An Introduction To Description Logic

Logic is often perceived as having little to do with the rest of philosophy, and even less to do with real life. Graham Priest explores the philosophical roots of the subject, explaining how modern formal logic addresses many issues.

A textbook on modal logic, intended for readers already acquainted with the elements of formal logic, containing nearly 500 exercises. Brian F. Chellas provides a systematic introduction to the principal ideas and results in contemporary treatments of modality, including theorems on completeness and decidability. Illustrative chapters focus on deontic logic and conditionality. Modality is a rapidly expanding branch of logic, and familiarity with the subject is now regarded as a necessary part of every philosopher's technical equipment. Chellas here offers an up-to-date and reliable guide essential for the student.

These are exciting times in the fields of Fuzzy Logic and the Semantic Web, and this book will add to the excitement, as it is the first volume to focus on the growing connections between these two fields. This book is expected to be a valuable aid to anyone considering the application of Fuzzy Logic to the Semantic Web, because it contains a number of detailed accounts of these combined fields, written by leading authors in several countries. The Fuzzy

Logic field has been maturing for forty years. These years have witnessed a tremendous growth in the number and variety of applications, with a real-world impact across a wide variety of domains with humanlike behavior and reasoning. And we believe that in the coming years, the Semantic Web will be major field of applications of Fuzzy Logic. This book, the first in the new series Capturing Intelligence, shows the positive role Fuzzy Logic, and more generally Soft Computing, can play in the development of the Semantic Web, filling a gap and facing a new challenge. It covers concepts, tools, techniques and applications exhibiting the usefulness, and the necessity, for using Fuzzy Logic in the Semantic Web. It finally opens the road to new systems with a high Web IQ. Most of today's Web content is suitable for human consumption. The Semantic Web is presented as an extension of the current web in which information is given well-defined meaning, better enabling computers and people to work in cooperation. For example, within the Semantic Web, computers will understand the meaning of semantic data on a web page by following links to specified ontologies. But while the Semantic Web vision and research attracts attention, as long as it will be used two-valued-based logical methods no progress will be expected in handling ill-structured, uncertain or imprecise information encountered in real world knowledge. Fuzzy Logic

and associated concepts and techniques (more generally, Soft Computing), has certainly a positive role to play in the development of the Semantic Web. Fuzzy Logic will not supposed to be the basis for the Semantic Web but its related concepts and techniques will certainly reinforce the systems classically developed within W3C. In fact, Fuzzy Logic cannot be ignored in order to bridge the gap between human-understandable soft logic and machine-readable hard logic. None of the usual logical requirements can be guaranteed: there is no centrally defined format for data, no guarantee of truth for assertions made, no guarantee of consistency. To support these arguments, this book shows how components of the Semantic Web (like XML, RDF, Description Logics, Conceptual Graphs, Ontologies) can be covered, with in each case a Fuzzy Logic focus. First volume to focus on the growing connections between Fuzzy Logic and the Semantic Web Keynote chapter by Lotfi Zadeh The Semantic Web is presently expected to be a major field of applications of Fuzzy Logic It fills a gap and faces a new challenge in the development of the Semantic Web It opens the road to new systems with a high Web IQ Contributed chapters by Fuzzy Logic leading experts

Introductory logic is generally taught as a straightforward technical discipline. In this book, John MacFarlane helps the reader think about the

limitations of, presuppositions of, and alternatives to classical first-order predicate logic, making this an ideal introduction to philosophical logic for any student who already has completed an introductory logic course. The book explores the following questions. Are there quantificational idioms that cannot be expressed with the familiar universal and existential quantifiers? How can logic be extended to capture modal notions like necessity and obligation? Does the material conditional adequately capture the meaning of 'if'—and if not, what are the alternatives? Should logical consequence be understood in terms of models or in terms of proofs? Can one intelligibly question the validity of basic logical principles like Modus Ponens or Double Negation Elimination? Is the fact that classical logic validates the inference from a contradiction to anything a flaw, and if so, how can logic be modified to repair it? How, exactly, is logic related to reasoning? Must classical logic be revised in order to be applied to vague language, and if so how? Each chapter is organized around suggested readings and includes exercises designed to deepen the reader's understanding. Key Features: An integrated treatment of the technical and philosophical issues comprising philosophical logic Designed to serve students taking only one course in logic beyond the introductory level Provides tools and concepts necessary to understand work in many areas of analytic philosophy Includes exercises,

