Philosophy of Logic

An Annotated Bibliography

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The American Society
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Verification and
Renewal Curriculum

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The Verification and Renewal Curriculum (VRC)
written by Ibrahim Qureshi, Aaron Spevack, Justin Poe

The following is a reading list and annotated bibliography for a study of the philosophy and metaphysics of logic. Students are often trained in formal logic – whether classical or symbolic – and find themselves able to "work" with their studied system of reasoning without comprehending the philosophical foundations that ground each system of logic. This reading list is organized into four units, and each unit is ordered according to our recommended reading order. Some questions to ponder throughout a study of the philosophy of logic include:

- Which aspects of formal logic presume a certain metaphysical foundation, and which aspects of formal logic are metaphysical 'neutral'? Is it possible to have a system of formal reasoning absent of an underlying metaphysics?

- What were the key shifts in Western philosophy which led to the decline of traditional logic and the rise of modern logic? On what basis did these shifts occur? How is one to evaluate the rationality of these philosophical shifts if they involve commitments prior to logic? Can the crises that provoked the philosophical shifts to modernity be found dormant in Islamic logic too, or are those crises peculiarly Western?

- Where do classical Muslim logicians lie on spectrum between classical, Western logic and modern, symbolic logic with respect to philosophical commitments? Does the Muslim adaptation of a broadly Aristotelian logic through Avicenna imply that Muslim logicians belong in the camp of traditional logic? Are Muslim objections to and divergences from Avicenna substantial enough to constitute its own philosophy of logic that cannot be grouped with anything else? Was Muslim logicians' adoption of a modified Avicennian logic 'pragmatic' because it was the 'philosophy of the time' implying that Islamic logic is amenable to any and all philosophical currents (barring creedal concerns)?

Unit I: Classical, Western Logic

Classical, western logic refers to the metaphysical foundations of logic as formulated in Greek antiquity by Aristotle and later elaborated and modified in the medieval Latin West by the likes of Thomas Aquinas. Particular attention should be paid to the problematics that shape the tradition of classical logic (like what constitutes a science (i.e., certain knowledge), the hierarchy of religion and reason, and the nature of the soul's faculties in relation to reason) as well as to the doctrines that come under attack in modernity (such as the inductive method of concept formation, realism in the problem of universals).

General Readings
- Kreeft, Peter. *Socratic Logic: A Logic Text using Socratic Method, Platonic Questioning, and Aristotelian Principles*. 3.1st ed. South Bend: St. Augustine's Press, 2014.
  [See "The Two Logics", "Understanding: the Thing that Distinguishes Man from both Beast and Computer", "The Problem of Universals", "The Nature of Definition", "What is Truth?", "Existential Import", "What does Reason Mean?", "The Ultimate Foundations of the Syllogism", "The Four Causes", "The Skeptic's Objection to the Syllogism", "The Empiricist's Objection to the Syllogism", "Some Philosophical Applications of Logic"]

  > Somewhat acerbic in tone, Kreeft's work is a contemporary manual in classical logic arranged pedagogically. Presenting logic as the mental map behind everyday language, Kreeft will often dedicate a section in each chapter of his work to the philosophical foundations of formal logic. This presentation will be useful as a plain-language introduction to the arguments of classical logicians against modern logic.

- Oesterle, John A. *Logic: The Art of Defining and Reasoning*. 2nd ed. Upper Saddle, N.J.: Prentice-Hall, Inc, 1963.

  > A concise and terse textbook of classical logic based on Aristotle's *Organon* that also draws from its synthesis with the medieval, Catholic tradition. Students should compare the outline of this book with traditional *manṭiq* presentations. Oesterle emphasizes logic as an instrumental science (organon/*āla*) and how it can be used in theology, ethics, and metaphysics.

- Gilby, Thomas. *Barbara Celarent: A Description of Scholastic Dialectic*. London: Longmans, Green and Co., 1949.

  > This exposition of logic and dialectics comprises reflections on the worldview of scholastic logicians and their view of the life of the mind, i.e., intellectual discipline and contemplation as a path to truth. It demonstrates why logic is grounded in metaphysical realism (i.e., that the world is real and knowable) and natural law. This

serves as a corrective to the symbolization of modern logic as an abstraction of formal relations with no bearing on the real world.

- Lear, Jonathan. *Aristotle: The Desire to Understand*. Cambridge: Cambridge University Press, 2007.

  Lear's aim in his work is to present Aristotle as a systematic philosopher concerned with the profound human desire to know, from which comes the famous definition of man as 'rational animal'. He treats key metaphysical concepts in Aristotle, such as 'teleology', 'substance', 'form', and 'actuality' and how they are bound to his logic, intended to reveal the structure of being itself.

