Philosophy of Science

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1. *COURSE OBJECTIVES*

In this course we shall, first, examine the general philosophical principles and theories that are operative in the philosophical discussion of general issues of natural science and social science. Second, we shall learn to apply these principles and theories to the key issues of natural science and social science, by studying and discussing them. Third, by discussing a presentation made by a student in each session, we shall learn to discuss the subject-matter of the presentation.

In general, the objective of this course will be to offer the student opportunities to study and refine the skills and techniques to analyze issues which are an integral part of natural science and social science. Another important objective will be that you acquire the skill of making presentations in English language.

In particular, the course will help the student to:

1. understand central philosophical principles and concepts enabling to understand key issues in natural science and apply them the process of reasoning in and about natural science and social science.
2. apply these principles and concepts to a variety of issues related to natural science and social science, and
3. to understand the meaning and place of natural science and social science in society.

2. *TEXTS*

There is one required textbook for the course: T. S. Kuhn's *Structure of Scientific Revolutions*. This textbook and all other reading materials are available in an electronic form; at each reading assignment the name of the electronic file is given in square brackets. You should read the respective reading assignment for each session and follow the presentation made by a student in order to actively participate in the ensuing discussion.

3. *OFFICE HOURS*

My office ours are from xx.xx till xx.xx each xxxx-day. Please feel free to come to see me during this time in my office located in building xxxxx, x. floor, room xxxx. You can, if you want, bring the draft of your presentation and we will discuss it.

4. *TENTATIVE COURSE CALENDAR AND STUDY GUIDE*

4.1 September xx, 2019 Introduction

Distribution of the syllabus; description of the subject-matter and objectives of the course; assignment of presentations to students.

4.2 September xx, 2019 Language—A Syntactical View and a Semantical View

Carnap, R.: Sections 1, 2, 3, and 4 in Chapter A, pp.1-14 in the book: Carnap, R.: *Introduction to Logic and its Applications*. New York: Dover. [Carnap-IntroLogic]

Carnap's introduction into symbol logic with a focus on the syntactic rules for constructing an artificial language for symbolic logic and on the place of the term "truth" in this introduction.

G. Frege: On Sense and Meaning. In: Frege, G.: *Collected Papers on Logic, Mathematics, and Philosophy*. Oxford, Blackwell: 157-177. [Frege-Sense&Meaning]

Frege's description of the constitutive parts language: sign; sense; reference (meaning); the relation of sense and reference (meaning); relation between declarative sentence and its truth-value; direct and indirect contexts.

4.3 September xx, 2019 Language-A Pragmatic View

J. Habermas: *Theory of Communicative Action*, Vol. 1, Boston, Beacon Press 1986-87. pp. 43-52 and 69-72 [Habermas-TCA1]; Vol. 2, pp. 124-126, 137-138 and 140-142 (up to Figures 21 and 22) [Habermas-TCA2]

Habermas' pragmatic conception of language; three world-relations of language; three validity claims inherent in language communication; the place of language in the reproduction of knowledge, society and personality.

4.4 September xx, 2019 Science and Sciences about Science

R. Tuomela: Science, Protoscience, and Pseudoscience. In J. Pitt (ed.*): Rational Changes in Science*. Dordrecht 1987: 83-101. [Tuomela-Science…]

Tuomela's differentiation between science, proto-science and pseudoscience; the central place and domination of the so-called "scientific" world view according to Tuomela.

4.5 October xx, 2019 Method, Scientific Method and the Methods of Science

T. Kuhn: *The Structure of Scientific Revolutions*. Chicago 1970. [Kuhn-Structure]

Kuhn on prescience, normal science and extraordinary science; the structure of scientific revolutions.