suggested readings, and suggestions for further exploration in each chapter

An Introduction to Ontology Engineering introduces the student to a comprehensive overview of ontology engineering, and offers hands-on experience that illustrate the theory. The topics covered include: logic foundations for ontologies with languages and automated reasoning, developing good ontologies with methods and methodologies, the top-down approach with foundational ontologies, and the bottomup approach to extract content from legacy material, and a selection of advanced topics that includes Ontology-Based Data Access, the interaction between ontologies and natural languages, and advanced modelling with fuzzy and temporal ontologies. Each chapter contains review questions and exercises, and descriptions of two group assignments are provided as well. The textbook is aimed at advanced undergraduate/postgraduate level in computer science and could fi t a semester course in ontology engineering or a 2-week intensive course. Domain experts and philosophers may fi nd a subset of the chapters of interest, or work through the chapters in a different order. Maria Keet is an Associate Professor with the Department of Computer Science, University of Cape Town, South Africa. She received her PhD in Computer Science in 2008 at the KRDB Research Centre, Free University of Bozen-Bolzano,

Italy. Her research focus is on knowledge engineering with ontologies and Ontology, and their interaction with natural language and conceptual data modelling, which has resulted in over 100 peer-reviewed publications. She has developed and taught multiple courses on ontology engineering and related courses at various universities since 2009.

The methods of logic are essential to an understanding of philosophy and are crucial in the study of mathematics, computing, linguistics and many other subjects. Introducing the major concepts and techniques involved in the study of logic, this authoritative book explores both formal and philosophical logic, and the ways in which we can achieve good reasoning. Individual chapters include: * Propositions and Arguments * Truth Tables * Trees * Conditionality * Natural Deduction * Predicates, Names and Quantifiers * Definite Descriptions. This exceptionally clear introduction to the subject is ideally suited to students taking introductory courses in logic.

The name "temporal logic" may sound complex and daunting; but while they describe potentially complex scenarios, temporal logics are often based on a few simple, and fundamental, concepts - highlighted in this book. An Introduction to Practical Formal Methods Using Temporal Logic provides an introduction to formal methods based on temporal logic, for developing and testing complex

computational systems. These methods are supported by many well-developed tools, techniques and results that can be applied to a wide range of systems. Fisher begins with a full introduction to the subject, covering the basics of temporal logic and using a variety of examples, exercises and pointers to more advanced work to help clarify and illustrate the topics discussed. He goes on to describe how this logic can be used to specify a variety of computational systems, looking at issues of linking specifications, concurrency, communication and composition ability. He then analyses temporal specification techniques such as deductive verification, algorithmic verification, and direct execution to develop and verify computational systems. The final chapter on case studies analyses the potential problems that can occur in a range of engineering applications in the areas of robotics, railway signalling, hardware design, ubiquitous computing, intelligent agents, and information security, and explains how temporal logic can improve their accuracy and reliability. Models temporal notions and uses them to analyze computational systems Provides a broad approach to temporal logic across many formal methods - including specification, verification and implementation Introduces and explains freely available tools based on temporal logics and shows how these can be applied Presents exercises and

pointers to further study in each chapter, as well as an accompanying website providing links to additional systems based upon temporal logic as well as additional material related to the book.

The Snake and the Fox is a highly imaginative and fun way to learn logic. Mary Haight's characters guide you through an elaborate tale of how logic works. This book features the Snake and the Fox, Granny, Gussie and the Newts, Ren^De Descartes and Miss Nightingale, along with a huge supporting cast of humans, devils and sausage machines. For anyone coming to logic for the first time, this is the best place to start. Mary Haight makes logic easy and fun - she asks the reader questions, and uses words instead of logic symbols with amusing pictures and characters to help them. This book teaches all the basics the reader needs to know about logic (how arguments work, sound, valid reasoning, truth tables, Venn diagrams etc) in a truly enjoyable and innovative way. Anyone teaching themselves logic, or learning it on a course is bound to benefit from this original and intriguing book.