- Veatch, Henry. *Aristotle: A Contemporary Appreciation*. Bloomington: Indiana University Press, 1974.

  Veatch presents Aristotelian realism as an alternative to the pitfalls of existentialism, idealism and linguistic ("paralysis-by-") analysis. He argues for the necessity of a logic integrated with ontology rather than a mere formalism in the mind, and that this constitutes the reason for Aristotle's relevance in the modern age.

- Ross, Sir David. *Aristotle*. 6th ed. New York: Routledge, 1995.
  [See "Logic", "Philosophy of Nature", "Biology", "Psychology", "Metaphysics"]

  An expert on Aristotle, Sir David Ross presents a faithful and compelling summary of Aristotle's key doctrines in all of the domains in which he wrote. This work should provide students with the "keys" to unlock Aristotle's abstruse passages.

- Schmidt, Robert W. *The Domain of Logic According to Saint Thomas Aquinas*. The Hague: Martinus Nijhoff, 1966.

  Schmidt's *The Domain of Logic* is a scholarly investigation into Aquinas's understanding of the nature, scope, and limits of logic in relation to metaphysics and epistemology. Schmidt argues that Aquinas sees logic not as a self-referential system or purely formal discipline, but as a rational instrument ordered toward truth. For Aquinas, logic is a liberal art, subordinate to philosophy but necessary for its execution, especially in theology and natural philosophy. The book provides one of the clearest explanations of Aquinas's understanding of second intentions, the mental categories that logic studies, which arise from the intellect's reflection upon its own acts.

Primary Sources

- Aquinas, Thomas. "The Principles of Nature (*De Principiis Naturae*) to Brother Sylvester." Translated by R.A. Kocourek. https://isidore.co/aquinas/english/DePrincNaturae.htm.

  Thomas Aquinas's *De Principiis Naturae* is an early and foundational treatise on Aristotelian natural philosophy. It systematically presents key metaphysical and

ontological principles such as matter and form, act and potency, substance and accident, and the four causes (material, formal, efficient, and final) which undergird medieval conceptions of nature and being. Drawing primarily from Aristotle's *Physics* and *Metaphysics*, Aquinas explains how change and multiplicity are to be understood through the union of prime matter and substantial form, and how actuality and potentiality form the basis of motion, generation, and corruption.

For Aquinas, the structure of being is mirrored in the structure of human thought, a principle that underwrites classical logic's confidence in valid reasoning and essential definitions. Therefore, Aquinas's explanation of substance, causality, and change provides the ontological bases behind the syllogistic structures of traditional logic.

- Aristotle. *Posterior Analytics*. Translated with a commentary by Jonathan Barnes. 2nd ed. Oxford: Clarendon Press, 1994.

  Aristotle's *Posterior Analytics* is the second part of the Organon. In it, Aristotle investigates the nature of scientific knowledge (*epistēmē*), its conditions, structure, and justification. He argues that true scientific knowledge must be derived from demonstration: a syllogism built from true, primary, immediate, and necessary premises. A central concept is that of "first principles" (*archai*), which are known not by demonstration but by intellect. These principles ground all further deductive knowledge, a theory of knowledge known as "foundationalism". Aristotle further insists that explanatory knowledge must reveal not just that something is the case (mere fact), but why it is so (scientific understanding).

- Maritain, Jacques. *The Degrees of Knowledge*. London: The Centenary Press, 1937.

  A classic of the 20th century Thomist revival, Maritain's work carefully presents the hierarchical structure of knowledge and the mode of inquiry appropriate to grasp different objects of knowledge. Maritain defends not only reason but also intellectual intuition and the process of universal abstraction, particularly insofar as they are necessary for metaphysics. His work implicitly responds to criticisms brought against traditional logic by Kant and by positivists.

- St. Thomas, John of. *The Material Logic of John of St. Thomas: Basic Treatises*. Translated by Yves R. Simon et al. Chicago: University of Chicago Press, 1955.

  John of St. Thomas (1589–1644) is a major figure of the late scholastic tradition and an interpreter of Thomistic metaphysics and logic. His treatise emphasizes the intentionality of concepts and the relation of logic to real being. He distinguishes between first intentions (concepts of real things, i.e., *maʿqūlat ūlā* in Arabic) and second intentions (logical relations like genus and species, i.e., *maʿqūlat thāniya* in

Arabic), showing how logic operates as a science precisely because it studies being as known rather than being as being. His material logic is thus not merely a set of rules for formal inference but a theory of understanding rooted in realism.

