

Approved copy attested
 (Director & Dean)
 Dr. P. J. JACOB
 (Former Director & Dean)
 Professor
 School of Pedagogical Sciences
 Mahatma Gandhi University

MAHATMA GANDHI UNIVERSITY
 Research Methodology: Course (for all Sciences & Technology)

The Course seeks to provide fundamentals of knowledge production in the material and natural sciences, together with the philosophy of science and technology.

Every School/Department/Centre in the Campus and Research Centres in affiliated colleges/ institutions offering Ph.D Research in any discipline under the Faculties pertaining to Science and Technology shall follow the content of the Course as outlined hereunder.

Unit I

- Logical Preliminaries: The Indian Tradition: Elements of Indian Hermeneutics – Basics of *Tarka*, *Nyāya*, and *Pramāṇa*
- Western Logical Preliminaries: Deduction – Induction – *A priori* – *A posteriori* – Kantian Synthesis – Fact – Proof – Objectivity
- Hume's formulation of the problem of the justification of induction – Hempel's logic of confirmation – Kolmogorov's notion of probability – Carnap's inductive logic based on logical interpretation of probability – Goodman's riddle of induction – Limitations of a purely syntactical approach to confirmation – Bayesian confirmation theory
- Theory of Knowledge: Recapitulation of the Preliminaries – Ontology – Epistemology – Objectivist Epistemology and Contemporary Debates
- Writing Knowledge: Techniques of Exposition – How to write a Thesis? – Conventions and Strategies of Authentication – Citation Style-sheet

Readings

- Radhakrishnan S. and Charles Moore, A., Ed. *A Source Book in Indian Philosophy*. - Rs 1.31
 Princeton: Princeton University Press, rpt., 1989. - £ 27.50, \$ 24.31
- Sundar Sarukkai, *Indian Philosophy and Philosophy of Science*. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, second edn. 2008
- Pojman, *Theory of Knowledge: Classic and Contemporary Readings*, 3rd edn. Wadsworth, 2003. \$ 11.42 - Rs 603
- Karl Popper, *The Problem of Induction*, London, 1953
- Karl Popper, *Objective Knowledge: An Evolutionary Approach*, Oxford. Oxford Univ. Press, 1972 New form \$ 39.4, Used form - \$ 25.51 - Rs 137
- Lakatos, I. *Proofs and Refutations: The Logic of Mathematical Discovery*. Cambridge University Press, 1976
- Lakatos, I. *The Methodology of Scientific Research Programmes: Volume 1: Philosophical Papers*, Cambridge University Press, 1980 \$ 50.84 - Rs 2743
- Preyer, G./Siebel, F./Ulfig, A. *Language, Mind and Epistemology*, Dordrecht: Kluwer Academic Publishers, 1997 252,00€
- Rand, Ayn. *Introduction to Objectivist Epistemology*, New York: Meridian, 1979

Okasha Samir, *Philosophy of Science - A Very Short Introduction*, Oxford, 2002 - Rs 545

- Steup, Matthias. "Knowledge and Scepticism". *Contemporary Debates in Epistemology*. Peter Sosa and Matthias Steup (eds.), 1-13. 2005.
- Tomberlin, James (ed.). *Philosophical Perspectives 13, Epistemology*. Blackwell Publishing, 1999.
- John P. van Gigch, "Comparing the Epistemologies of Scientific Disciplines in Two Distinct Domains: Modern Physics versus Social Sciences", I & II, *Systems Research and Behavioural Science*, 19 Series, 465 & 466, 2002, pp.199-209 & 551-562, respectively
- Peter Sosa and Matthias Steup (ed.), *Contemporary Debates in Epistemology*, 2005
- Jacque Barzun and Henry F. Graff, *The Modern Researcher*. London, 1970
- Wayne C. Booth et.al. *The Craft of Research*. University of Chicago Press, 2008

Unit II

- a. Philosophy of Science and Technology
- b. Science and its Objects of Analysis that are Ontologically and Epistemologically Objective – Epistemology of Science – Proofs and Refutations – Construction of Scientific Facts
- c. Structure of Scientific Knowledge: Karl Popper's Properties of science – Flexible Proof – Concept of Falsification – Thomas Kuhn and the Concept of Normal Science – Three Poci of Normal Science – Kuhn's notion of a scientific "paradigm" – Paradigm Shift and Crisis of Scientific Knowledge Production – Science as the non-cumulative – Rejection of the Popperian Falsification

