Statistical Principles and Techniques in Scientific and Social Research

Wojtek J. Krzanowski, Exeter University

This text provides a clear discussion of the basic statistical concepts and methods frequently encountered in statistical research. Assuming only a basic level of Mathematics, and with numerous examples and illustrations, this text is a valuable resource for students and researchers in the Sciences and Social Sciences.

June 2007 | 256 pages

978-0-19-921309-2, PAPERBACK £34.95/$70.00
978-0-19-921310-8, HARDBACK £70.00/$140.00

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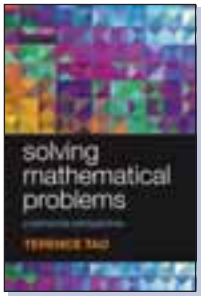
A Personal Perspective



Terence Tao, UCLA, Los Angeles

'There are a handful of really wonderful books that can introduce a young high-school student to the beauty of mathematics. This is definitely one of them. Besides, this book is probably going to be known as the first book written by one of the best mathematicians of the twenty-first century.'

Mihaela Poplicher, MAA Reviews

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The Conceptual Foundations of Gauge Theories

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Richard Healey presents a ground-breaking study of an area of physics not previously explored by philosophy: gauge theory. Gauge theories have provided our most successful representations of the fundamental forces of nature. But how do such representations work? Healey presents a critical examination of the interpretations of gauge theory that aim to answer this question, and defends a distinctive thesis which gives us reason to believe that loops rather than points are the locations of fundamental properties.

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Charles S. Chihara, Department of Philosophy, University of California, Berkeley

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May 2007 | 400 pages

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February 2007 | 200 pages

978-0-19-920431-1, PAPERBACK £16.99/$29.95

Visual Thinking in Mathematics

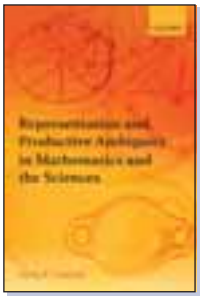
Marcus Giaquinto, University College London

Marcus Giaquinto presents an investigation into the different kinds of visual thinking involved in mathematical thought, with chapters on basic geometry, arithmetic, algebra, and more advanced mathematics. He argues that the use of mental images and physical diagrams is rarely just a superfluous aid: it is often a means of discovery, understanding, and even proof. Drawing on work in cognitive psychology, philosophy, and mathematics, this book will appeal to anyone with an interest in mathematical thinking.

July 2007 | 304 pages

978-0-19-928594-5, HARDBACK £40.00/$72.00

Representation and Productive Ambiguity in Mathematics and the Sciences



Emily R. Grosholz, The Pennsylvania State University

Emily Grosholz offers an original investigation of demonstration in mathematics and science, examining how it works and why it is persuasive. Focusing on geometrical demonstration, she shows the roles that representation and ambiguity play in mathematical discovery. She presents a wide range of case studies in mechanics, topology, algebra, logic, and chemistry, from ancient Greece to the present day, but focusing particularly on the seventeenth and twentieth centuries. Anyone interested in how mathematics works will find this a stimulating read.

August 2007 | 332 pages

978-0-19-929973-7, HARDBACK £45.00/$63.00

OXFORD TEXTS IN LOGIC

Mathematical Logic

Ian Chiswell and **Wilfrid Hodges**, both at Queen Mary, University of London

Assuming no previous study in logic, this informal yet rigorous text covers the material of a standard undergraduate first course in mathematical logic, using natural deduction and leading up to the completeness theorem for first-order logic. At each stage of the text, the reader is given an intuition based on standard mathematical practice, which is subsequently developed with clean formal mathematics. Alongside the practical examples, readers learn what can and can't be calculated; for example the correctness of a derivation proving a given sequent can be tested mechanically, but there is no general mechanical test for the existence of a derivation proving the given sequent. The undecidability results are proved rigorously in an optional final chapter, assuming Matiyasevich's theorem characterising the computably enumerable relations. Rigorous proofs of the adequacy and completeness proofs of the relevant logics are provided, with careful attention to the languages involved. Optional sections discuss the classification of mathematical structures by first-order theories; the required theory of cardinality is developed from scratch. Throughout the book there are notes on historical aspects of the material, and connections with linguistics and computer science, and the discussion of syntax and semantics is influenced by modern linguistic approaches. Two basic themes in recent cognitive science studies of actual human reasoning are also introduced. Including extensive exercises and selected solutions, this text is ideal for students in Logic, Mathematics, Philosophy, and Computer Science.

