OFFICIAL SYLLABUS

MATH 106 – DEDUCTIVE REASONING AND PROBLEM SOLVING

Adopted – Fall 2003

(Committee: Drs. M. Hasty, T. Voepel, A. Wheeler)

Catalog Description. Theory and practice of reasoning, formal logic, elements of scientific method. Graduation credit may be earned for MATH 106 or PHIL 106 but not both. Prerequisite: two years of high school mathematics.

Textbook – *LOGIC*, by Robert Baum (Fourth Edition)

Course Outline and Topics

Chapter I – Introduction
- I.1 The Value and Uses of Logic
- I.2 What Can Be Learned about Logic and How Can It Be Learned

Chapter 1 – Informal Analysis of Statements
- 1.1 Sentences
- 1.2 Cognitive and Noncognitive Uses of Sentences
- 1.3 Statements
- 1.4 Recognizing Sentences Used to Express Statements
- 1.5 Self-Evident and Supported Statements
- 1.6 Logical Relationships between Two (or More) Propositions

Chapter 2 – Informal Analysis of Arguments
- 2.1 Inferences and Arguments
- 2.2 The Logical Sense of 'Argument'
- 2.3 Premises and Conclusions
- 2.4 Problems in Recognizing Intended Arguments
- 2.5 Supplying Missing Statements
- 2.6 Deductive and Inductive Arguments
- 2.7 Criteria for Good Arguments

Chapter 5 – Propositional Logic: Statements
- 5.1 Compound Propositions and Logical Operators
- 5.2 Truth-Functional Operators
- 5.3 Propositional Abbreviations and Schemas
- 5.4 Conjunction
- 5.5 Truth Tables
- 5.6 Negation
- 5.7 Disjunction
- 5.8 Material Implication
- 5.9 Material Equivalence
- 5.10 Propositions with More Than One Logical Operator
- 5.11 Truth Table Construction
- 5.12 Logically Equivalent Statements
- 5.13 Logical Equivalence and Material Equivalence
- 5.14 Tautologies
- 5.15 Contradictions
- 5.16 Contingent Statements

Chapter 6 – Propositional Logic: Arguments
- 6.1 Truth-Functional Validity
- 6.2 Contradictory Premises and Tautological Conclusions
- 6.3 Abbreviating Truth-Functional Arguments
- 6.4 Shematizing Truth-Functional Arguments
- 6.5 Testing Validity by Truth Tables
- 6.6 The Short Truth Table Method
- 6.7 Truth-Functional Arguments and Corresponding Conditionals
- 6.8 The Propositional Calculus
- 6.9 Constructing a Formal Proof
- 6.10 Inference Rules
- 6.11 Rules of Thumb for Proof Construction
- 6.12 The Rule of Rigor
- 6.13 The Replacement Rule
- 6.14 Conditional Proof

Chapter 10 – Scientific Method
- 10.1 The Hypothetico-Deductive Method
- 10.2 Hypothetico-Deductive Method and Inductive Generalization
- 10.3 Crucial Experiments
- 10.4 Scientific Method
- 10.5 Causal Explanations
- 10.6 Kinds of Cause
- 10.7 Mill's Method
- 10.8 Replicability and Controls

Chapter 12 – Informal Fallacies
- 12.1 Disguised Nonarguments
- 12.2 Valid but Fallacious Arguments
- 12.3 Other Informal Fallacies

Any instructor should cover all of the material specified, additional sections are optional.