A Mathematical Introduction to Logic, Second Edition, offers increased flexibility with topic coverage, allowing for choice in how to utilize the textbook in a course. The author has made this edition more accessible to better meet the needs of today's undergraduate mathematics and philosophy students. It is intended for the reader who has not

studied logic previously, but who has some experience in mathematical reasoning. Material is presented on computer science issues such as computational complexity and database queries, with additional coverage of introductory material such as sets. * Increased flexibility of the text, allowing instructors more choice in how they use the textbook in courses. * Reduced mathematical rigour to fit the needs of undergraduate students

Answer set programming (ASP) is a programming methodology oriented towards combinatorial search problems. In such a problem, the goal is to find a solution among a large but finite number of possibilities. The idea of ASP came from research on artificial intelligence and computational logic. ASP is a form of declarative programming: an ASP program describes what is counted as a solution to the problem, but does not specify an algorithm for solving it. Search is performed by sophisticated software systems called answer set solvers. Combinatorial search problems often arise in science and technology, and ASP has found applications in diverse areas—in historical linguistic, in bioinformatics, in robotics, in space exploration, in oil and gas industry, and many others. The importance of this programming method was recognized by the Association for the Advancement of Artificial Intelligence in 2016, when AI Magazine published a special issue on answer set

programming. The book will introduce the reader to the theory and practice of ASP. It will describe the input language of the answer set solver CLINGO, which was designed at the University of Potsdam in Germany and is used today by ASP programmers in many countries. It will include numerous examples of ASP programs and present the mathematical theory that ASP is based on. There will be many exercises with complete solutions.

With more substantial funding from research organizations and industry, numerous large-scale applications, and recently developed technologies, the Semantic Web is quickly emerging as a well-recognized and important area of computer science. While Semantic Web technologies are still rapidly evolving, Foundations of Semantic Web Technologies focuses

"Forall x is an introduction to sentential logic and first-order predicate logic with identity, logical systems that significantly influenced twentieth-century analytic philosophy. After working through the material in this book, a student should be able to understand most quantified expressions that arise in their philosophical reading. This books treats symbolization, formal semantics, and proof theory for each language. The discussion of formal semantics is more direct than in many introductory texts. Although forall x does not contain proofs of soundness and completeness, it lays the

groundwork for understanding why these are things that need to be proven. Throughout the book, I have tried to highlight the choices involved in developing sentential and predicate logic. Students should realize that these two are not the only possible formal languages. In translating to a formal language, we simplify and profit in clarity. The simplification comes at a cost, and different formal languages are suited to translating different parts of natural language. The book is designed to provide a semester's worth of material for an introductory college course. It would be possible to use the book only for sentential logic, by skipping chapters 4-5 and parts of chapter 6"--Open Textbook Library.

An introductory 2001 textbook on probability and induction written by a foremost philosopher of science.

The vital resource for grading all assignments from the Introduction To Logic course, which includes:Instructional insights enhanced with worksheets and additional practice sheetsSpecial chapter reviews at the beginning of each new chapter worksheet created to help students and teachers grasp the scope of each section.OVERVIEW: Welcome to the world of logic. This logic course will both challenge and inspire students to be able to defend their faith against atheists and skeptics alike. Because learning logical terms and principles is often like learning a foreign

language, the course has been developed to help students of logic learn the practical understanding of logical arguments. To make the course content easier to grasp, the schedule provides worksheets and practice sheets to help students better recognize logical fallacies, as well as review weeks for the quizzes and the final. The practice sheets in the back of the book offer practical study for both the final exam and for actual arguments you might encounter online or in the media.FEATURES: The calendar provides daily sessions with clear objectives and worksheets, quizzes, and tests, all based on the readings from the course book. Designed for students with no prior training in logic, INTRODUCTION TO LOGIC AND CRITICAL THINKING offers an accessible treatment of logic that enhances understanding of reasoning in everyday life. The text begins with an introduction to arguments. After some linguistic preliminaries, the text presents a detailed analysis of inductive reasoning and associated fallacies. This order of presentation helps to motivate the use of formal methods in the subsequent sections on deductive logic and fallacies. Lively and straightforward prose assists students in gaining facility with the sometimes challenging concepts of logic. By combining a sensitive treatment of ordinary language arguments with a simple but rigorous exposition of basic principles of logic, the text develops students'

understanding of the relationships between logic and language, and strengthens their skills in critical thinking. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Table of contents