Oxford Texts in Logic No. 3

May 2007 | 264 pages

978-0-19-921562-1, PAPERBACK £29.50/$59.00
978-0-19-857100-1, HARDBACK £75.00/$150.00

A First Course in Logic

An Introduction to Model Theory, Proof Theory, Computability, and Complexity

Shawn Hedman, Department of Mathematics, Florida Southern College

Based on the author's teaching notes, this comprehensive text covers the basics of classical logic, including propositional logic, first-order logic, and second-order logic, as well as proof theory, computability theory, and model theory. Extremely clear, thorough and accurate, this text is ideal for a first or refresher course.

Oxford Texts in Logic No. 1

2004, 451 pages

978-0-19-852981-1, PAPERBACK £33.00/$70.95
978-0-19-852980-4, HARDBACK £97.00/$175.45

Proof and Disproof in Formal Logic

An Introduction for Programmers

Richard Bornat, School of Computing Science, Middlesex University

Proof and Disproof in Formal Logic is a lively and entertaining introduction to formal logic providing an excellent insight into how a simple logic works. This book concentrates on using logic as a tool: making and using formal proofs and disproofs of particular logical claims. The logic it uses—natural deduction—is very simple and shows how large mathematical universes can be built on small foundations. Aimed at undergraduates and graduates in computer science, logic, mathematics, and philosophy, the text includes reference to and exercises based on the computer software package Jape, an interactive teaching and research tool designed and hosted by the author that is freely available on the web.

Oxford Texts in Logic No. 2

2005, 264 pages, numerous line drawings and mathematical examples

978-0-19-853027-5, PAPERBACK £36.00/$74.00
978-0-19-853026-8, HARDBACK £87.00/$149.50

Introduction to Category Theory

Steve Awodey, Carnegie Mellon University

Category theory has established itself as a subject about which every pure mathematician, and a large proportion of computer scientists, need to know the basic ideas and how to use them. Containing numerous exercises, examples and diagrams, *Introduction to Category Theory* acts as a textbook and reference for students and researchers students in mathematics, computer science, logic, and cognitive science. It makes the basic definitions, theorems, and proof techniques understandable to

Oxford Texts in Logic No. 4

June 2008 | 350 pages

978-0-19-923718-0, PAPERBACK £30.00/$60.00

Identity and Modality

Edited by **Fraser MacBride**, Birkbeck College, University of London

'the volume . . . is of high quality and contains important contributions to many areas of contemporary metaphysics'
Matti Eklund, Notre Dame Philosophical Review

'all in all, this is an impressive volume, of significant interest to anyone who wants to stay abreast of developments in contemporary metaphysics'
Matti Eklund, Notre Dame Philosophical Review

The eleven new papers in this volume address fundamental and interrelated philosophical issues concerning modality and identity, issues that were pivotal to the development of analytic philosophy in the twentieth century, and remain a key focus of debate in the twenty-first. *Identity and Modality* brings together leading researchers in metaphysics, the philosophy of mind, the philosophy of science, and the philosophy of mathematics.

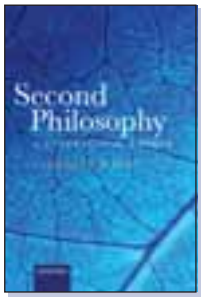
Mind Association Occasional Series

2006 | 288 pages

978-0-19-928574-7, HARDBACK £35.00/$74.00

Second Philosophy

A Naturalistic Method



Penelope Maddy, University of California, Irvine

Many philosophers these days consider themselves naturalists, but it's doubtful any two of them intend the same position by the term. Here Penelope Maddy proposes a particularly austere form of naturalism called 'Second Philosophy'. Using the persona of an idealized inquirer—the 'Second Philosopher'—she constructs a properly second-philosophical line of thought which she then practises in reflections on the ground of logical truth, the methodology, ontology and epistemology of mathematics, and the general prospects for metaphysics naturalized.

April 2007 | 460 pages

978-0-19-927366-9, HARDBACK £40.00/$65.00

The Structural Foundations of Quantum Gravity

Edited by **Dean Rickles**, University of Calgary, Canada, **Steven French**, University of Leeds, and **Juha T. Saatsi**, University of Manchester

What is spacetime? General relativity and quantum field theory answer this question in very different ways. This collection of essays by physicists and philosophers looks at the problem of uniting these two most fundamental theories of our world, focusing on the nature of space and time within this new quantum framework, and the kind of metaphysical picture suggested by recent developments in physics and mathematics. This is a book that will inspire further philosophical reflection on recent advances in modern physics.

