The course will introduce students to deep philosophical issues raised by modern natural science of metaphysical and epistemological nature. From a reflection on methodological questions, it will approach the question of realism. We will be guided by nested "what does it take"-questions. For example: What does it take for a system of sentences to count as a good scientific theory? What does it take for a scientific theory to be testable by observational and experimental data (and, by the way: what does it take for certain series of experiences to count as data or observations?)? What does it take for a given theory to be better supported by the available evidence than its competitors? What does it take for a given theory to explain the known phenomena in an area of knowledge? What does it take for an explanatory scientific theory to be credited with reference to underlying structures of reality? We will begin with a brief overview of the scientific revolution of the 16th and 17th century, and then turn to the treatment of certain problems in the contemporary literature, like the problem of induction, the problem of the underdetermination of theory choice by the available data, the problem of rationality and conceptual change, the problem of realism.