- Five Texts on the Mediaeval Problem of Universals: Porphyry, Boethius, Abelard, Duns Scotus, and Ockham. Edited and translated by Paul Vincent Spade. Indianapolis: Hackett Publishing, 1994.

  Paul Vincent Spade's *Five Texts on the Mediaeval Problem of Universals* is a carefully curated and translated collection of key medieval writings addressing the central philosophical issue of the ontological status of universals. A question stemming from Porphyry's *Isagoge*, its answer grounds the possibility or impossibility of deductive logic being a logic of being. Famously, Ockham's claim that universals are merely "names" and that only individuals exist outside the mind invented the position of 'nominalism', often argued to be the root of the modern turn in logic.

- Evangeliou, Christos. *Aristotle's Categories and Porphyry*, in *Philosophia Antiqua: A Series of Studies on Ancient Philosophy*. Edited by W.J. Verdenius and J.C.M. Van Winden. Volume XLVIII. Leiden: D.J. Brill, 1988.

  The book examines how Porphyry's interpretation and expansion of Aristotle's work helped systematize and transmit Aristotelian logic and metaphysics to the medieval world, particularly through Neoplatonic and scholastic traditions. Evangeliou focuses on how the Categories, which outlines Aristotle's classification of being and introduces his logic of predication, became a cornerstone for metaphysical and logical analysis. He then traces how Porphyry, in the Isagoge, provided a methodological prologue to the Categories, formalizing key concepts such as genus, species, difference, property, and accident, all terms that became foundational to medieval dialectic and Thomistic logic.

Unit 2: Modern, Symbolic Logic

Modern, symbolic logic refers to the invention of a new system of logic in the 19th and 20th centuries by analytic philosophers called 'symbolic logic' and 'mathematical logic'. Particular attention should be paid to the historical developments that undermined classical logic, key divergences in symbolic logic from the classical approach (such as substituting content-laden concepts in classical logic with empty symbols in mathematical logic, the challenge of existential import, and the philosophical skepticisms of symbolic logic).

General Readings
- Copi, Irving. *Symbolic Logic*. 5th ed. New York: Macmillan Publishing, 1979.
  - Irving M. Copi's *Symbolic Logic* is a widely used textbook that introduces the formal techniques and conceptual foundations of symbolic (mathematical) logic. The book covers sentential (propositional) logic, predicate logic (first-order logic), symbolization of English statements, truth-functional connectives, quantification theory, proof methods (truth tables, natural deduction, and axiomatic systems), and metatheory (consistency, soundness, completeness). Copi's provides exercises designed to develop formal reasoning skills, while occasionally addressing questions about validity, truth, inference, and formality, issues central to the philosophy of logic.
- Priest, Graham. *An Introduction to Non-Classical Logic.* Cambridge: Cambridge University Press, 2001.
  - Priest's introduction systematizes a broad range of logical systems that depart from classical logic. He aims to provide a comprehensive, formal, and philosophical treatment of non-classical logics, including modal logic (necessity and possibility), intuitionistic logic (rejects the law of excluded middle), relevant logic (preserves relevance between premises and conclusion), paraconsistent logic (permits contradictions without triviality), many-valued logics (more than two truth values), and fuzzy logic, free logic, and quantified modal logic. Additionally, Priest includes philosophical discussions that motivate the adoption of non-classical logics, drawing on paradoxes, linguistic problems, and metaphysical concerns.
- Rescher, Nicholas. *Many-Valued Logic.* New York: McGraw Hill, 1969.
  - Rescher's *Many-Valued Logic* surveys logical frameworks that allow for more than two truth values, such as three-valued, n-valued, and infinite-valued logics, and situates them within the broader evolution of logical theory. Rescher begins by tracing the historical motivations for departing from classical two-valued logic, including problems of semantic vagueness, paradoxes, and future contingents. He then

formalizes a variety of many-valued systems and discusses their underlying algebraic structures, such as truth tables, lattices, and matrix semantics. The work addresses both axiomatic foundations and the philosophical implications of accepting more than two truth values, raising issues such as truth-functionalism, logical consequence, and the nature of determinacy. Rescher situates many-valued logic as a natural extension of Aristotelian and Boolean traditions, emphasizing its continuity rather than opposition to classical logic.

- Shapiro, Stewart. *Thinking about Mathematics: The Philosophy of Mathematics*. Oxford: Oxford University Press, 2000.

