We often hear that scientists discover the "Laws of Nature". What are these laws? How strict, universal, and necessary are they? Can they serve to unify and reduce a variety of sciences to fundamental physics? How are they empirically confirmed? Do they actually exist? As we shall see in the first part of this course, philosophers in the 20th century analytical tradition have addressed these important questions in an insightful manner. Unfortunately, they have failed to explore the emergence and development of the concept in the history of science. Since the power and interest of the concept derives precisely from the sciences, this lacuna is problematic. We will try to remedy it by investigating the history of science in the second part of this course. When, and under what conditions, did the very concept of laws of nature emerge? Does the historical evolution of science point to a plurality of ways of imagining laws of nature – e.g., fundamental, historical and statistical laws? And how do trends in contemporary science—systems thinking, experimentation, and computational power—reframe our conceptualization of laws of nature? Ultimately, the goal of this course is to evaluate and concretize abstract philosophical analyses of laws of nature in the context of real history of science. Both Analytic Philosophy and History of Science have much to gain from such an endeavor.

COURSE REQUIREMENTS
1. A weekly one-paragraph summary of the reading (roughly 10% of your grade)
2. Two one-page assignments for undergraduates; three one-page assignments for graduates (20% of your grade)
3. A short (10-15 minute, 2-page) presentation. (15%)
4. Paper (undergraduates 5-7 pages; graduates 10-14 pages, 1.5 spaced), with rough draft. (40%)
5. Class participation. Attendance is mandatory. (15%)

6. In addition to the regular course meetings, there will be a special graduate student section of 1.5 hours, which will meet every other week (5 times per quarter).

GRADING POLICY
1. In order to pass the course, you must satisfy every requirement.
2. One third of a letter grade will be deducted per day for any late assignments (e.g., a B+ becomes a B, etc.).

3. No assignments will be accepted more than seven (7) days after the due date.

**WARNING**

Academic misconduct will not be tolerated. Please consult: [http://www.ucsc.edu/academics/academic_integrity/index.html](http://www.ucsc.edu/academics/academic_integrity/index.html)

**READINGS**

**PART 1. Philosophical Analysis**

**Week 1. Laws of Nature. Basic Definitions.**
Recommended:

**Week 2. Analytic Philosophy of Laws of Nature.**
(i) *Deductive Systems?*
(ii) *Universals?*

**Week 3. Analytic Philosophy Skepticism Regarding Laws?**

**Week 4. Philosophy of Science and Laws of Nature**
PART 2. Historical Context

Primary Sources:
Selections: Isaac Newton

Week 6. The Emergence of Historical Laws: Geology (primarily 19th Century)
Primary Sources:

Week 7. The Emergence of Statistical Laws (17th to 19th Centuries)

Week 8. Bohr, Einstein and Rethinking the Fundamental Laws of Nature
-- MacKinnon E. 1983 Scientific Explanation and Atomic Physics, University of Chicago Press. [Chapter 10, "Two Theories of Scientific Knowledge: Bohr and Einstein"]

Week 9. Laws in science today? Systems, the Experimental Life, and Computers

Week 10. Tying Together the Philosophical Analysis and the Historical Context of Laws of Nature
Discussion of emergent themes from the course.