Readings

- Hempel, C. *Philosophy of Natural Science*. Englewood Cliffs, N. J.: Prentice Hall, 1966.
- Burt, E.A. *The Metaphysical Foundations of Modern Science*. London, 2003
- Kuhn, T. S. *The structure of scientific revolutions* (2nd ed.) Chicago: University of Chicago Press, 1970.
- Kuhn, T.S. *The Essential Tension: Selected Studies in Scientific Tradition and Change*. Chicago and London: University of Chicago Press, 1977.
- Feyerabend, P. *Against Method: Outline of an Anarchistic Theory of Knowledge*. London, 1975
- Gilbert, G. N. & Mulkay, M. *Opening Pandora's box: A sociological analysis of scientists' discourse*. Cambridge: Cambridge University Press, 1984
- Pickering, A. *Constructing Quarks: A sociological history of particle physics*. Chicago: University of Chicago Press, 1984
- Mulkay, M. *Science and the Sociology of Knowledge*, 1985:1-26.
- Collins, H.M. *Changing order: Replication and induction in scientific practice*. London: Sage, 1985
- Latour, B. & Woolgar, S. *Laboratory Life: The Construction of Scientific Facts*. 2nd Edition. Princeton: Princeton University Press, 1986
- Latour, B. *Science in Action: How to Follow Scientists and Engineers through Society*. Harvard University Press, 1987.

- Callon M. "Four Models for the Dynamics of Science". in Jasanoff et al. (eds.) *Handbook of Science and Technology Studies*. 1995:29-63.
- Feyerabend, P. *Against Method: Outline of an Anarchistic Theory of Knowledge*. London: New Left Books, 1974.
- Chalmers, A.F. *Science and Its Fabrication*. Open University Press, Buckingham, rpt. 1990
- Chalmers, A.F. *What is this Thing Called Science ?*. Open University Press, Buckingham, rpt. 1994
- Feyerabend, P. *For and Against Method: Including Lakatos's Lectures on Scientific Method and the Lakatos-Feyerabend Correspondence with Imre Lakatos*. London, 1999
- Joseph Margolis, *Science without Unity: Reconciling the Human and Natural Sciences*. Basil Blackwell, London, 2010

Unit III

- a. Science as Knowledge of Finality – Newtonian Foundation – Hegemony of Science
- b. New Science and Theories of Complexity – Gellman and Heisenberg – Predictability and Objectivity Revisited
- c. Science and Ideology – Feyerabend and his thesis 'Against Method'
- d. Emerging New Epistemologies: Gender Studies and Environmental Studies – Knowledge as Discourse – Ungendered Knowledge – Science and Gender – Technology and Gender – The Green Science
- e. Epistemological collapse of disciplinary Approach – Interdisciplinary Approach as Convergence Research

Readings

- McCarthy E. D. "Engendered Knowledge." *Knowledge as Culture*. 1996: 85-105.
- Haraway D., "Situated Knowledge: The Science Question in Feminism and the Privilege of Partial Perspective" in *Simians, Cyborgs, and Women: The Reinvention of Nature*. 1991: 183-202.
- Wajcman, J. "Feminist Theories of Technology". in Jasanoff et. al. *Handbook of Science and Technology Studies*. 1995:189-204.
- Keller E. F., "The Origin, and Politics of the Subject Called 'Gender and Science'". in *Handbook for Science and Technology Studies*. 1995.
- Martin E., "Body Narratives, Body Boundaries". in Grossberg (ed.) *Cultural Studies*. Pp. 409-423.
- Fox M. F., "Women and Scientific Careers". in *Handbook for Science and Technology Studies*. 1995: 205-224.
- Haraway D., "Teddy Bear Patriarchy". in *Primate Visions*. Routledge. London. 1989.
- Joseph Margolis, *Pragmatism without Foundations: Reconciling Realism and Relativism*. Basil Blackwell. London, 2010