  Shapiro's *Thinking About Mathematics* presents a comprehensive, introductory survey of key debates in the philosophy of mathematics, written for both philosophers and mathematically literate readers. The book systematically covers logicism (Frege, Russell, Whitehead), formalism (Hilbert, metamathematics), intuitionism/constructivism (Brouwer, Heyting), structuralism (Shapiro), platonism vs. nominalism, and Quinean naturalism and indispensability arguments. The book is especially clear in delineating the epistemological and ontological implications of different positions about mathematics and its logical foundations. Shapiro shows how logic contributes to debates about the existence of mathematical objects, and why the structure of logical systems impacts metaphysical interpretations of mathematics.

Primary Sources

- Bacon, Francis. *The New Organon*. Edited by Lisa Jardine and Michael Silverthorne. Cambridge: Cambridge University Press, 2000.

  Francis Bacon's *The New Organon* (*Novum Organum*, 1620) is a foundational text in modern scientific methodology. It marks a turning point in the history of epistemology from using deductive logic to study the natural world to using empirical observation, inductive reasoning, and directed experimentation. Bacon sharply criticized Aristotle's reliance on the deductive syllogism and the medieval scholasticism which built upon it, intending his work as a replacement for Aristotle's *Organon* (i.e., his corpus of works on logic). In fact, it formed a part of his *Instauratio Magna* ("Great Restoration"), a comprehensive plan to reorganize the sciences to restore man to mastery over nature.

- Ayer, Alfred Jules. *Language, Truth, and Logic*. New York: Dover Publications, 1952.

  Published in 1936, this seminal work contains the defining statement of logical positivism as espoused by the Vienna Circle. Ayer's central thesis that meaningful statements are either analytically true (logical/mathematical tautologies) or

empirically verifiable. All other metaphysical, ethical, and theological statements are, he argues, literally meaningless because they lack verifiability conditions. Ayer defends the verification principle, which asserts that the meaning of a proposition consists in the method of its empirical verification. This strict verification criteria effectively meant huge swaths of human discourse like ethics, metaphysics, religion, and aesthetics are literally meaningless; they are not only false, but they have nothing really to tell us. This strong logical empiricism methodology encapsulated in *Language, Logic and Truth* dislodged philosophy from the excessive metaphysical speculation that Ayer thought haunted and confounded it and put it in its proper place which is to focus on and clarify the logical relationships between empirically verified propositions.

- Quine, W.V.O. *Philosophy of Logic.* Cambridge: Harvard University Press, 1986.

  Quine's *Philosophy of Logic* is a compact but influential treatise that articulates and defends a naturalistic and empiricist approach to logic. Quine critically examines the foundations of classical logic, particularly first-order predicate logic with identity, arguing that it is the best formal system available for science and philosophy. In his view, logic is not metaphysically foundational but is part of our overall scientific web of belief, continuous with the laws of science. Logical laws are subject to empirical revision if needed, though they are among the most entrenched beliefs we hold.

- Popper, Karl. *The Logic of Scientific Discovery*. New York: Routledge Classics, 2002.

  Karl Popper's *The Logic of Scientific Discovery* present an important development in the philosophy of science again empiricism and positivism. Popper instead argues for the falsifiability principle as the criterion for real science – that a theory is scientific if empirical observation can, in principle, prove it false. He reformulates scientific inquiries as deductive hypotheses that experiments aim to empirically refute rather than as the accumulation of inductive observations.

- Frege, Gottlob. *Begriffsschrift ('Concept-Script'): A Formal Language for Pure Thought Modelled on that of Arithmetic*.
  https://www.informationphilosopher.com/solutions/philosophers/frege/Frege_Begriffsschrift.pdf

  Frege is attributed with the title of being the founder of modern mathematical logic – a subject that integrated philosophical questions and techniques to mathematics; something not done by anyone prior to him. He is also considered the father of analytic philosophy and is said to have marked the 'linguistic turn' that ushered in the analytic philosophical method. He argued for logicism – that mathematics grew out of logic influenced major figures like Bertrand Russell and

Ludwig Wittgenstein. In this work, Frege sought to free human reasoning from the 'deceptions' of natural language and uncover its underlying logical structure and to represent it with a symbolic language. One of Frege's revolutionary innovations in the *Begriffsschrift* was not only symbolic machinery but the introduction of modern quantificational theory and an axiomatic predicate calculus. In this way, he also broke with the prior Aristotelian-Stoic propositional logic and set out the contours of modern logic.

- Whitehead, Alfred North and Bertrand Russell. *Principia Mathematica*. 3 vol. Cambridge: Cambridge University Press, 1925.

