DE LA SALLE UNIVERSITY – MANILA
COLLEGE OF SCIENCE
Mathematics Department

SYLLABUS

COURSE CODE	MTH601M/D
COURSE TITLE	Set Theory and Logic
CLASS DAY & TIME	
ROOM	
NAME OF FACULTY	
COURSE CREDIT	3 Units
CONTACT NO. (DEPT)	(02) 536-0270, (02) 524-4611 loc. 420/413
TERM/SCHOOL YEAR	

COURSE DESCRIPTION

This course demonstrates the development of mathematical thought through basic logical structures and the concepts of classes and sets, functions, relations, partially ordered classes, axiom of choice and transfinite numbers.

COURSE OBJECTIVES

The students will:

1. apply correctly the basic rules of inference;
2. distinguish valid from invalid arguments;
3. understand the basic concepts of set theory;
4. provide an answer to the question “what is a number?”
5. gain an insight into the methods of mathematical abstraction.approach a real problem,
6. Exhibit values that enable the students to:
   - realize the significance of the role each one plays as a member of the universe;
   - develop the ability to think clearly and logically;
   - develop the values of honesty, patience and perseverance.

Topic/Subtopic	Learning Strategies/ Activities	Week/Meeting/ Hours
I. SYMBOLIC LOGIC		
A. Review of the Fundamentals and Algebra of Logic 1. Propositions		3 Hours

Topic/Subtopic	Learning Strategies/ Activities	Week/Meeting/ Hours
2. Logical Operators 3. Tautology, Contradiction and Contingencies 4. Tautological Implication and Equivalence 5. Rules of Replacement	Lecture Class Discussions Problem Set	
B. Arguments 1. Valid and Invalid Arguments 2. Rules of Inference 3. Rule of Conditional Proof 4. Rule of Indirect Proof		5 Hours
C. Quantification Theory 1. Propositional Functions 2. Quantification Identities 3. Quantification Rules 4. Valid Arguments		6 Hours
D. Methods of Proof		5 Hours
II. SET THEORY		
A. Sets, Functions and Relations 1. The Concept of Set 2. Some Basic Notations and Definitions 3. Subsets, Equality of Sets, Empty Set 4. Algebra of Sets 5. Special Sets 6. Ordered Pairs 7. Cartesian Products, Relations 8. Functions (or Mappings) 9. Equivalence Relations and Partitions	Lecture Class Discussions Problem Set	12 Hours
B. Finite and Infinite Sets 1. Definition of Natural Numbers 2. Ordering of the Natural Numbers 3. Mathematical Induction 4. Counting 5. Finite Sets 6. Countable Sets 7. Infinite Sets 8. Cardinal Numbers 9. Schoeder – Bernstein Theorem* 10. Axiom of Choice and its Equvalent Form* 11. Continuum Hypothesis*		14 Hours
C. Partially Ordered Sets* 1. Partially Ordered Sets Posets 2. Types of Ordering 3. Order Preserving Functions and Isomorphisms 4. Lower Bound, Least Upper Bound 5. Duality 6. Lattices 7. Boolean Algebra		
FINAL EXAMINATION		2 Hours

* OPTIONAL

TEACHING STRATEGIES

To achieve the course objectives, a combination of lecture, group discussion and solutions of problem sets will be used.

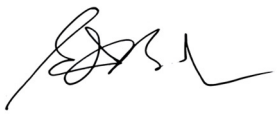
COURSE REQUIREMENTS

- Average of Long Exams 50%
- Final Exam 30%
- Problem Sets 20%

SOURCES

- Bloch, Ethan. *Proofs and Fundametals A First Course in Abstract Mathematics*, Springer London, 2011.
- Chartrand, Gary. *Mathematical proofs : a transition to advanced mathematics*, Boston: Addison Wesley, 2003.
- Copi, Irving. *Introduction to Logic*, Upper Saddle River, N.J. : Pearson/Prentice Hall, 2009.
- Copi, Irving. *Logic: Language, Deduction and Induction,* Singapore : Pearson Education South Asia Pte Ltd., 2005.
- Cupillari, Antonella. *The nuts and bolts of proofs: an introduction to mathematical proofs*, Waltham, MA : Academic Press, 2013.
- Dowek, Gilles. *Proofs and Algorithms: An Introduction to Logic and Computability*, Springer London, 2011.
- Lipschutz, Seymour. *Set Theory and Related Topics*, *Schaum's Outline Series*, McGraw-Hill Education, 1998.
- Halmos, Paul. *Naïve Set Theory*, Springer-Verlag Inc., New York. 1960 (2011 Reprint)
- Hamilton, N. and J. Landin, *Set Theory and the Structure of Arithmetic,* Literary Licensing, LLC, 2012
- Pinter, Charles. *Set Theory*, Addison-Wesley Publishing Company, 1971.
- Rubin, Jean. *Set Theory for the Mathematicians*, Holden-Day, 1967.
- Suppes, Patrick. *Axiomatic Set Theory*, Dover Publications Inc., New York, 1972.

Noted by:



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