



DE LA SALLE UNIVERSITY
College of Science
 Department of Mathematics



INTOSET – *Introduction to Set Theory*

Prerequisite:

Prerequisite to: MODEALG, LINEALG

Instructor: _____
Consultation Hours: _____

Contact details: _____
Class Schedule and Room: _____

Course Description

This is a course covering the principles of symbolic logic, valid arguments and methods of proof; axioms on sets, algebra of sets; relations and functions, the natural numbers finite and infinite sets, cardinal numbers.

Learning Outcomes

On completion of this course, the student is expected to present the following learning outcomes in line with the Expected Lasallian Graduate Attributes (ELGA)

ELGA	Learning Outcome
Critical and Creative Thinker Effective Communicator Lifelong Learner Service-Driven Citizen	At the end of the course, the student will apply the principles of logic to tell sound from unsound reasoning in everyday discourse, and apply appropriate set theoretic concepts, thinking processes, tools and technologies in the solution to various conceptual or real-world problems.

Final Course Output

As evidence of attaining the above learning outcomes, the student is required to submit the following during the indicated dates of the term.

Learning Outcome	Required Output	Due Date
<ul style="list-style-type: none"> Apply the principles of logic to tell sound from unsound reasoning in everyday discourse, and apply appropriate set theoretic concepts, thinking processes, tools and technologies in the solution to various conceptual or real-world problems. 	Any one of the following: 1) A short script (similar to the conversation held at the Mad Hatter's Tea Party in Chapter 7 of Alice's Adventures in Wonderland) showing both good and deliberately poor logic, with an analysis of the validity or invalidity of the arguments in the script. 2) Newspaper clippings, or record of radio/TV interviews of government officials, policy-makers and famous personalities containing valid or invalid arguments, with a proof of validity or invalidity using symbolic logic or set theory.	Week 13

Rubric for assessment

Script				
CRITERIA	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
Logic Content and Analysis (50%)	The script contains in-depth analysis and insightful comments in addition to score 3 performance.	The script contains a variety of valid or invalid arguments and inferences, with correct proofs.	The script contains few valid or invalid arguments and inferences with correct proofs.	The script contains few valid or invalid arguments and inferences, with errors in their proofs.
Creativity (30%)	The script reflects the students' creative expression and imagination in addition to score 3 performance.	The script has an interesting/amusing storyline that is easy to understand and follow.	The script is easy to understand and follow but has few interesting details.	The script is not easy to understand.

Grammar, Spelling (20%)	The script contains appropriate choice of words in addition to score 3 performance.	The script contains no errors in grammar and spelling.	The script contains at most 3 errors in grammar and spelling.	The script contains more than 3 errors in grammar and spelling.
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Newspaper Clippings

Criteria	Excellent 4	Satisfactory 3	Developing 2	Needs Improvement 1
Logic Content and Analysis (50%)	The work contains in-depth analysis and insightful comments in addition to score 3 performances.	The work contains a variety of valid or invalid arguments and inferences, with correct proofs.	The work contains few valid or invalid arguments and inferences with correct proofs.	The work contains few valid or invalid arguments and inferences, with errors in their proofs.
Organization (30%)	The writing contains inputs of original ideas in addition to score 3 performance.	The writing is clear, logical, and coherent.	The writing is clear but lacks logical flow or coherence.	The writing is vague or ambiguous and lacks logical flow of ideas.
Grammar, Spelling (10%)	The work contains appropriate language in addition to score 3 performance.	The work contains no errors in grammar and spelling.	The work contains at most 3 errors in grammar and spelling.	The work contains more than 3 errors in grammar and spelling.
Bibliography (10%)	Multiple and varied citations are given in addition to score 3 performance.	All resources cited	Some of the resources not cited	Majority of the resources not cited

Additional Requirements

- Quizzes
- Final Examination
- Seatwork, Assignment, Recitation, Homework

Grading System

	FOR EXEMPTED STUDENTS (w/out Final Exam)	FOR STUDENTS with FINAL EXAM		Scale:
		with no missed quiz	With one missed quiz	
Average of quizzes & Project	95%	60%	50%	95-100% 4.0 89-94% 3.5 83-88% 3.0 78-82% 2.5 72-77% 2.0 66-71% 1.5 60-65% 1.0 <60% 0.0
Class participation & Lab exercises	5%	10%	10%	
Final exam	-	30%	40%	

Learning Plan

Learning Outcome	Topic	Week No.	Learning Activities
At the end of the course, the student will apply the principles of logic to tell sound from unsound reasoning in everyday discourse, and apply appropriate set theoretic concepts, thinking processes,	I. SYMBOLIC LOGIC A. Fundamentals and Algebra of Logic 1. Propositions and Logical Operators 2. Tautology, Contradiction and Contingency 3. Rules of Replacement	Week 1	Prior knowledge/beliefs survey Problem solving Skills exercises Group/Class discussion Library work

