapters 3 and 4

Week Seven: Music and Science, II
Monday: Music and Science: Quantifying the Virtuoso. Reading: Jackson, 
*Harmonious Triads* (T), chapters 7 and 8

Wednesday: **Student Presentations Two.** Kursell,” Piano Méchanique and Piano Biologique: Nikolai Bernstein’s Neurophysiological Study of Piano Touch” (on electronic reserve).

**Week Eight: Visual Art and Science**


**Week Nine:**

**Monday: Student Presentations Three**

**Wednesday: Student Presentations Four**

**Week Ten: Physics and the State, I**


**Week Eleven: Physics and the State, II**

Monday: Film in Class: “The Day After Trinity.”

Wednesday: **Student Presentation Five**

**Week Twelve: Physics and the State, III**


Wednesday: The History of Particle Physics. Reading: Lederman and Schrank, *From Quarks to the Cosmos*, Chapter 4 (on electronic reserve).
Week Thirteen: Physics and the State, IV


Week Fourteen: Biocapitalism

Wednesday: **Student Presentations Six**

Week Fifteen

Monday: **Student Presentations Seven**
Wednesday: Course Evaluations. **Paper Three Due in Class, 6 pages, 25 %**

**Grade Determination:**

3 papers totaling 60%, class presentation 20%, class discussion 20%

**Required Texts (available in the bookstore and on two-hour reserve in Bobst Library):**

H.G. Alexander, *The Newton-Clarke Correspondence: Together with Extracts from Newton’s Principia and Optics* (Manchester, UK), paperback


Dan Kevles, *The Physicists* Harvard University Press


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