    A revolutionary work in mathematical logic building off Frege, this work is a defense of logicism – the theory that mathematics is reducible to the formal axioms of logic. Although hefty, extremely dense and highly technical, it influenced the way philosophers, mathematicians and logicians undertook the study and presentation of logic and logical analysis. The *Principia*'s formal system includes a complete symbolic notation for logic, a theory of types to avoid self-referential paradoxes, a detailed set theory, and a derivation of key mathematical truths (such as 1+1=2) from purely logical axioms.

- *Jan Łukasiewicz: Selected Works*. Edited by L. Borkowski. Amsterdam: North Holland Publishing Company, 1970.
    [See "On Three-Valued Logic", "On Determinism", "Philosophical Remarks on Many-Valued Logic", "On Infinite-Valued Logic"]

    This collection compiles Łukasiewicz's most influential papers on logic, particularly his development of logic beyond bivalent logic which only admits propositions as either true or false. "On Three-Valued Logic" introduces a third truth value to handle propositions that are neither true nor false. "On Determinism" and "Philosophical Remarks on Many-Valued Logic" discusses the motivations for the development of many-valued logic and connects it to issues in metaphysics and the logic of future contingents. "On Infinite-Valued Logic" introduces the structure of logic with infinitely-many truth values, a precursor to 'fuzzy logic'.

- Plantinga, Alvin. *The Nature of Necessity*. Oxford: Oxford University Press, 1974.

    Working within the analytic tradition often dismissive of metaphysics, this work offers a rigorous treatment of modal of necessity and possibility vis-à-vis essence. Plantinga uses possible world semantics to develop a modal metaphysics include a modal ontological argument for God and a defense of free will within the problem of evil. His account influenced future analytic philosophers to continue to bridge formal systems to philosophy of religion and ontology.

Unit 3: History of Western Logic and Comparative Studies

Having completed a study of the two philosophies of logic in the Western tradition, this unit presents readings that directly compares classical logic with symbolic logic. This includes historical treatments of how different logicians assessed the viability and scope of formal logic in terms of metaphysics and where logic is situated in each logician's greater philosophical system, if it all.

General Readings
- Copi, Irving. *Introduction to Logic*. 2nd ed. New York: The Macmillan Company, 1961.
  A widely-used introductory textbook to logic, Copi's work covers informal logic, formal logic, and symbolic logic. He includes chapters directly comparing traditional Aristotelian logic with modern symbolic logic and teases out some of the philosophical implications of each system.
- Bochenski, I.M. *A History of Formal Logic*. Notre Dame: University of Notre Dame Press, 1961.
  I.M. Bochenski's *A History of Formal Logic* offers a comprehensive chronological survey of the development of formal logic from ancient Greece through the early 20th century. Bochenski divides the history of logic into four major traditions: 1) ancient Greek logic, especially the Aristotelian syllogistic, 2) Stoic logic, emphasizing propositional reasoning, 3) medieval scholastic logic, including the contributions of figures like Peter of Spain, John of St. Thomas, and Thomas Aquinas, and 4) modern symbolic logic, with Boole, Frege, Peirce, Russell, and others. Bochenski's approach is both historical and analytical and also covers less commonly treated periods (e.g., Byzantine and Arabic logic). He argues that modern logic cannot be fully understood without appreciating its historical roots.
- Kneale, William and Martha Kneale. *The Development of Logic*. Oxford: Clarendon Press, 1962.
  The Development of Logic provides a survey and analysis of four distinct periods of study of logic: 1) ancient logic, which treats in detail Aristotle's *Organon*, Stoic propositional logic, and later Greek developments, 2) medieval logic, which synthesized Aristotelian and Stoic strands in Latin scholasticism, with attention to the semantic and modal innovations of medieval theorists, 3) early modern logic when logic transformed in response to the rise of scientific method, including the influence of Bacon, Descartes, Leibniz, and Kant, and 4) Nineteenth- and twentieth-century logic including the mathematical turn in logic, developments in symbolic and formal systems, and the work of Frege, Peano, Russell, and Wittgenstein. Key attention is paid to the epistemological commitments of each period.

- Deely, John. *Four Ages of Understanding: The First Postmodern Survey of Philosophy from Ancient Times to the Turn of the Twenty-first Century.* Toronto: University of Toronto Press, 2001.