tools and technologies in the solution to various conceptual or real-world problems	B. Arguments 1. Valid and Invalid Arguments 2. Rules of Inference 3. Rule of Conditional Proof 4. Rule of Indirect Proof QUIZ 1	Week 2-3	
	C. Quantification Theory 1. Propositional Functions 2. Quantification Negation 3. Quantification Rules 4. Proving Validity of Arguments Involving Quantifiers	Week 4-5	Prior knowledge and beliefs survey Problem solving Skills exercises Group/Class discussion Library work
	II. METHODS OF PROOF 1. Proving an Implication 2. Proving a Biconditional 3. Proving Existence 4. Proving Uniqueness QUIZ 2	Week 6-7	Prior knowledge and beliefs survey Problem solving Skills exercises Group/Class discussion Library work
	III. SET THEORY A. Sets, Equivalence Relations and Functions 1. Set, Subset, Equality of Sets 2. Set Operations (Union, Intersection, Complement, Difference, Cartesian Product) 3. Algebra of Sets 4. Indexed Families of Sets 5. Equivalence Relations and Partitions 6. Functions (Injective, Surjective, Bijective) 7. Composition of Functions QUIZ 3 B. Finite and Infinite Sets 1. Definition of Natural Numbers 2. Ordering of the Natural Numbers 3. Mathematical Induction 4. Finite and Infinite Sets 5. Countable Sets 6. Cardinal Numbers 7. Continuum Hypothesis	Week 8-11	Prior knowledge and beliefs survey Problem solving Skills exercises Group/Class discussion Library work
	FINAL EXAMINATION	Week 12-13	
		2 hours	

References

- Bloch E.,(2000) *Proofs and Fundamentals, A First Course in Abstract Mathematics*. Boston:Birkhauser
Cupillari A., (1989) *Nuts and Bolts of Proofs*. Belmont, Calif: Wadworth Pub.
Copi I., (1979). *Symbolic Logic (5th Edition)*.Prentice Hall
Eccles P. (1998). *An Introduction to Mathematical Reasoning*. Cambridge University Press
Gerstein L.,(1996). *Introduction to Mathematical Structures and Proofs*. NY: Springer
Lin, Y. and Lin, S. (1998) *Set Theory An Intuitive Approach*, Korea: Kyung Moon Publishers.
Lipschultz S., (1999). *Set Theory and Related Topics, Schaum's Outline Series*. Singaore: Mcgraw Hill

Namilton and Landin, (1962). *Set Theory and the Structure of Arithmetic*. Allyn and Bacon
 Pinter C., (1971). *Set Theory*. Taipei-Taiwan: Mei YA Publication
 Rubin J., (1967) *Set Theory for the Mathematician*. San Francisco: Holden Day
 Schumacha Carol., (2001). Chapter Zero, *Fundamental Notions of Abstract Mathematics (2nd Edition)*
 Boston: Addison-Wesley
 Solow D., (2002) *How to Read and Do Proofs, An Introduction to Mathematical Thought Processes*. N. Y.:
 Wiley
 Vellemen D., (1994). *How to Prove It, A Structured Approach*. Cambridge: Cambridge University Press
 Rotman J., (2007). *Journey into Mathematics, An Introduction to Proofs* . Mineola, N.Y. :Dover Publication
 Inc.

Online Resources

Introduction to Reasoning. Accessed October 10, 2012 from:
http://www.cs.odu.edu/~toida/nerzic/content/logic/prop_logic/tautology/tautology.html
Proof Techniques. Accessed October 10, 2012 from:
http://nicolas.thiery.name/mac358/Notes/2_Proofs/ProofTechniques.html
Proof. Accessed October 10, 2012 from:
<http://www.math.uncc.edu/~droyster/math3181/notes/hyprgeom/node18.html>
 Hutchings, M. *Introduction to Mathematical Arguments* Accessed October 10, 2012 from:
<http://math.berkeley.edu/~hutching/teach/113/proofs.pdf>

Class Policies

1. The required minimum number of quizzes for a 3-unit course is 3, and 4 for 4-unit course. No part of the final exam may be considered as one quiz.
2. Cancellation of the lowest quiz is not allowed even if the number of quizzes exceeds the required minimum number of quizzes.
3. As a general policy, no special or make-up tests for missed exams other than the final examination will be given. However, a faculty member may give special exams for
 - A. approved absences (where the student concerned officially represented the University at some function or activity).
 - B. absences due to serious illness which require hospitalization, death in the family and other reasons which the faculty member deems meritorious.
4. If a student missed two (2) examinations, then he/she will be required to take a make up for the second missed examination.
5. If the student has no valid reason for missing an exam (for example, the student was not prepared to take the exam) then the student receives 0% for the missed quiz.
6. Students who get at least 89% in every quiz are exempted from taking the final examination. Their final grade will be based on the average of their quizzes and other prefinal course requirements. The final grade of exempted students who opt to take the final examination will be based on the prescribed computation of final grades inclusive of a final examination. Students who missed and/or took any special/make-up quiz will not be eligible for exemption.
7. Learning outputs are required and not optional to pass the course.
8. Mobile phones and other forms of communication devices should be on silent mode or turned off during class.
9. Students are expected to be attentive and exhibit the behavior of a mature and responsible individual during class. They are also expected to come to class on time and prepared.
10. Sleeping, bringing in food and drinks, and wearing a cap and sunglasses in class are not allowed.
11. Students who wish to go to the washroom must politely ask permission and, if given such, they should be back in class within 5 minutes. Only one student at a time may be allowed to leave the classroom for this purpose.
12. Students who are absent from the class for more than 5 meetings will get a final grade of 0.0 in the course.
13. Only students who are officially enrolled in the course are allowed to attend the class meetings.

Approved by:

Dr. Arturo Y. Pacificador, Jr.

Chair, Department of Mathematics