The Paideia School
Logic: Deductive and Inductive

Biblical Principles

1. The mind and character of God are the foundation of mathematical truth as revealed in creation: order, non-contradiction, immutability, infinitude, precision, beauty, and harmony.
2. God equips man with a rational mind to apprehend mathematical truth in creation.
3. Man's finitude and sin nature preclude a comprehensive understanding of mathematical intricacies of the created order.
4. God enables man to use mathematical knowledge to strive toward fulfillment of the dominion mandate.
5. God's command to count and measure reflects the truth that there is a righteous standard by which He will judge men.

Mathematics Department Goals

1. Recognize the attributes of God that are revealed by a study of Mathematics.
2. Perceive the utility and the limitations of the discipline of Mathematics.
3. Understand that human standards of measurement testify to the reality of God's perfect knowledge and righteous standard.
4. Progress in logical thinking patterns, problem solving abilities, and elegant expression of the same.
5. Appreciate the role of Mathematics in the historical development of other disciplines and of culture.
6. Develop mathematical faculties to the fullest in order to use such tools in the service of God and man.

Course Goals

Students will:

1. Appreciate logic as a divine reflection and a human distinctive.
2. Understand basic elements of deductive and inductive logic.
3. Identify formal and informal logical fallacies.
4. Recognize, apply, and integrate logic into other disciplines of study.
5. Analyze and construct arguments in daily discourse.

Objectives

First Quarter

- Biblical foundations of logic.
    - *a.* Logic as a distinctive of the *imago dei.*
    - b. Logic and apologetics.
        - i. Proverbs 26:4-5 as an apologetic model.
        - ii. The 12 Deadly Questions as an apologetic tool.
- Fundamental laws of logic.
    - a. Law of identity.
    - b. Law of non-contradiction.
    - c. Law of excluded middle.
    - d. Law of rational inference (Geisler).
- Fundamental elements of logic and their properties.
    - a. Terms (distributed or undistributed).
    - b. Propositions (true or false).
    - c. Syllogisms (valid or invalid).

Second Quarter

- Categorical syllogisms and their fallacies.
    - a. Major and minor premises.
    - b. Testing validity by rule, by counterexample.
- Hypothetical syllogisms and their fallacies.
    - a. Antecedents and consequents.
    - b. Testing validity by rule.
- Disjunctive syllogisms and their fallacies.
    - a. Testing validity by rule.
    - b. Two excepting conditions: comprehensiveness and exclusivity.
- Dilemmas: logical and rhetorical utility.
    - a. Logical weakness and rhetorical power.
    - b. Escaping dilemmas.
- Logic in normal language.
    - a. Finding the conclusion first.
    - b. Putting core propositions into logical form.

Third Quarter

- Informal fallacies: clarity/ambiguity.
    - a. Equivocation.
- Informal fallacies: attack.
    - *b. Ad hominem* (to the man).
    - *c. Ad baculum* (to fear).
    - *d. Tu quoque* (you also).
    - e. Poisoning the well.
- Informal fallacies: authority.

    a. *Ipse dixit* (he says so).
    b. *Ad populum* (mob appeal)
    c. *Ad ignorantiam* (appeal to ignorance).
    d. *Ad misericordium* (appeal to emotion).
    e. Chronological snobbery.
- Informal fallacies: stacking the deck and diversion.
    a. Begging the question.
    b. Straw man.
    c. Red herring.
- Informal fallacies: generalization.
    a. Sweeping generalization (accident).
    b. Hasty generalization (converse accident).
- Informal fallacies: reductive.
    a. Complex question.
    b. Category mistake.
    c. Nothing buttery.
    d. Argument of the beard.
    e. The ultimate fallacy (willful blindness, hardness of heart).

Fourth Quarter

- The seismic shift from deduction to induction.
    a. Bacon: Novum Organum.
    b. From religion/philosophy to science.
- Causality: its nature and importance.
    a. Necessary and sufficient conditions.
    b. Hume's attack on causality.
- Analogy: the basic building block of induction.
- Mill's methods of inductive logic.
    a. Agreement.
    b. Difference.
    c. Joint method.
    d. Concomitant variation.
    e. Residues.
- Philosophy Timeline
    a. Socrates
    b. Plato
    c. Aristotle
    d. Stoics/ Zeno/ Skeptics
    e. Thomas Aquinas – 5 proofs for the existence of God
    f. Ockham
    g. Renee Descartes
    h. John Locke
    i. Immanuel Kant

Teacher Resources

- Norman Geisler and Ronald Brooks, *Come, Let Us Reason* (ISBN 0-8010-3836-7).

- James B. Nance and Douglas Wilson, *Introductory Logic – The Fundamentals of Thinking Well, Teacher Edition (5th Ed.).* ISBN: 978-1591281672
- Original materials (lecture notes, etc.)

Student Resources

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