  [See "Aristotle and the Foundations of Logic", "The Hellenistic School", "Logic in the High Scholastic Period", "Semiotic Logic and the End of the Latin Age", "Descartes and the Turn to the Subject", "The Mathematical Turn in Logic", "The Recovery of the Doctrine of Signs"]

     Deely's celebrated *Four Ages of Understanding* traces the evolution of Western thought through four major intellectual epochs: 1)the Greek Age dominated by classical metaphysics, especially Aristotle's theory of being and causality, 2) the Latin Age corresponding to medieval Scholasticism, where logic and metaphysics were unified through the development of semiotics, 3) the Modern Age initiated by Descartes and culminating in Kant, characterized by the separation of epistemology from ontology, and the emergence of subject-object dualism, and 4) the Postmodern Age, a developing period in which Deely sees a revival of semiotic realism and a reappreciation of the medieval insights lost during the modern era. Deely argues that the neglect of sign theory in modern philosophy led to fundamental epistemological and metaphysical confusions, while the Latin age uniquely achieved a true fusion of logic, ontology, and semiotics.

- Haack, Susan. *Philosophy of Logics*. Cambridge: Cambridge University Press, 1978.

     This widely respected introduction to the philosophical foundations of logic bridges technical formal logic with broader epistemological and metaphysical questions. The book offers a historical analysis of classical logic and its modern extensions, including many-valued, intuitionistic, modal, and paraconsistent logics. Haack's central thesis is that logic, though formal in nature, must be evaluated not only by internal criteria (e.g. consistency and completeness) but also by its philosophical adequacy, i.e., how well a system captures our intuitive notions of inference, truth, and meaning. Throughout the book, Haack distinguishes between deductive and inductive logic, syntax and semantics, and logical form and linguistic expression. She explores the nature and justification of logical laws, the viability of alternative logics, the implications of Gödel's incompleteness theorems, and logical pluralism vs. monism.

- Łukasiewicz, Jan. *Aristotle's Syllogistic from the Standpoint of Modern Formal Logic.* Oxford: Clarendon Press, 1951.

     Aristotle's Syllogistic from the Standpoint of Modern Formal Logic is considered a landmark work in modern formal logic that reinterprets Aristotle's system of logic using the tools of modern symbolic logic, specifically building on the *Principia Mathematica* of Bertrand Russell and Alfred North Whitehead, translating valid logical

forms into modern propositional and predicate logic. He famously argues that Aristotle had an implicit grasp of formal principles that anticipate elements of modern logic, despite the lack of a symbolic language in antiquity. However, he also contends that Aristotle's system is incomplete and restricted, lacking the expressive power of modern quantificational logic. One of Łukasiewicz's major contributions is the demonstration that Aristotle's syllogistic can be treated as a formal axiomatic system, and that it is both consistent and complete within its limited domain.

- Veatch, Henry. *Two Logics: The Conflict Between Classical and Neo-Analytic Philosophy*. Evanston: Northwestern University Press, 1969.

  Henry Veatch's *Two Logics* contrasts two major traditions in 20th-century philosophy: the classical (Aristotelian-Thomistic) tradition of logic and metaphysics, and the neo-analytic (modern symbolic/logical positivist) tradition stemming from Frege, Russell, and Wittgenstein. Veatch argues that these two "logics" are not merely different technical systems but reflect competing philosophical worldviews—one grounded in metaphysical realism and the other in linguistic and formal abstraction. Veatch defends the classical logic of terms and syllogisms, claiming analytic logic divorces logic from ontological categories and the intelligibility of being, leading to conceptual fragmentation and metaphysical skepticism. He argues that formal logic without a grounding in metaphysics becomes a sterile, meaningless manipulation of symbols rather than a science of being and truth.

Unit 4: Islamic Logic

Islamic logic refers to the methods of reasoning developed in the Islamic intellectual tradition (not just *manṭiq*) and their philosophical commitments and underpinnings. Particular attention should be paid to the Greek translation movement, native forms of reasoning developed by Muslim scholars, discourse around limits of logic, and Muslim engagement with claims about theory of knowledge in other traditions. This unit also includes readings covering broad treatments of the nature of reason, intellect, and the soul in the Islamic intellectual tradition. Students should keep in mind that many of the primary texts on the philosophy of logic have yet to be translated into English.