This is a compact mtroduction to some of the pnncipal tOpICS of mathematical logic . In the belief that beginners should be exposed to the most natural and easiest proofs, I have used free-swinging set-theoretic methods. The significance of a demand for constructive proofs can be evaluated only after a certain amount of experience with mathematical logic has been obtained. If we are to be expelled from "Cantor's paradise" (as nonconstructive set theory was called by Hilbert), at least we should know what we are missing. The major changes in this new edition are the following. (1) In Chapter 5, Effective Computability, Turing-computabIlity IS now the central notion, and diagrams (flow-charts) are used to construct Turing machines. There are also treatments of Markov algorithms, Herbrand-Godel-computability, register machines, and random access machines. Recursion theory is gone into a little more deeply, including the s-m-n theorem, the recursion theorem, and Rice's Theorem. (2) The proofs of the Incompleteness Theorems are now based upon the Diagonalization Lemma. Lob's Theorem and its connection with Godel's Second

Theorem are also studied. (3) In Chapter 2, Quantification Theory, Henkin's proof of the completeness theorem has been postponed until the reader has gained more experience in proof techniques. The exposition of the proof itself has been improved by breaking it down into smaller pieces and using the notion of a scapegoat theory. There is also an entirely new section on semantic trees.

Unified and self-contained introduction to term-rewriting; suited for students or professionals.

This revised and considerably expanded 2nd edition brings together a wide range of topics, including modal, tense, conditional, intuitionist, many-valued, paraconsistent, relevant, and fuzzy logics. Part 1, on propositional logic, is the old Introduction, but contains much new material. Part 2 is entirely new, and covers quantification and identity for all the logics in Part 1. The material is unified by the underlying theme of world semantics. All of the topics are explained clearly using devices such as tableau proofs, and their relation to current philosophical issues and debates are discussed. Students with a basic understanding of classical logic will find this book an invaluable introduction to an area that has become of central importance in both logic and philosophy. It will also interest people working in mathematics and computer science who wish to know about the area.

Possible worlds models were introduced by Saul Kripke in the early 1960s. Basically, a possible world's model is nothing but a graph with labelled nodes and labelled edges. Such graphs provide semantics for various modal logics (alethic, temporal, epistemic and doxastic, dynamic, deontic, description logics) and also turned out useful for other nonclassical logics (intuitionistic, conditional, several paraconsistent and relevant logics). All these logics have been studied intensively in philosophical and mathematical logic and in computer science, and have been applied increasingly in domains such as program semantics, artificial intelligence, and more recently in the semantic web. Additionally, all these logics were also studied proof theoretically. The proof systems for modal logics come in various styles: Hilbert style, natural deduction, sequents, and resolution. However, it is fair to say that the most uniform and most successful such systems are tableaux systems. Given logic and a formula, they allow one to check whether there is a model in that logic. This basically amounts to trying to build a model for the formula by building a tree. This book follows a more general approach by trying to build a graph, the advantage being that a graph is closer to a Kripke model than a tree. It provides a step-by-step introduction to possible worlds semantics (and by that to modal and other nonclassical logics) via the tableaux method. It is accompanied by a piece of

software called LoTREC (www.irit.fr/Lotrec). LoTREC allows to check whether a given formula is true at a given world of a given model and to check whether a given formula is satisfiable in a given logic. The latter can be done immediately if the tableau system for that logic has already been implemented in LoTREC. If this is not yet the case LoTREC offers the possibility to implement a tableau system in a relatively easy way via a simple, graph-based, interactive language.

Description logics (DLs) have a long tradition in computer science and knowledge representation, being designed so that domain knowledge can be described and so that computers can reason about this knowledge. DLs have recently gained increased importance since they form the logical basis of widely used ontology languages, in particular the web ontology language OWL. Written by four renowned experts, this is the first textbook on description logics. It is suitable for self-study by graduates and as the basis for a university course. Starting from a basic DL, the book introduces the reader to their syntax, semantics, reasoning problems and model theory and discusses the computational complexity of these reasoning problems and algorithms to solve them. It then explores a variety of reasoning techniques, knowledge-based applications and tools and it describes the relationship between DLs and OWL.

