TENTATIVE SCHEDULE

The History and Philosophy of the Concepts of Scientific Law and Probability

Course dates: July 11-22, 2022

Course Director: Barry Loewer, Rutgers

Course Graduate Assistant: Diego Arana, Rutgers

Brief description of the course:

The history and metaphysics of the concepts of laws of nature and objective probabilities are closely connected with one another and with main topics in the philosophy and history of science. Fundamental laws of physics, particularly quantum theory and statistical mechanics, posit objective probabilities and it has been debated whether all objective probabilities are ultimately grounded in such laws. Laws and probabilities also figure prominently in the special sciences (e.g., biology, psychology, economics) Understanding the metaphysics of scientific laws and objective probabilities are central concerns of philosophy of science. Understanding begins with the history of both concepts. The idea that it is a goal, perhaps the primary goal, of the sciences to discover laws arose in the 17th century. Descartes (and various of his contemporaries) conceived of laws as principles that describe how God makes material bodies move. Subsequently some (e.g., Newton) came to think of laws as themselves governing physical events while others (especially David Hume) came to think of laws not as governing but rather as describing patterns and regularities among events. These two views have developed into the two main philosophical accounts of the metaphysics of laws which are usually called anti-Humean and Humean accounts.

The idea that some events are chancy also arose in the 17th century first to describe the behavior of gambling devices (e.g., Pascal) and later to deal with patterns of events that were either too complicated to account for in terms of laws or were not subject to laws at all. However, in the 20th century probability was incorporated into the laws of statistical mechanics, evolutionary and genetic theory and quantum mechanics. The main views concerning the metaphysics of probability mirrors the views about laws. Anti-Humean views construe probability as a measure of the propensity of a situation to produce an effect (e.g., the propensity of a lump of radium to emit an alpha particle in a given time period) while Humean views construe probability as describing patterns of events (e.g. the frequency of a lump of radium to emit an alpha particle in a given time period or the probability implied by the Best System).

The first week of the summer school will focus the history and metaphysics of the concept of laws and the second will focus on the history and metaphysics of the concept of probability and how objective probability is connected to laws and its role in statistical mechanics and quantum mechanics. The metaphysics of laws and probability are also connected to a number of other issues in metaphysics and epistemology including the nature of time, the relations between physics and special sciences, the compatibility of free will and physical laws, and how objective probabilities rationally guide belief. These issues will be discussed throughout the course.

***Course director*:** Barry Loewer, Rutgers University

Course assistant: Diego Arana, Rutgers University

COURSE SCHEDULE

Mornings 10-12:45   Afternoons 2:15-5

WEEK 1

July 11

9:00-10:00: Orientation (SUN Office)

Morning Intro: *History of the Concept of Laws of nature*

Loewer

Afternoon: *History of the Concept of probability*

Handfield

July 12

Morning: *Survey of metaphysical view re laws*

Esfeld

Afternoon: *Survey of metaphysical views re chance*

Handfield

July 13

Morning: *Humean Accounts* (Lewis etc.)

Hicks, Demarest

Afternoon: *Super Humeanism*

Esfeld

July 14

Morning: *Governing Accounts of laws and chances (Armstrong, Maudlin etc.)*

Emery

Afternoon: *Powers Accounts of laws and chances (Bird etc.)*

Demarest, Handfield

July 15

Morning: : *Laws and Explanation; the circularity objection*

Emery, Hicks

Afternoon: Special Science Laws

Schrenk

July 16

Morning: *Student talks and discussion*

Everyone

Afternoon: **Boat trip**

July 17, Sunday

WEEK 2

July 18

Morning: *Metaphysics of chance*

Demarest, Handfield

Afternoon: *Metaphysics of chance the PP etc.*

Loewer, Hicks

July 19

Morning: *Causation and counterfactuals*

Loewer, Fernandes

Afternoon: *The PDA*

Loewer

July 20

Morning: *Probability in statistical mechanics*

Albert, Lazarovici

Afternoon: *Probability in quantum mechanics*

Albert, Wilhelm

July 21

Morning: *Typicality and Probability*

Wilhelm, Lazarovici

Afternoon: *Laws and Time*

Loew, Albert. Fernandes

July 22

Morning: *Free will and Laws*

Loew, Loewer

Afternoon: *Summing up*

Everyone