2006 | 288 pages

978-0-19-926969-3, HARDBACK £45.00/$85.00

NEW IN PAPERBACK

The Law of Non-Contradiction

New Philosophical Essays

Edited by **Graham Priest**, Departments of Philosophy, Universities of Melbourne and St Andrews, **JC Beall**, Department of Philosophy, University of Connecticut, and **Bradley Armour-Garb**, Department of Philosophy, University at Albany, SUNY

The Law of Non-Contradiction—that no contradiction can be true—has been a seemingly unassailable dogma since the work of Aristotle. It is an assumption challenged from a variety of angles in this collection of original papers. Twenty-three of the world's leading experts investigate the 'law', considering arguments for and against it and discuss methodological issues that arise. The result is a balanced inquiry into a venerable principle of logic, one that raises questions at the very centre of logic itself.

2006 | 400 pages

978-0-19-920419-9, PAPERBACK £19.99/$35.00

Bayesian Nets and Causality: Philosophical and Computational Foundations

Jon Williamson, Department of Philosophy, Logic and Scientific Method, London School of Economics, London

'*Bayesian Nets and Causality* is a very well-written and well-organized book ... No doubt it will be recognized as a very important contribution to the philosophy of probability and causality by a young distinguished philosopher.'

Sungho Choi, Mind

Bayesian nets are widely used in artificial intelligence as a calculus for causal reasoning, enabling machines to make predictions, perform diagnoses, take decisions and even to discover causal relationships. This book, aimed at researchers and graduate students in computer science, mathematics and philosophy, brings together two important research topics: how to automate reasoning in artificial intelligence, and the nature of causality and probability in philosophy.

2004 | 250 pages | numerous figures

978-0-19-853079-4, HARDBACK £48.00/$98.45

Absolute Generality

Edited by **Agustín Rayo**, Massachusetts Institute of Technology (MIT), and **Gabriel Uzquiano**, The Ohio State University

The problem of absolute generality has attracted much attention in recent philosophy. Agustin Rayo and Gabriel Uzquiano have assembled a distinguished team of contributors to write new essays on the topic. They investigate the question of whether it is possible to attain absolute generality in thought and language and the ramifications of this question in the philosophy of logic and mathematics.

2006 | 408 pages

978-0-19-927643-1, PAPERBACK £25.00/$45.00
978-0-19-927642-4, HARDBACK £55.00/$99.00

NEW IN PAPERBACK

Towards Non-Being

The Logic and Metaphysics of Intentionality

Graham Priest, Universities of Melbourne and St Andrews

Graham Priest presents a ground-breaking account of the semantics of intentional language - verbs such as 'believes', 'fears', 'seeks', or 'imagines'. *Towards Non-Being* proceeds in terms of objects that may be either existent or non-existent, at worlds that may be either possible or impossible. The book will be of central interest to anyone who is concerned with intentionality in the philosophy of mind or philosophy of language, the metaphysics of existence and identity, the philosophy of fiction, the philosophy of mathematics, or cognitive representation in AI.

October 2007 | 206 pages

978-0-19-923055-6, PAPERBACK £16.99/$30.00
978-0-19-926254-0, HARDBACK £35.00/$55.00

Extending Ourselves

Computational Science, Empiricism, and Scientific Method

Paul Humphreys, Department of Philosophy, University of Virginia

Extending Ourselves contains the first systematic philosophical account of new computer methods for empirical scientific research, and how they require a different approach to scientific method. Paul Humphreys draws a parallel between the ways in which such computational methods have enhanced our abilities to mathematically model the world, and the more familiar ways in which scientific instruments have expanded our access to the empirical world.

April 2007 | 256 pages

978-0-19-531329-1, PAPERBACK £14.99/$24.95

Mathematical Knowledge

Edited by **Mary Leng**, University of Liverpool, **Alexander Paseau**, University of Oxford, and **Michael Potter**, University of Cambridge

What is the nature of mathematical knowledge? Is it anything like scientific knowledge or is it sui generis? How do we acquire it? Should we believe what mathematicians themselves tell us about it? Are mathematical concepts innate or acquired? Eight new essays offer answers to these and many other questions. Written by some of the world's leading philosophers of mathematics, psychologists, and mathematicians, *Mathematical Knowledge* gives a lively sense of the current state of debate in this fascinating field.