Introduction to Description LogicCambridge University Press

Famous classic has introduced countless readers to symbolic logic with its thorough and precise exposition. Starts with simple symbols and conventions and concludes with the Boole-Schroeder and Russell-Whitehead systems. No special knowledge of mathematics necessary. "One of the clearest and simplest introductions to a subject which is very much alive." — Mathematics Gazette.

"This book brings together researchers, scientists, and representatives from different communities to study, understand, and explore the theory, tools, and applications of the semantic Web. It joins the semantic Web, ontologies, knowledge management, Web services, and Web processes into one fully comprehensive resource, serving as the platform for exchange of both practical technologies and research"--Provided by publisher.

An Invitation to Formal Reasoning introduces the discipline of formal logic by means of a powerful new system formulated by Fred Sommers. This system, term logic, is different in a number of ways from the standard system employed in modern logic; most striking is its greater simplicity and naturalness. Based on a radically different theory of logical syntax than the one Frege used when initiating modern mathematical logic in the 19th Century, term logic borrows insights from Aristotle's

syllogistic, Scholastic logicians, Leibniz, and the 19th century British algebraists. Term logic takes its syntax directly from natural language, construing statements as combinations of pairs of terms, where complex terms are taken to have the same syntax as statements. Whereas standard logic requires extensive 'translation' from natural language to symbolic language, term logic requires only 'transcription' into the symbolic language. Its naturalness is the result of its ability to stay close to the forms of sentences usually found in every day discourse. Written by the founders of the term logic approach, An Invitation to Formal Reasoning is a unique introduction and exploration of this new system, offering numerous exercises and examples throughout the text. Summarising the standard system of mathematical logic to set term logic in context, and showing how the two systems compare, this book presents an alternative approach to standard modern logic for those studying formal logic, philosophy of language or computer theory. Fred Sommers is Professor Emeritus, Brandeis University, USA; George Englebretsen is Professor of Philosophy, Bishop's University, Canada.

Logic and Representation brings together a collection of essays, written over a period of ten years, that apply formal logic and the notion of explicit representation of knowledge to a variety of problems in artificial intelligence, natural language semantics and the philosophy of mind and language. Particular attention is paid to modelling and reasoning about knowledge and belief, including reasoning about one's own beliefs, and the semantics of sentences about knowledge and belief.

Robert C. Moore begins by exploring the role of logic in artificial intelligence, considering logic as an analytical tool, as a basis for reasoning systems, and as a programming language. He then looks at various logical analyses of propositional attitudes, including possible-world models, syntactic models, and models based on Russellian propositions. Next Moore examines autoepistemic logic, a logic for modelling reasoning about one's own beliefs. Rounding out the volume is a section on the semantics of natural language, including a survey of problems in semantic representation; a detailed study of the relations among events, situations, and adverbs; and a presentation of a unification-based approach to semantic interpretation. Robert C. Moore is principal scientist of the Artificial Intelligence Center of SRI International.

Modal logics, originally conceived in philosophy, have recently found many applications in computer science, artificial intelligence, the foundations of mathematics, linguistics and other disciplines. Celebrated for their good computational behaviour, modal logics are used as effective formalisms for talking about time, space, knowledge, beliefs, actions, obligations, provability, etc. However, the nice computational properties can drastically change if we combine some of these formalisms into a many-dimensional system, say, to reason about knowledge bases developing in time or moving objects. To study the computational behaviour of many-dimensional modal logics is the main aim of this book. On the one hand, it is concerned with providing a solid mathematical foundation for this discipline, while on

the other hand, it shows that many seemingly different applied many-dimensional systems (e.g., multi-agent systems, description logics with epistemic, temporal and dynamic operators, spatio-temporal logics, etc.) fit in perfectly with this theoretical framework, and so their computational behaviour can be analyzed using the developed machinery. We start with concrete examples of applied one- and many-dimensional modal logics such as temporal, epistemic, dynamic, description, spatial logics, and various combinations of these. Then we develop a mathematical theory for handling a spectrum of 'abstract' combinations of modal logics - fusions and products of modal logics, fragments of first-order modal and temporal logics - focusing on three major problems: decidability, axiomatizability, and computational complexity. Besides the standard methods of modal logic, the technical toolkit includes the method of quasimodels, mosaics, tilings, reductions to monadic second-order logic, algebraic logic techniques. Finally, we apply the developed machinery and obtained results to three case studies from the field of knowledge representation and reasoning: temporal epistemic logics for reasoning about multi-agent systems, modalized description logics for dynamic ontologies, and spatio-temporal logics. The genre of the book can be defined as a research monograph. It brings the reader to the front line of current research in the field by showing both recent achievements and directions of future investigations (in particular, multiple open problems). On the other hand, well-known results from modal and first-order logic are formulated without proofs and supplied

