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"Mathematics and Statistics" redirects here; not to be confused with Mathematical statistics, Mathematics, or Statistics.

Formal science is a branch of science studying disciplines concerned with abstract structures described by formal systems, such as logic, mathematics, statistics, theoretical computer science, artificial intelligence, information theory, game theory, systems theory, decision theory and theoretical linguistics. Whereas the natural sciences and social sciences seek to characterize physical systems and social systems, respectively, using theoretical and empirical methods, the formal sciences use language tools concerned with characterizing abstract structures described by formal systems and the deductions that can be made from them. The formal sciences aid the natural and social sciences by providing information about the structures used to describe the physical world, and what inferences may be made about them. [1]

Branches [edit]

- 1. Logic (also a branch of philosophy)
- 2. Mathematics
- 3. Statistics
- 4. Systems science
- 5. Data science
- 6. Information theory
- 7. Computer science
- 8. Cryptography

Differences from other sciences [edit]

One reason why mathematics enjoys special esteem, above all other sciences, is that its laws are absolutely certain and indisputable, while those of other sciences are to some extent debatable and in constant danger of being overthrown by newly discovered facts.

—Albert Einstein^[2]

Because of their non-empirical nature, formal sciences are construed by outlining a set of axioms and definitions from which other statements (theorems) are deduced. For this reason, in Rudolf Carnap's logical-positivist conception of the epistemology of science, theories belonging to formal sciences are understood to contain no synthetic statements, instead containing only analytic statements.^{[3][4]}

See also [edit]

- Philosophy Study of general and fundamental questions
- Science Systematic endeavour to gain knowledge
- Rationalism Epistemological view centered on reason
- Abstract structure Type of abstraction in science, mathematics, and philosophy
- Abstraction in mathematics Process of extracting the underlying essence of a mathematical concept
- Abstraction in computer science Technique for arranging complexity of computer systems
 Cognitive science Interdisciplinary scientific study of cognitive processes
- Formalism (philosophy of mathematics) View that mathematics does not necessarily represent reality, but is more akin to a
 game
- Formal grammar Structure of a formal language
- Formal language Sequence of words formed by specific rules
- Formal methods Mathematical program specifications
- Formal system Mathematical model for deduction or proof systems
 Form and content Distinct aspects of a work of art
- Mathematical model Description of a system using mathematical concepts and language
 Mathematical sciences Group of areas of study that are primarily mathematical
- Mathematics Subject Classification Classification scheme for mathematics
- Semiotics Study of signs and sign processes
- Theory of forms Philosophical theory attributed to Plato

References [edit]

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- 3. ^ Carnap, Rudolf (1938). "Logical Foundations of the Unity of Science". *International Encyclopaedia of Unified Science*. Vol. I. Chicago: University of Chicago Press.
- 4. ^ Thompson, Bill (2007), "2.4 Formal Science and Applied Mathematics", *The Nature of Statistical Evidence*, Lecture Notes in Statistics, vol. 189 (1st ed.), Springer, p. 15

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External links [edit]

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- $\bullet \ \ \text{Interdisciplinary conferences} \textit{Foundations of the Formal Sciences} \ \ \underline{\square}$

Categories: Formal sciences | Branches of science