November 2007 | 236 pages

978-0-19-922824-9, HARDBACK £30.00/$54.00

The Oxford Handbook of Philosophy of Mathematics and Logic

Edited by **Stewart Shapiro**, Ohio State University

Mathematics and logic have been central topics of concern since the dawn of philosophy. Since logic is the study of correct reasoning, it is a fundamental branch of epistemology and a priority in any philosophical system. Philosophers have focused on mathematics as a case study for general philosophical issues and for its role in overall knowledge- gathering. Today, philosophy of mathematics and logic remain central disciplines in contemporary philosophy, as evidenced by the regular appearance of articles on these topics in the best mainstream philosophical journals; in fact, the last decade has seen an explosion of scholarly work in these areas.

This volume covers these disciplines in a comprehensive and accessible manner, giving the reader an overview of the major problems, positions, and battle lines. The 26 contributed chapters are by established experts in the field, and their articles contain both exposition and criticism as well as substantial development of their own positions. The essays, which are substantially self-contained, serve both to introduce the reader to the subject and to engage in it at its frontiers. Certain major positions are represented by two chapters—one supportive and one critical.

The Oxford Handbook of Philosophy of Math and Logic is a ground-breaking reference like no other in its field. It is a central resource to those wishing to learn about the philosophy of mathematics and the philosophy of logic, or some aspect thereof, and to those who actively engage in the discipline, from advanced undergraduates to professional philosophers, mathematicians, and historians.

Oxford Handbooks

June 2007 | 832 pages

978-0-19-532592-8, PAPERBACK £23.99/$39.95

OXFORD LOGIC GUIDES

From Sets and Types to Topology and Analysis

Towards Practicable Foundations for Constructive Mathematics

Laura Crosilla, Universite di Firenze, and **Peter Schuster**, Mathematical Institut, Universitaet Munich

This edited collection bridges the foundations and practice of constructive mathematics. Aimed at academic logicians, mathematicians, philosophers and computer scientists. Including, with contributions from leading researchers, it is up-to-date, highly topical and broad in scope.

Oxford Logic Guides No. 48

2005 | 376 pages

978-0-19-856651-9, HARDBACK £83.00/$149.50

NEW EDITION

Set Theory

Boolean-Valued Models and Independence Proofs

THIRD EDITION

John L. Bell, Professor of Philosophy, University of Western Ontario

This monograph is a follow up to the author's classic text *Boolean-Valued Models* and *Independence Proofs in Set Theory*, providing an exposition of some of the most important results in set theory obtained in the 20th century—the independence of the continuum hypothesis and the axiom of choice.

Oxford Logic Guides No. 47

2005 | 216 pages

978-0-19-856852-0, HARDBACK £80.00/$164.50

The Structure of Models of Peano Arithmetic

Roman Kossak, City University of New York, and **James Schmerl**, University of Connecticut, Storrs

Aimed at graduate students, research logicians and mathematicians, this much-awaited text covers over 40 years of work on relative classification theory for nonstandard models of arithmetic. The book covers basic isomorphism invariants: families of type realized in a model, lattices of elementary substructures and automorphism groups.

Oxford Logic Guides No. 50

2006 | 328 pages

978-0-19-856827-8, HARDBACK £53.00/$98.50

Interpolation and Definability

Modal and Intuitionistic Logics

Dov M. Gabbay, Department of Computer Science, King's College London, and **Larisa Maksimova**, Institute of Mathematics, Siberian Branch of Russian Academy of Science, Novosibirsk, Russia

This monograph is on interpolation and definability, a notion central in pure logic and with significant meaning and applicability in all areas where logic is applied, especially computer science, artificial intelligence, logic programming, philosophy of science and natural language.

Oxford Logic Guides No. 46

2005 | 522 pages

978-0-19-851174-8, HARDBACK £92.00/$189.50

Reductive Logic and Proof-search

Proof Theory, Semantics, and Control

David J. Pym, University of Bath and Royal Society Industry Fellow, Hewlett-Packard Laboratories, Bristol, and **Eike Ritter**, Lecturer in Computer Science, University of Birmingham

This book is a specialized monograph on the development of the mathematical and computational metatheory of reductive logic and proof-search, including proof-theoretic, semantic/model-theoretic and algorithmic aspects. The scope ranges from the conceptual background to reductive logic, through its mathematical metatheory, to its modern applications in the computational sciences.

Oxford Logic Guides No. 45

2004 | 226 pages

978-0-19-852633-9, HARDBACK £75.00/$159.50