with references to accessible sources. The intended audience of this book is logicians as well as those researchers who use logic in computer science and artificial intelligence. More specific application areas are, e.g., knowledge representation and reasoning, in particular, terminological, temporal and spatial reasoning, or reasoning about agents. And we also believe that researchers from certain other disciplines, say, temporal and spatial databases or geographical information systems, will benefit from this book as well. Key Features: • Integrated approach to modern modal and temporal logics and their applications in artificial intelligence and computer science • Written by internationally leading researchers in the field of pure and applied logic • Combines mathematical theory of modal logic and applications in artificial intelligence and computer science • Numerous open problems for further research • Well illustrated with pictures and tables

The first introductory textbook on description logics, relevant to computer science, knowledge representation and the semantic web.

Logic: The Basics is an accessible introduction to several core areas of logic. The first part of the book features a self-contained introduction to the standard topics in classical logic, such as: · mathematical preliminaries · propositional logic · quantified logic (first monadic, then polyadic) · English and standard 'symbolic translations' · tableau procedures. Alongside comprehensive coverage of the standard topics, this thoroughly revised second edition also introduces several philosophically important nonclassical logics, free logics, and modal

logics, and gives the reader an idea of how they can take their knowledge further. With its wealth of exercises (solutions available in the encyclopedic online supplement), Logic: The Basics is a useful textbook for courses ranging from the introductory level to the early graduate level, and also as a reference for students and researchers in philosophical logic.

Introduction to Logic combines likely the broadest scope of any logic textbook available with clear, concise writing and interesting examples and arguments. Its key features, all retained in the Second Edition, include: • simpler ways to test arguments than those available in competing textbooks, including the star test for syllogisms • a wide scope of materials, making it suitable for introductory logic courses (as the primary text) or intermediate classes (as the primary or supplementary book) • engaging and easy-to-understand examples and arguments, drawn from everyday life as well as from the great philosophers • a suitability for self-study and for preparation for standardized tests, like the LSAT • a reasonable price (a third of the cost of many competitors) • exercises that correspond to the LogiCola program, which may be downloaded for free from the web. This Second Edition also: • arranges chapters in a more useful way for students, starting with the easiest material and then gradually increasing in difficulty • provides an even broader scope with new chapters on the history of logic, deviant logic, and the philosophy of logic • expands the section on informal fallacies • includes a more exhaustive index and a new appendix on suggested further readings • updates the LogiCola

instructional program, which is now more visually attractive as well as easier to download, install, update, and use.

Logical Forms examines the formal languages of classical first order logic and modal logic, and some alternatives and in each case takes as the central question: how can natural language best be formalized in this formal language? The approach involves close encounters with issues in the philosophy of logic and the philosophy of logic and the philosophy of language.

In this text, a variety of modal logics at the sentential, first-order, and second-order levels are developed with clarity, precision and philosophical insight. All of the S1-S5 modal logics of Lewis and Langford, among others, are constructed. A matrix, or many-valued semantics, for sentential modal logic is formalized, and an important result that no finite matrix can characterize any of the standard modal logics is proven. Exercises, some of which show independence results, help to develop logical skills. A separate sentential modal logic of logical necessity in logical atomism is also constructed and shown to be complete and decidable. On the first-order level of the logic of logical necessity, the modal thesis of anti-essentialism is valid and every de re sentence is provably equivalent to a de dicto sentence. An elegant extension of the standard sentential modal logics into several first-order modal logics is developed. Both a first-order modal logic for possibilism containing actualism as a proper part as well as a separate modal logic for actualism alone are constructed for a variety of modal systems. Exercises on this level show the

connections between modal laws and quantifier logic regarding generalization into, or out of, modal contexts and the conditions required for the necessity of identity and non-identity. Two types of second-order modal logics, one possibilist and the other actualist, are developed based on a distinction between existence-entailing concepts and concepts in general. The result is a deeper second-order analysis of possibilism and actualism as ontological frameworks. Exercises regarding second-order predicate quantifiers clarify the distinction between existence-entailing concepts and concepts in general. Modal Logic is ideally suited as a core text for graduate and undergraduate courses in modal logic, and as supplementary reading in courses on mathematical logic, formal ontology, and artificial intelligence.