4.6 October xx, 2019 Process of Measurement and Definition by Abstraction as Two Methods of Introduction of Magnitudes

B. Ellis: Some Fundamental Problems of Direct Measurement. In*: Australasian Journal of Philosophy*, 1960, Vol. 38: 37-47. [Ellis-FundProblems]

Ellis on the differences between fundamental and derived types of measurement; the structure and character of the fundamental type of measurement; introduction of new quantities by means of direct measurement

G. Peano: "Definition by abstraction." {My translation of § 38, pp. 45-46 from *Notations de logique mathématique*. Turin 1894} [Peano-DefAbstr]

Introduction of new quantities by means of already measured magnitudes using the method labelled as "definition by abstraction."

4.7 October xx, 2019 Induction and Deduction as a Basic Thought Operations

J. Ladyman: Induction and Inductivism. In: J. Ladyman: *Understanding Philosophy of Science*. London 2002: 11-30. [Ladyman-Induction]

Ladyman's views on induction as a scientific method; problems of justifying of induction; the place of induction in scientific reasoning.

K. R. Popper: *The Logic of Scientific Discovery*. London 1968: 27-44, 59-70. [Popper-LogScDisc]

Popper's critique of induction as a scientific method; the difference between induction and deduction; the structure of falsification according to Popper.

4.8 November xx, 2019 Problems of Scientific Explanation I.

C. G. Hempel: Studies in the Logic of Explanation. In: *Philosophy of Science*, 1948, Vol. 15: 135-140, 152-164. [Hempel-Studies]

Hempel on the structure of scientific laws and scientific explanation based on universal laws of science,

4.9 November xx, 2019 Problems of Scientific Explanation II.

C. G. Hempel: Aspects of Scientific Explanation. In: C. G. Hempel *Aspects of Scientific Explanation and Other Essays in the Philosophy of Science*. New York 1964: 333-340, 380-382. [Hempel-Aspects]

J. Woodward: Scientific Explanation. In: *British Journal for the Philosophy of Science*, 1979, Vol. 30: 41-67. [Woodward-Scientific]

Problems inherent in Hempel's approach to scientific explanation. Woodward's critique of Hempel's views on scientific laws and scientific explanation; the criterion of functional interdependence and its place in scientific explanation.

4.10 November xx, 2019 Problems of Scientific Explanation III.

W. C. Salmon: Statistical Explanation. In: Colodny, R. G. (Ed.): *The Nature and Function of Scientific Theories*. Pittsburgh 1970: 173-180, 186-189. [Salmon-StatExpl]

Koertge, N.: An exploration of Salmon's S-R model of explanation. In *Philosophy of Science*, 1975, Vol. 42: 270-274. [Koertge-Exploration]

Salmon's statistical-relevant model of scientific explanation as an alternative to Hempel's model of statistical explanation; N. Koertge's comparison of this model with Hempel's approach.

4.11 November xx, 2019 Problems of Scientific Explanation IV.

L. Nowak: Laws of Science, Theory, Measurement. In *Philosophy of Science*, 1972, Vol. 39: 533-548. [Nowak-Laws]

Nowak on the structure of scientific laws and scientific explanation; Nowak's views the structure of scientific laws and scientific explanation as compared to that of Hempel.

4.12 December xx, 2019 Scientific Theories and Experience

C. G. Hempel: The Theoretician's Dilemma. In: C. G. Hempel*: Aspects of Scientific Explanation and Other Essays in the Philosophy of Science*. New York 1964: 173-182, 185-187. [Hempel-Dilemma]

Hempel on the structure of scientific theories and the empiricist program of the elimination of terms for non-observable entities.

4.13 December xx, 2019 Philosophy of Social Sciences I (Natural and Social Sciences)

A. Schutz: Concept and Theory Formation in the Social Sciences. In*: Journal of Philosophy* 1954, Vol. 51: 257-273. [Schutz-Concept]

Schutz on the difference between social and natural sciences; first-order and second-order constructs and their relation in the social sciences.

4.14 December xx, 2019 Philosophy of Social Sciences II (Interpretation and Understanding)

B. Fay, B. – J. Moon: What Would an Adequate Philosophy of Social Science Look Like? In: *Philosophy of Social Sciences* 1977, Vol. 7: 209-227. [Fay-SocScience]

Fay and Moon on the structure of social sciences; the place of interpretation, critique and understanding in social science.