General Readings
- Atçil, Abdurrahman. "Greco-Islamic Philosophy and Islamic Jurisprudence in the Ottoman Empire (1300-1600): Aristotle's Theory of Sciences in the Works of *Uṣūl al-Fiqh*," *Journal of Ottoman Studies*, XLI (2013): 33-54.
   > This detailed historical survey examines treatments of the definition and subject matter of *fiqh* and *uṣūl al-fiqh* in the major works of the late post-classical period and then analyzes whether they meet the requisites given by Aristotle to constitute a science proper.
- Setia, Adi. "The Genesis of Greek Intellectuality in Islamic and Western Historiographies of Science: A Comparative Overview." *Afkār: Jurnal Akidah Dan Pemikiran Islam* 10 (1) (2009): 61-82.
   > Adi Setia provides a comparative study of how Islamic and Western historiographies have represented the origins and influence of Greek rationality. He critiques the traditional Eurocentric narrative that regards Greek intellectuality as isolated and acknowledges the early Islamic preservation, assimilation, and transformation of Aristotelian rationality through translation, commentary, and critical innovation. Setia argues for revisiting the ontological and methodological depth that Islamic scholars brought to logic and science through semiotics, grammar, and philosophical inquiry.
- Türker, Ömer. "The Possibility of Thinking on Existence: An Analysis Following the Traditions of Islamic Metaphysics." *Nazariyat Journal for the History of Islamic Philosophy and Sciences* 2/3 (November 2015): 1-35.
   > Drawing on Islamic currents of logic and metaphysics, this article demonstrates the possibility of speaking about existence *qua* existence against two skeptical criticisms that motivate the development of symbolic logic. The first criticism is that metaphysical investigation transcends the limits of reason, and the second criticism is

that concepts and propositions which are thought to be metaphysical are nothing but mind-made constructs. Türker argues that knowledge of existence is indeed intuitional in the sense of being direct and non-instrumental and sets forth that meaning of existence is the self-evident and universal. The final problem tackled is how we can know that concepts and propositions which are achieved through a priori concepts, correspond to the external world.

- Lahham, Karim. *The Anatomy of Knowledge and the Ontological Necessity of First Principles.* Abu Dhabi: Tabah Research, 2021.

    Karim Lahham's *The Anatomy of Knowledge* a philosophical investigation into the principles foundational to metaphysical and logical order, especially the principle of non-contradiction and the principle of identity. Lahham argues that first principles (such as identity and non-contradiction) are not merely useful logical axioms but ontologically necessary realities, rooted in the structure of being. Logical principles, he contends, correspond to first intelligibles that reflect real, created order and thus second-order concepts (second intentions) must derive from first intentions grounded in actual existence. Lahham critiques the modern de-ontologization of logic, which divorces logic from metaphysical grounding. He maintains that without an ontologically grounded logic, the coherence of intellectual discourse collapses since logic cannot contradict metaphysics, nor metaphysics violate logical norms. The book also addresses dialetheism and paraconsistent logic, rejecting them as incompatible with first principles. Lahham asserts that logical and metaphysical reality are seamless and objective, not subject to contradictory truths or relativistic interpretations.

- Kaş, Murat. "Apprehension and Existence, Appearance and Reality: The Reception of *Nafs al-amr* Debates after the 13th Century." *Ilahiyat Studies* 12, no. 1 (2021): 7-39.

    This article maps the history of the concept of *nafs al-amr* from its inception in the post-classical period of Islamic philosophy and logic. *Nafs al-amr* is a term for the reality or thing-as-it to which a proposition corresponds to be 'true'. In other words, it is a 'truth-maker' for propositions. Muslim logicians who admit the correlation between the structure of reality and the categories of the mind but reject the notion of the construction and the determination of reality by the mind refer to the realm that is independent of the mind's personal judgments as *nafs al-amr*. This work aims to create a map of treatments, arguments and problems with regard to the concept of *nafs al-amr*.

- Strobino, Riccardo. *Avicenna's Theory of Science: Logic, Metaphysics, Epistemology*. Oakland: University of California Press, 2021.

Riccardo Strobino's monograph is the first comprehensive study of Avicenna's epistemological and logical framework—especially as presented in his *Kitāb al-Burhān* (*Book of Demonstration*), embedded within the logic section of the *Shifāʾ*. He interprets Avicenna as reconstructing Aristotle's *Posterior Analytics* into a robust theory of science. Strobino traces how Avicenna reorganizes the sciences into hierarchical systems (sciences by essence versus demonstration), distinguishes between causal and non-causal demonstration, elaborates on the logic of essence, and articulates a modal theory of scientific necessity. This includes analyses of the four causes, definition, and epistemology of essence, showing how logical demonstration is grounded in Avicennian metaphysics, the theory of first principles, essence/existence, and necessity. Overall, Strobino helps reconstruct Islamic logic as an original tradition, rather than a passive adoption of Greek logic.

- Gutas, Dimitri. "The Empiricism of Avicenna." *Oriens* vol. 40, no. 2 (2012): 391-436.