Philosophy of logic is a fundamental part of philosophical study, and one which is increasingly recognized as being immensely important in relation to many issues in metaphysics, metametaphysics, epistemology, philosophy of mathematics, and philosophy of language. This textbook provides a comprehensive and accessible introduction to topics including the objectivity of logical inference rules and its relevance in discussions of epistemological relativism, the revived interest in logical pluralism, the question of logic's metaphysical neutrality, and the demarcation between logic and mathematics. Chapters in the book cover the state of the art in contemporary philosophy of logic, and allow students to understand the philosophical relevance of these debates without having to contend with complex technical arguments. This will be a major new resource for students working on logic, as well as for readers seeking a better understanding of

philosophy of logic in its wider context.

Ontological modelling today is applied in many areas of science and technology, including the Semantic Web. The W3C standard OWL defines one of the most important ontology languages based on the semantics of description logics. An alternative is to use rule languages in knowledge modelling, as proposed in the W3C's RIF standard. So far, it has often been unclear how to combine both technologies without sacrificing essential computational properties. This book explains this problem and presents new solutions that have recently been proposed. Extensive introductory chapters provide the necessary background for understanding the goals and challenges of this field, whereas advanced chapters discuss novel solutions in full detail. Enriched knowledge representation languages that are introduced include DL Rules, Horn description logics, and DL+safe Rules. In each of these cases, emphasis is put on finding a favourable trade-off between expressiveness and computational complexity. This naturally leads to the light-weight DL rule language ELP which illustrates that expressive ontological modelling and tractable inferencing can indeed go together. Comprehensive references for further reading are provided throughout the book.

"The Semantic Web is a new area of research and development in the field of computer science that aims to make it easier for computers to process the huge amount of information on the Web, and indeed other large databases, by enabling them not only to read, but also to understand the information. Based on successful courses taught by the authors, and liberally sprinkled with examples and exercises, this comprehensive textbook describes not only the theoretical issues underlying the Semantic Web, but alsoalgorithms, optimisation ideas and implementation details. The book will therefore be valuable to practitioners as

well as students, indeed to anyone who is interested in Internet technology, knowledge engineering or description logics. Supplementary materials available online include the source code of program examples and solutions to selected exercises"--

Handbook of Knowledge Representation describes the essential foundations of Knowledge Representation, which lies at the core of Artificial Intelligence (AI). The book provides an up-to-date review of twenty-five key topics in knowledge representation, written by the leaders of each field. It includes a tutorial background and cutting-edge developments, as well as applications of Knowledge Representation in a variety of AI systems. This handbook is organized into three parts. Part I deals with general methods in Knowledge Representation and reasoning and covers such topics as classical logic in Knowledge Representation; satisfiability solvers; description logics; constraint programming; conceptual graphs; nonmonotonic reasoning; model-based problem solving; and Bayesian networks. Part II focuses on classes of knowledge and specialized representations, with chapters on temporal representation and reasoning; spatial and physical reasoning; reasoning about knowledge and belief; temporal action logics; and nonmonotonic causal logic. Part III discusses Knowledge Representation in applications such as question answering; the semantic web; automated planning; cognitive robotics; multi-agent systems; and knowledge engineering. This book is an essential resource for graduate students, researchers, and practitioners in knowledge representation and AI. * Make your computer smarter * Handle qualitative and uncertain information * Improve computational tractability to solve your problems easily

Description Logics (DLs) is a family of formalisms used to represent knowledge of a domain. They are equipped with a formal logic-based semantics. Knowledge representation

systems based on description logics provide various inference capabilities that deduce implicit knowledge from the explicitly represented knowledge. A Proof Theory for Description Logics introduces Sequent Calculi and Natural Deduction for some DLs (ALC, ALCQ). Cut-elimination and Normalization are proved for the calculi. The author argues that such systems can improve the extraction of computational content from DLs proofs for explanation purposes.