

730 Philosophy 109, Sect 04 Intro to Formal Reasoning and Decision Making

This course meets the following goal: Examine critically philosophical and other theoretical issues concerning the nature of reality, value, knowledge, human experience.

Instructor: Sidney Felder, e-mail: sf30@panix.com

Rutgers, The State University of New Jersey, Fall 2021

I. Elements of Set Theory (weeks 1-3)

Denumerable and Non-denumerable Sets; The Paradoxes and Axiomatic Set Theory.

Course Notes: Elements of Set Theory.

II. Linear and Partial Orderings (weeks 3-4)

Linear Orderings; Partial Orderings.

Limits and Bounds; Least Upper and Greatest Lower Bounds.

Transfinite Order Types, Ordinals and Cardinals.

Course Notes: Linear and Partial Orderings.

III. Elements of Truth-Functional Propositional Logic (weeks 4-5)

Symbolism and Logical Form; The Logical Constants.

Semantic Consistency, Contingency, and Validity; Spaces of Assignments.

Logical Implication.

Course Notes: Truth Functional Propositional Logic. Schaum's pps. 44-68

IV. Elements of Quantification (week 5)

'All' and 'There exists' — The universal and existential quantifiers.

Free and Bound variables; Open and Closed Formulæ (Sentences).

Interpretations and Models.

Logical Strength: States of Affairs and Relative Determinateness.

Course Notes: Quantification Logic. Schaum's ch. 5; ch. 6 pps. 130-149; ch. 9 pps. 223-226

V. Representation and Measurement (weeks 5-6)

Nominal, Ordinal, Interval, and Ratio Scales.

Geometry and Physics.

Aristotelian, Newtonian, and Relativistic Space and Time.

Euclidean and Non-Euclidean Geometries.

Psychophysics.

VI. Elementary Probability (weeks 6-7)

Elements of Axiomatic Probability.

Conditional Probabilities and Probabilistic Dependence; Bayes' Theorem.

Evidence and Non-monotonicity.

Statistical Mechanics and the Temporal Anisotropy of Physical Processes.

Schaum's ch. 9 pps. 226-234; ch. 10

VII. Probability and Statistics: Foundational Questions (weeks 7-8)

Interpretations of Probability: Objective and Epistemic Theories.

VIII. Probability and Decision (weeks 8-10)

The Concept and Measurement of Utility.
Risk and Uncertainty.

IX. Game Theory (weeks 10-12)

The Concept of a Strategy.
Prisoner's Dilemma and Prisoner's Dilemma Repeated.
Iterated Dominance arguments and Common Knowledge.
Nash Equilibrium as a Normative Principle.

Course Notes: Problems of Mutual Expectation.

X. The Concept of Causation (weeks 12-14)

Regularities and Laws.
Probabilistics and Causal Dependence.
Counterfactual Dependence.
Newcomb's Problem.

The texts for this class are the following:

A series of short expositions I have written which I refer to as *Course Notes* in the Syllabus.

The Schaum's Outlines *Logic* (Second Edition), by John Nolt, Dennis Rohatyn and Achille Varzi.

A student's grade will be determined by grades on the homeworks, the quality of essays (submitted by e-mail to sf30@panix.com, either in plain text format or attached PDF, at the end of the term), the quality of participation in the various forms of class discussion that are possible under the constraints of "asynchronous" remote learning).

My class presents material that is conceptually deeper and more philosophically oriented than some students enrolling in a class under this title may expect. My grading will take this into account.

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