  Gutas argues that Avicenna's theory of knowledge is rooted in a form of empiricism, where the human rational soul, upon its first creation, is absolutely potential—a tabula rasa. Through experience, the soul receives information about the sensibles via the senses, from which it abstracts intelligible concepts. Then, reflection turns inwards to provide insight into the operations of the soul. The natural operation of the mind sorts and classifies concepts, investing them with mutual relations and combining them to form definitions and self-evident propositions that constitute the logical and mathematical framework of thinking. Students should compare this account of human knowledge with the medieval scholastic understanding of the process of abstraction that results in universals.

- Amin, Wahid M. "Qutb al-Din al-Razi and the Problem of Universals: A Fourteenth-Century Critique of Avicenna's Theory of Natural Universals." *Nazariyat* 5/2 (November 2019): 25-58.

  The problem of universals is a philosophical discussion central to determining the possibility of logic describing reality. Originally at home in the Western tradition stemming from Porphyry's *Isagoge*, this article traces a parallel discussion on universals developed by Avicenna who argued that a non-conditioned quiddity, also known as the natural universal (*al-kullī al-ṭabīʿī*), exists in external particulars in the way that a part exists in the whole. This paper examines Quṭb al-Dīn al-Rāzī's (d. 766/1364) criticisms of this theory.

- Walbridge, John. *God and Logic in Islam: The Caliphate of Reason.* Cambridge: Cambridge University Press, 2011.

  Walbridge's book argues that rational inquiry (*ʿaql*) was central to Islamic intellectual culture, particularly during its classical and medieval phases. The book challenges

modern narratives that depict Islam as inherently anti-rational, showing instead that for centuries Islamic scholars developed sophisticated logical, philosophical, and juridical traditions grounded in reason. Walbridge documents the widespread teaching of "school logic" in seminaries across the Islamic world for over seven centuries. He describes how traditional logic was disseminated through textbooks, commentaries, and oral instruction, and integrated with Arabic grammar, rhetoric, and *uṣūl al-fiqh*.

- Kalin, Ibrahim. *Reason and Rationality in the Qur'an.* Abu Dhabi: Kalam Research and Media, 2016.

   Ibrahim Kalin's work examines the Qur'an's conception of reason (*'aql*) and rationality as embedded within an ontological and moral context, not as an independent, purely instrumental faculty. He argues that Quranic rationality is grounded in the idea that the universe, being created by a wise Creator, possesses an intrinsic order and intelligibility. Rationality thus becomes a means of disclosing the structure of existence, not merely manipulating symbols or pursuing ends. Kalin contrasts Quranic rationality with modern Enlightenment reason, which is often atomistic and detached. Instead, he emphasizes a communitarian and intersubjective rationality where reason functions within a shared order of meaning and moral responsibility, a teleologically integrated epistemology, whereby reason is aligned with moral consciousness, spiritual awareness, and divine purpose, and a vocabulary of thought in the Qur'an that evokes syllogistic and deductive forms to awaken reflection.

Primary Sources

- *Avicenna's Deliverance: Logic.* Translated and edited by Asad Q. Ahmed. Oxford: Oxford University Press, 2011.
   This volume presents the first complete scholarly English translation and commentary of the logic section of Avicenna's *al-Najāt* (*Deliverance*). Comprising meanings and sentences (akin to *De Interpretatione*), categorical and modal syllogistic (*Prior Analytics*), and demonstration and scientific knowledge (*Posterior Analytics*), it provides a concise yet comprehensive account of Avicennian logic.
- Rahman, Fazlur. *Avicenna's Psychology: An English Translation of Kitāb al-Najāt, Book II, Chapter VI.* Westport: Hyperion Press, 1981.
   This volume presents a complete translation and commentary of Avicenna's exposition on the soul, its animal faculties and its human faculties from *al-Najāt* (*Deliverance*). The latter half of this work consists of Avicenna's view on the nature of the intellect, intellection, abstraction, and the Active Intellect. Fazlur Rahman's

commentary compares Avicenna's view with those of Aristotle and others in late antiquity.

- Spiker, Hasan. *The Metacritique of Kant and the Possibility of Metaphysics.* Abu Dhabi: Tabah Research, 2022.

> This short study evaluates the fundamental paradox at the core of Kant's philosophy, known as the 'metacritical' problem. Although Kant's critical project was motivated by examining the instrument of cognition, he fails to subject his own critique, which uses reason (i.e., the instrument of cognition) and hence his project is self-defeating. Spiker's work defends the possibility of logic as an instrument to study being (as conceptualized in classical logic) against the Kantian bifurcation of subject and object and subsequent limitation of logic to internally consistent system without applicability to external reality.