This book aims to provide an accessible pedagogically focused introduction to the Philosophy of Science, which serves as a useful general introduction to the subject and also to those topics usually covered in more advanced potentially specialist modules in the subject. This introduction covers contemporary problems in the Philosophy of Science, bringing together both the epistemological and metaphysical issues raised in philosophical thinking about science. It is a comprehensive and accessible introduction to the Philosophy of Science, suitable for both philosophy and non-philosophy students. The book is problem-based introducing a range of topics set against a general distinction between epistemological and metaphysical issues in the philosophy of science. Historical concerns about scientific method and progress are used to introduce the epistemological problems, but contemporary discussion of scientific explanation, rationality and probability and are also included. The metaphysical issues are introduced against the backdrop of the realism and anti-realism debate, but contemporary problems such as laws of nature, natural kinds and causation are also included. The text is pedagogically focused including key point summaries, introductions, case studies of empirical examples and further reading and thus, can be used both as the core text for a general philosophy of science course or to lead smaller-group seminar discussion.

Table of Contents

Introduction: What is Philosophy of Science? (5,000 Words)
The philosophy of science is introduced and the general distinction between metaphysics and epistemology is explained.

Section 1: Epistemology of Science (Total 35,000 Words)

Chapter 1: Scientific Method and Progress (10,000 Words)
This chapter will begin with a chronological discussion of the issue of scientific method, starting with the birth of Inductivism and empiricism in the Scientific Revolution and Hume’s famous problem of Induction. Subsequent attempts to delineate a method for science are discussed: Popper and falsificationism, Kuhn and Theory Change and Feyerabend and Relativism.

Chapter 2: Scientific Explanation (10,000 Words)
The issue of scientific explanation is introduced. The Chapter begins with Hempel’s hypothetico-deductive model of explanation and studies the famous counterexamples to this model proposed in the literature. Statistical relevance, causal, mechanistic and unificationist accounts of explanation are all introduced as is Lipton’s famous account of inference to the best explanation.

Chapter 3: Rationality and Probability (7,500 Words)
This chapter focuses on the concept of probability, and the topic of rational decision making in science. It is introduced via Bayes Theorem and proceeds to discuss the relationship between ‘objective’ and ‘subjective’ probability. The general question as to
whether probability can help with the problem of induction is also discussed. The issue of what a rational person choose to do in the light of probabilistic outcomes is also introduced in the context of the prisoner’s dilemma.

*Chapter 4: Realism and Empiricism (7,500 Words)*

Do theories aim for truth about unobservables? This chapter discusses possible answers to this question against the backdrop of the distinction between realism and anti-realism about truth.

*Section 2: Metaphysics of Science (Total 35,000 Words)*

*Chapter 5 Realism and Anti-Realism (10,000 Words)*

Do theoretical objects exist? What ontological significance should be attach to the posits of our scientific theories? Do Electrons literally exist? These issues are discussed against the main philosophical positions of metaphysical realism and anti-realism. The issues of reductionism and the ontological status of higher-level entities are also introduced.

*Chapter 6 Causation (10,000 Words)*

Why do like causes bring about like effects? Do causes necessitate their effects? What links causes with their effects? Accounts of causation are introduced that attempt to answer these questions. The chapter opens with a Humean analysis of causation and discusses Lewis’ counterfactual account of causation. Some modern mechanistic accounts of causation are also discussed. The issue of causation as it pertains to specific sciences is discussed (e.g. causation in the medical sciences, causation in biology and causation in physics)

*Chapter 7 Laws of Nature (7,500 Words)*

What are laws of nature? Both philosophers and scientists are tempted to believe that laws of nature play a governing role in reality and consequently, that the order and uniformity that we observe in nature is the result of or is best explained by laws of nature. One of the chief aims of scientific enquiry then is to discover nature’s laws. The chapter begins with Hume’s Regularity view of laws and discusses the Ramsey-Lewis Sophisticated Regularity View. The Nomic Necessitation view of Armstrong, Tooley and Dretske is subsequently introduced as is the more recent Dispositionalist account of laws of nature (Bird). The issue of Laws of Nature is also discussed in relation to specific examples from the sciences. The more recent problem of ceteris paribus laws is also introduced from looking at examples of laws in the sciences.

*Chapter 8 Natural Kinds and Properties (7,500 Words)*

Scientific disciplines divide the particulars they study into kinds and theorise about those kinds. This final chapter will discuss whether scientific categories ought to be taken ontologically seriously. Theories of Natural Kinds will be discussed against the backdrop of realism and conventionalism about kind categories. The chapter is introduced by a discussion of Kripke’s famous twin earth thought experiment and his essentialism about natural kinds. Subsequent theories of Natural Kinds introduced by Quine, Armstrong, Mellor, Dupré, and Boyd will be introduced.

*Conclusion and Bibliography: (5,000 Words)*